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Beyond SmartCities: Creating the most Attractive Cities for Talented Citizens

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Estética: Imaginación-Verdad-Razón

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La imaginación necesaria: fundamentación y aplicaciones de la teoría de los mundos posibles.

The necessary imagination: possible worlds theory foundation and applications.

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Beyond SmartCities: Creating the most Attractive Cities for Talented Citizens

ABSTRACT

Main Challenge for modern Cities is how to become Attractive enough to retain brilliant brains and attract talented citizens and investors. Citizen is placed at the City center, with Data, and Artificial Intelligence as new advanced service enablers.

José Antonio Ondiviela Garcia

April 2020

Foreword

To my family, Conchi, Patricia and Toño, which allowed me to steal massive time from them to write this. Hope the impact compensate them these two years' work.

To my company, Microsoft, which kept me trained on latest technology, and also taught me on how much human values, ethical principles and environmental sustainability can be matched with technology innovation.

To my beloved Cities, magic places for human social development and solid foundations for mankind future dreams.

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0. Intro.

0.0 Why this research

I travel a lot due to my job, and that allows me to visit many countries and observe why people move and what motivations have pushed them to go to that particular city. I love cities, I think they are the most important physical creation that mankind has ever done. If we were to show an alien the brightest man-made realizations, we would definitely include quite a few cities. But I also see antihuman cities, chaotic, amorphous, meaningless agglomerations and even bad for human development because instead of stimulating it, they block and null it.

I am an engineer and also a humanist. Through my job, countless technological proposals pass through my screen to improve cities efficiency, with technology applied to their development. All of them explain the benefits, savings and advantages for city managers (the customers), but none talk about what they bring to citizens, to people.

I also have some urbanist friends. They explain me the same pure technological approach made at designer's offices, with thousands of architects creating buildings with CAD computer tools, not paying a minimal attention to who is going to live/work inside those geometric boxes. We talk a lot about SmartCities, but are we helping citizens to become SmartCitizens? My experience in buildings designed by famous architects is poor. They are wonderful on the outside, on the design plane or in a photo, but uncomfortable and almost uninhabitable inside. Perhaps the problem is that nobody talked to those buildings end users and asked about their preferences. The same happens to me with many technology projects applied to city management. They mean an important advance in efficiency and significant savings, but few are based on thinking or asking citizens about their uses, customs or priorities.

That is why I decided to try to connect the good use of technology with human development, all within the place where the great collective human innovations are cooked, where the social animal that we are, finally manages to be, in fact, social: the city.

Cities are currently the epicenter of human activity. In a context of global stability (economic, military / peace), cities lead innovation and human development. We live, indisputably, at the best moment in the mankind history. Technology allows us to increasingly dominate our world/environment and enjoy a longer and more comfortable life, but we must not idolize it. Technology helps us, but its development and execution base is, we must remember this, just human, so it won't respond to all our needs and, of course, it is useless to answer our fundamental, existential or transcendental questions.

Cities are the citizens' closest administration. This is good from the efficiency point of view at the public services provision, but it needs a constant adaptation to the citizens' needs, to connect with them using their language, communication mechanisms and habits. The city must be a partner that helps, that facilitates human activity, and this means a great challenge.

There are big issues that impact citizens and that the city is called to work out. In its position of 'latest administration' in front of the citizens, it also has the execution capacity and effective services provision. But, unfortunately, cities do not have enough resources or budget to respond to all those challenges. Here is where technology provides an enormous benefit: it fundamentally reduces problems, makes them more manageable and allows scarce economic and human resources to be more effective.

When I talk to politicians and especially to Mayors, I honestly feel some compassion for them. Next year's challenges they will have to face are so complex and society impactful that regardless what they do, they will be harshly answered, as the first administrative visible face to slap, incapable of solving them, but please, keep trying!

Cities are embarked on a struggle to retain and attract talent. This is fundamental if they want to play a role in the 4th industrial revolution, or simply languish on an aging social structure, until they disappear? Yes, this scares us, but we have just to look at archeology to understand that cities also die. The people aging, the Industry 4.0 and the predominant role of 'creative class', the people virtual privacy, and our planet sustainability are huge issues, where the city decisions will be fundamental, and where its success capacity strongly depends on its geoposition, area of influence or associated civilization. There are many other super important issues such as

urban mobility, physical security, social services, participation and city co-creation, decarbonization, culture, urban planning, ... where the city can play a much more active position, deploying technology and obtaining visible and tangible results that impact the city prosperity short-medium term.

So, a City is a very complex dynamic model. If you are good at Math's, let me tell you that a city is a NP-complete problem, because as you add more variables linearly, the complexity or time to resolve situations increases exponentially[1]. Some experts like Dan Doctoroff (NYC former deputy mayor, now Toronto's Sidewalk Labs' CEO) says that, "*cities are always going to be immensely complex human organisms to manage, likening the challenge to trying to solve a 50-sided Rubik's cube*"[2]. Understanding what can be done and setting priorities trying to anticipate the consequences is really tough and our city managers need help, mainly massive data from city facts, Artificial Intelligence algorithms and analytic tools to obtain insight from it and an almost permanent interaction with citizens to make best- and better-informed decisions.

My friend Pablo decided to move from Madrid to Singapore last year. At his farewell party, I asked him why, and he described me his list of motivations: good job, high salary, low taxes, safe city, excellent urban mobility, good on-the-job training, excellent conditions for a single no-dependencies (children or elder people) 25y digital nomad. He also explained what he didn't like: type of government, some local customs, weather, distance…but he considered this as a 2-year investment into his professional career, improving skills, understanding the rampant Asia/Pacific market, then come back home with an brilliant CV and money to buy a house.

My colleague Juan told me the other week about his decision to leave the company and come back to his birthplace, where his wife is highly appreciated as a master on creating and designing local folk culture dresses. So, he preferred to prioritize his wife career, work for a mid-size company and make half the wage, but in a city which lifestyle is much cheaper than Madrid and where he will enjoy a wonderful

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[1] GAREY, M. and JOHNSON, D., *Computers and Intractability; A Guide to the Theory of NP-Completeness*, 1979 W. H. Freemand and Company, San Francisco, CA

[2] THORNHILL, J. "Smart cities still need a human touch". *Financial Times*, published Aug 2019 p.2 https://www.ft.com/content/67c52480-b51f-11e9-8cb2-799a3a8cf37b retrieved by Aug 2019.

life with his wife and daughter. So, a good job is not always the main driver to move.

Around 50.000 qualified professionals left Spain during past 2010-2014 crisis.[3] Engineers to Germany and North Europe Countries, nurses to UK,..all emigrated to find a good job, with home at just 2h flight and always looking back, or not. If each one is a public University graduate, with an associated training public funded cost of 5k EUR/y x 4y avg, imagine the mega lost for Spain, not only in terms of brains, but on investment (1b EUR). Many are already returning.

These situations made me think about the competition for talent in this early 4th Industrial revolution and the role of cities in that global contest.

So, I decided to dedicate this research to understand what's making and what's needed to make a city attractive for these talented citizens. There are many partial approaches, research studies about employment, safety, happiness, expat treatment, economy, cost of live, but none is trying to give talented citizens an integrated vision on this new world of cities.

0.1 Objectives

Main Thesis Objective:

The objective of a thesis in the field of Humanities is always knowledge, from which practical consequences can be derived. Therefore, our main objective is how, within the 4th Industrial Revolution framework, the city is competing to become more attractive to talent, what elements define and improve that attractiveness and the available options to transform the city in that sense. The practical consequences are twofold:

1.- Help citizens to choose the best city in the world to realize their full potential, realize their goals as a citizen and person, and make the greatest possible contribution to the society.

[3] FITA, J. "El talento emigra de España". *La Vanguardia*. 2013 https://www.lavanguardia.com/vida/20130505/54371747713/el-talento-emigra-de-espana.html retrieved by March 2018.

2.- Advice majors and city managers on how to create the most possible attractive city to retain and attract talented citizens and build a more prosper, innovative, fair and human city. Help them design, prioritize and implement a:

- Long-term Transformational Plan
- Short/Mid-term Improvement/Integrated Plan

0.2 Thesis material vs formal Objects

The material object is the city. The city as a destination, as a meeting place, as a platform for human development. And also as an entity that struggles to have a global relevant role in the 21st century, where thanks to technology, change is the new ruling constant and this change has an accelerated speed that we had never experienced before, so decisions must be taken fast, as much as its consequences. Error margins are consequently smaller and technology aid is even more crucial. No action is not an option. Non-action means that you have lost the train of the new economy and innovation, you are just past history.

The Thesis formal object is the perspective that I will use (‘quod’). It is the City Attractiveness. It is what made Pablo, Juan and many others decide to migrate to another city. It is about studying the reasons for that decision and learning from them to improve the current city status. It is about attractive cities in the sense of attractant or magnetic, dazzling, cost effective, convenient, abundant in conclusive decision maker elements. And the plan is to drill down on those elements that are making a city more or less attractive and analyze their impact. Then create a model (a basic reduction, simplification and conceptualization of a very complex reality) and compare the main world cities against it.

0.3 Thesis Research Discipline

The scope of the thesis is multidisciplinary. Since talent moves where innovation raises, it is clear that in order to attract it, leadership on new technologies development and implementation is necessary. It is about valuing technology as an enabler from a humanistic perspective, evaluating its impact on the city not only from a performance or economic points of view (merits), but from an ethical and

social one, always based on extreme human dignity respect. Talented citizens are attracted to technological innovation, but they are human at last, and therefore, there are other city aspects that make it attractive or not, such as its inclusiveness, equality, ethics, human values, identity, creativity, etc.

Therefore, the view to use will be that from a drone flying over the thin bridge that links current technicality and western humanism, adding sociology, aesthetics, anthropology without losing sight of urban planning, process management and geopolitics as well.

Technology is the main enabler, and the base concept to be described in the Thesis is how technology could help transform our cities to prepare them to tackle (or at least improve) the main XXI Century cities challenges that lie ahead.

0.4 Thesis Main Hypothesis

Main City Challenges which can be addressed with technology are:

- Impact of Industry 4.0. Rise of 'Creative Class'.
- People Aging. How to maintain welfare society without increasing costs, taxes
- Power shift to Data. Controlling the World. Sensoring. Internet of Things (IoT)
- Citizen at Center: Communicating/Listening to citizens (Social Networks, Online). SoftPower (opinions, trends). City Co-Creation.
- Urban Mobility = Cities' blood. Traffic, Intelligent transportation.
- Safety. Threats (Terrorism, Natural Disasters). Resiliency.
- Citizens Trust (CyberSecurity, Privacy, Compliance, Transparency). GDPR (European Union General Data Protection Regulation)
- Environmental Sustainability (Energy Efficiency, Water Care, CO_2 Emissions reduction-Carbon Neutral). Circular Economy
- Needed Financing. Avoid Taxes Fraud. Cashless Cities

Disruptive new technologies show up into these scenarios. They can help or even add more complexity: 5G high-speed Networks, Autonomous Cars, Batteries increasing capacity helping to electrify / decarbonize, Sensoring Homes,

omnipresent Artificial Intelligence to understand all this huge amount of data, 3D Printing for any physical thing, to mention the most impactful.

7 Main postulates

1. Cities are taking the key role as Centers for Human Development. There is a hidden, bloodless, but fierce competition to attract the 'creative class' people, those who will rule the Innovation led by 4th Industrial Revolution.

Technology is again the vital aspect of the SmartCities conversation, but Cities that focus and design technology around their people will be more prepared for the inevitable future.

2. City Prosperity recipe = 3T's (Technology, Talent, Tolerance)
3. 4th Industrial Revolution is about Artificial Intelligence/Robotics. Artificial Intelligence (AI) is made of Massive Data (from IoT world, social networks) + Computing Power (from large Cloud Datacenters) + Algorithms (made by Talent, again to understand, predict, analyze, visualize, speak, obtain insights, real-time react,…). No city leads this revolution, but none wants to be left behind, so competition for talented citizens is even more crucial.
4. SmartCities approach uses Technology to transform/improve Cities and make them more Attractive for talented citizens.
5. City Attractiveness = City Magnetism x City Profitability (yield)
6. City Magnetism. Conditions that make you like/love the City.

Mostly permanent, slow movers / not easy to quickly change/evolve conditions that impact you emotionally. To significantly change them, you must invest on a City Transformation Plan along 10+ years.

7. City Profitability (Yield). Conditions that make you value the City Performance. It's a balance between give's and get's. It's relatively easy and quick to impact. Problem is how to prioritize, integrate all performance components into a comprehensive strategy. You should invest on a City Improvement/Quick Transformation Plan along 2+ years. This is the main rational component.

City Profitability (Yield) is made of Services that you receive from City compared to the associated Cost of Living in that City = CITIZENSHIP CONTRACT

0.5 Research Methodology

There are some basic well-known sources of inspiration, coming from some books like Schwab, K. talking about 4th Industrial revolution, Prof. Florida and his famous 'Creative Class' concept, linked to the 4th Industrial revolution paradigm. Urbanists like Jane Jacobs explaining why cities which don't work for and listen to citizens are leading to a chasm; Jan Gehl as best modern urbanist, reshaping Copenhagen as a model to follow, and some few other like Rem Koolhaas explaining how much unhuman a city can become (Generic City)[4]. Good inspirations came from the Philosophy background: Aristotle, Plato, Julián Marias, Ortega y Gasset, and the city and circumstances where Wittgenstein lived (Vienna, end of XIX Century). Main concepts about Ethics, Aesthetics, Anthropology, Arts have been fundamental to understand why these city challenges are so relevant.

All other hundreds of references come from Internet, and most are dated less than 5 years ago, so the explained concepts and issues are hyper current and realistic.

There are tons of info about SmartCities coming from the 50 main companies trying to sell their solutions. But most of this info is technical, made of architectural descriptions, and use cases, not explaining the root causes, problem tackled and results or benefits for the citizens, not just for the Information Technologies department (customer who directly pays for those solutions)

Working model will be based on Bibliography, International Congresses, and other related sources of information (mainly Internet).

A model is built for top 140 most attractive world cities. Plan is not to create another ranking. Cities hate rankings, except the one who leads it. As the Attractiveness concept is quite personal, and the most attractive city for an individual may be not so attractive for another, depending on their different scale of values to weight the city performance indicators, different aesthetic or personal preferences (mountains or seashore or both, spoken languages, religion...), and personal status (family dependencies, children, elder people at their charge…). The model allows comparisons between cities in the same geo cluster, obtains a single city

[4] KOOLHAAS, R. *Acerca de la ciudad*, GG, Barcelona, 2014 from "The Generic City" Domus, núm. 791, Milano, 1997 pp. 8-12

Attractiveness radiography to prioritize areas to improve, and provides a list of cities that best fit one citizen values and preferences.

Cities Sample Size and Selection Criteria

Main Most Attractive 140 World Cities.

- Selection Criteria: Top at Quality of Living (Mercer)[5] AND Cities in Motion (IESE)[6] AND scoring over 50 (no personal risk or severe living restrictions) at Global Liveability Index (The Economist)[7]
- Like any good/useful set of indicators, all info included from external studies/rankings must comply with some basic principles: It must be benchmark-able, repeatable, data acquisition cost trending to zero, facts/data-based (no surveys, rumors, opinions, subjective topics), relevant, fair, manageable, so we can compare apples to apples (based on cities on same situation), and dynamic, as the city changes and a new indicator could show up and better describe one particular topic.

City Magnetism model

- 67 Indicators (Self-made from open sources or Selected from Universities, International Bodies, Key Actors already published Studies/Analysis)
- Each selected City SmartCity (140) Status Analysis from City Web, SmartCity published Plan.

City Profitability (Yield) model

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[5] "Quality of Living Mercer Index". *MERCER*. 2018 https://mobilityexchange.mercer.com/Insights/quality-of-living-rankings retrieved by March 2018

[6] IESE. 2018 Cities in Motion Index. IESE. https://media.iese.edu/research/pdfs/ST-0471-E.pdf retrieved by March 2018

[7] "Global Liveability Report." *The Economist*. 2018 https://store.eiu.com/article.aspx?productid=455217630 and https://www.eiu.com/public/topical_report.aspx?campaignid=liveability2018 retrieved by March 2018

- 33 Indicators (Self-made from open sources or Selected from Universities, International Bodies, Key Actors already published Studies/Analysis)

So, total number of evaluated indicators is 100, but many of them include a large number of subindicators, raising the total number of analyzed city dimensions to around 500.

Research. Surveys run to check model accuracy.

- Survey to 4.500 NordicEdge event[8], Stavanger (Norway) Sep2018 attendees. Largest SmartCities event in the Nordics.
- Survey to 21.334 SmartCity Expo & WW Congress[9], Barcelona Nov2018 attendees. Largest SmartCities worldwide event. Data to tune weights on Magnetism and Performance.

Model Reliability

- Medium on City Magnetism. High on Profitability.
- Intention is not to develop a Scientific Analysis, but a Human Sciences Study. Main topics will be weighted from Citizens input. Results will vary from Citizen to Citizen or different life status (age, dependencies)
- Model obtained from two surveys should achieve: 95% Confidence, <5% Error

Proposal Innovative Characteristics

First time ever (not found in any literacy or web info) discussion about: City Attractiveness components (Magnetism, Profitability), Citizenship Contract concept. First time all SmartCityExpo participants are asked to range their preferences about what is their most Attractive City.

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[8] NordicEdge. Stavanger. https://www.nordicedge.org/ retrieved by March 2018

[9] SmartCity Expo. Barcelona. http://www.smartcityexpo.com/en/home retrieved by March 2018

0.6 Key words

SmartCities, Citizen, Talent, Technology, Tolerance, Cloud, AI (Artificial Intelligence), IoT (Internet of Things), Data, Industry 4.0, Urban Mobility, Social Services, City Sustainability, Circular Economy, Autonomous car, CyberSecurity, Privacy, GDPR, Social Listening, Citizen Services, City Safety, Ethics.

1. Cities in the XXI Century. Main Challenges.

1.0 Intro. Era of Cities

We celebrated in 2019 the first century after the end of First World War with the Treaty of Versailles, and that marked the end of the old empires. The end of WWII with the Yalta and Potsdam conferences constituted a world made of countries, and the birth of the United Nations as a global countries' organization. Now, at the beginning of the 21st century, we are spectators of a new era: The Age of Cities.
"*The 19th century was a century of empires. The 20th century was a century of nation states. The 21st century will be a century of cities."*, said Wellington E. Webb, former Mayor of Denver, US, at a meeting in Colorado, 2000

Urbanization Process

For the first time in history, more than half of us live in cities—a global population of 4 billion people live today in cities. Urban and rural population matched by 2007[10], today urban has achieved 55%, and by 2030, city population will double to 6.5 billion people (same as adding 3 Brazils and one new China), or 70% of total world population.[11]
This is creating the concept of MegaCities (or cities over 20 M inh) and its continuous rise. According to UN[12], by 2030, the world will count with 43 megacities, from just 2 in 1950. Fastest-growing urban agglomerations are cities with less than 1 million inhabitants, most located in Asia and Africa. By 2028, there will be close to 500 cities larger than 1 million people inh[13]. From every eight living people today, one lives in a MegaCity, 3 in large cities, and four (half of total) live in smaller than 500k inh settlements. We are building collectively the equivalent of

[10] GLAESER, E. *Triumph of the City*. The penguin Press. New York 2011, p.1
[11] RHODAN, M. "UN: Number of City-Dwellers to Double by 2050" *TIME*. Published Dec. 09, 2013 http://world.time.com/2013/12/09/un-number-city-double/ retrieved by July 2018

[12] "2018 Revision of World Urbanization Prospects" *United Nations* https://www.un.org/development/desa/publications/2018-revision-of-world-urbanization-prospects.html Published May2018, retrieved by July 2018
[13] "Governing Cities" *OECD* http://www.oecd.org/gov/cities.htm retrieved by January 2018

another NYC every month, and the pace will continue for the next 40 years. In this next 40 years we are going to build as many cities as in all our past human history.[14] Since the beginning of civilizations, men have gathered in cities to obtain the benefits and synergies of living together. As cities have become more attractive and more competitive in the various industrial revolutions, they have attracted more citizens from the rural environment. The performance of a city and its prosperity are not only a matter of population, but of a talented population, the one that generates wealth by developing the latest innovations and technological advances. By becoming the engine of the economy and human development, it is easy to understand the correlation between Urban Population and GDP / Capita shown in Figure 1.

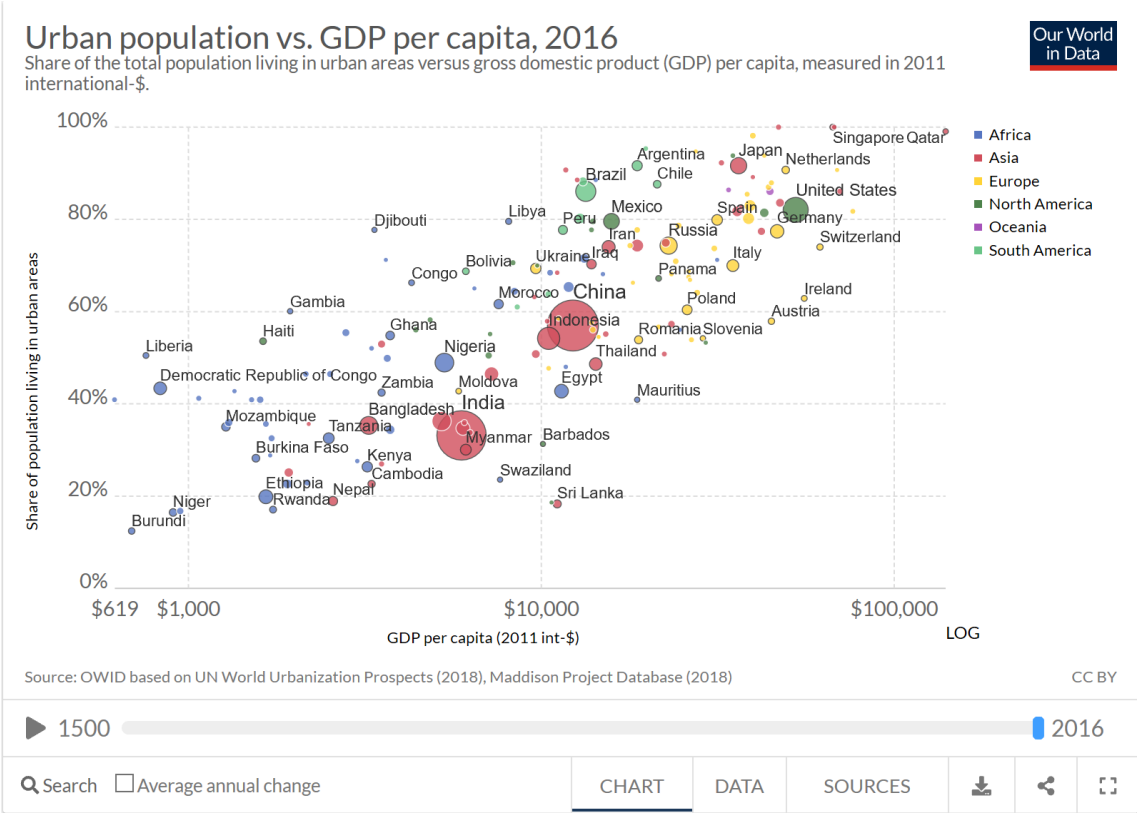

Figure 1.- Correlation between Urban population Share and GDP/Capita[15]

[14] GATES, B. and GATES, M. "Our 2019 Annual Letter. Things We Didn't See Coming" *Bill & Melinda Gates Foundation*, published February 12, 2019, https://www.gatesnotes.com/media/AL2019/PDFs/2019AnnualLetter-EN.pdf retrieved by April 2019

[15] RITCHIE, H. and ROSER, M. "Urbanization" *Our world in Data* https://ourworldindata.org/urbanization published by Sep2018, retrieved by January 2019

Cities are nerve centers of economic growth, social interaction and innovation. Today, 1.5 billion people are living in the top 600 largest urban agglomerations, which are responsible for nearly 60% of the gross world product (GWP). We can find that now 80% of total World wealth is generated in the cities[16]. Cities consume 75% of the world's natural resources, use 80% of the global energy, and produce 75% of the global carbon emissions.[17] In 2014, 41% of total US energy was consumed in residential and commercial buildings alone.[18]

Urbanization is happening very quickly and by a way that we did not anticipate a few years ago. It was thought that by digitalizing the cities and our daily lives we would observe a dispersion of the population in the territory, slowing down at least the process of urbanization, with people not needing so much direct human contact. On the contrary, when we digitalize, we are experiencing the acceleration of urbanization. What happened? First, let's understand that half of the human population lives in Asia and China. With the increase of middle class in Asia, its purchasing power has increased, and this is producing a social transformation, calling the population to the cities. We can also appreciate this on the increase of Asian tourism. The classic or industrial urbanization, linked to production and factories, and led by China, with its 5 special development zones has meant an increase of some 600 million people living in urban areas. But there is another contemporary urbanization not linked to industrialization: it is that of Africa. Africa has around 1b inh today, planning to reach 2b by 2030 and no less than 3b by 2040. This African urbanization has the same pace as that of China, but is not driven by industrialization or by employment or work, but by information technology, mainly mobile technology, revolutionizing African society, with citizens equipped with smartphones and with the African telcos growing wildly. We could say that Africans are urbanizing and growing their cities to get mobile coverage... Bill and Melinda Gates explained in a meeting that the key to development in Africa is to provide women with a smartphone, with which they can access the world of culture.

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[16]"Harnessing urbanization to end poverty and boost prosperity in Africa" *World Bank*. 2013, http://documents.worldbank.org/curated/en/710431468191672231/Harnessing-urbanization-to-end-poverty-and-boost-prosperity-in-Africa-an-action-agenda-for-transformation retrieved by July 2018

[17]"The weight of cities" *UN environment programme* http://www.unep.org/news-and-stories/story/weight-cities retrieved by 1 July 2018

[18] US Energy Information Administration http://www.eia.gov/tools/faqs/faq.cfm?id=86&t=1 Retrieved by 1 July 2018

If we take into account that the Cameroon population average age is less than 18 years and we compare it with the European one (around 44 years) then we will immediately realize that African citizens are called to populate the rest of the world and the Chinese to manufacture the necessary technology (already 70% of smartphones and 90% of computers are manufactured there). But this African urbanization is very poorly planned and means that 65% of sub-Saharan housing are slums. The Africa's main problem is the bad planning and the absence of an African plan into the main power's agenda (US, Europe) fundamentally. We already know the disasters of poor planning if we look at Mexico City or Cairo. We have already learned the consequences of poorly urbanized territories or suburbs, as incubators of the worst extremist danger. Out of those suburbs came the uprising of the Arab Spring, or without leaving Europe, the terrorists who attacked in Brussels came out of the worst suburb of the city.

But the value of urbanization is indisputable. The greater urban density leads to greater prosperity and wealth. It is obvious that converting 1 m2 of land into 1 m2 of urbanized city space raises the value of the property, but the city must bring there the necessary services and utilities and this implies a cost. If we compare the municipal budget of an European city (around 1000 EUR/Cap/y) and compare it with the one in Nairobi (only 6 EUR/Cap/y) then we will realize the kind of urbanization that we can do in one place or in other. If the value created when urbanizing is greater than the cost of urbanizing, this topic turns into a mere question of speed. The great value to society comes from the generation of wealth that brings proximity between people. From the beginning of the urbanization of our planet, it is clear that humans find synergies, savings, advantages and opportunities by living together, and the space where they live together is called a city. The value of this land changes and is increased by two factors: one the real estate value, which depends exclusively on its location within the city, and another value of agglomeration, due to the proximity of factors of production, talent and cultural development and scientist. A new one is added to the traditional production factors (land, capital and labor): information. This turns cities into huge information hubs, with massive data generation and consumption, in parallel on the traditional industrial urbanization. Thus, the city will play a fundamental role in the post-Industrial era, or in the so-called 4th Industrial Revolution. This is driven by the

new economy not only managed by industrial development but by the information economy; by the digital revolution that involves the connection of billions of things to the network (Internet of Things or IoT); by the Green economy as the only solution to curb climate change and make its consequences only serious and non-lethal; and by a new form of production called Artificial Intelligence and Robotics, which will take advantage of the cloud computing (Cloud) technical means (massive computing, data storage and data analytics power) so that talent (and not capital or land) can generate new business models.

Urbanization is inherently good from the point of view of planet caring: Apart from the synergies that human beings achieve by living in community in a city, from an environmental point of view, a person who lives in a city causes less impact on the environment than a person in the countryside. The city inhabitants use their cars less because they have an efficient public transport and consume scarce resources such as housing, health services, water and energy more efficiently.

In this context, the city is our life's natural space, it is our nest, and citizens increasingly see the state or nation as a more distant instance, preferring to pay taxes to the city as they perceive a more direct return in the services they get. This talent, as part of human capital, is distributed grossly by DNA throughout the world population, it's solidified and developed into universities and is socially constructed in the city. We can say that talent is urban, and approaches the city and develops there, and the greater the city is, the more it attracts talent, and the greater its capacity to generate culture and innovation. It is said that to maintain an Opera house you need to have a population of more than 5 M inhabitants. Ok, but we see people returning to the rural space... true, very few rich people are returning to enjoy the nature, although they do not live from the countryside or in agriculture, and they always have the means to go to the city whenever they need it. As the former mayor of Bogotá, Enrique Peñalosa once said. "*A developed and advanced city is one in which the poor have a car and the rich go by bicycle*".

Urban planning was formerly very bureaucratic and complicated, now it is multidisciplinary in technologies and people. You have to think about the citizens from the very beginning. How could anyone has thought that the enormous internal distances in Brasilia were good for their economic development? Quite the

opposite. The density is a good indicator of development, and same is size. The average salary is related to the size of the city and this situation does not change with the technological revolution. Mid-sized cities concept works well provided they have an adequate density, excellent access to information technologies and placed into corridors of cooperation with other similar or larger ones.

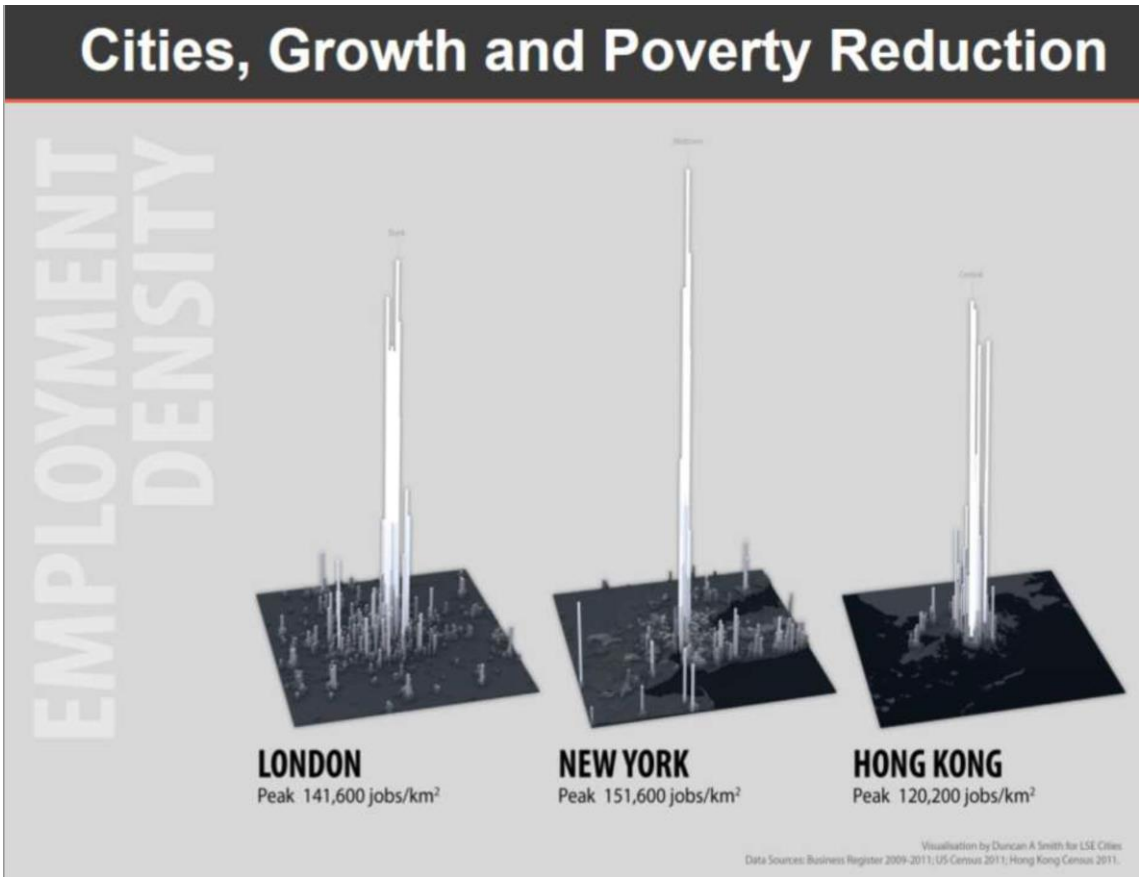

Figure 2. Impact of density. Visualization by Duncan A. Smith for LSE Cities. Data sources: Business register 2009-2011. US Census 2011, Hong-Kong Census 2011.

Anna Wellenstein, Director, The World Bank explained that concept in the SmartSuisse meeting at Basel (Switzerland), 2018 with Figure 2.

Urbanization is even good for climate change, since the energy consumed/cap is lower in the city than in the countryside, making our cities and countries more sustainable in order to consume less resources than those capable to generate.

Rapid urbanization is adding pressure on cities' aging infrastructure from transportation, safety, communications, to the environment (water, energy), and housing, health and social services. Citizen's trust on emergency and safety forces has decreased due to cases of improper use of force and jihadist terrorism.

Cybercrime is soaring, taking advantage from the massive use of social networks, easy access to massive impact technologies and low associated costs.

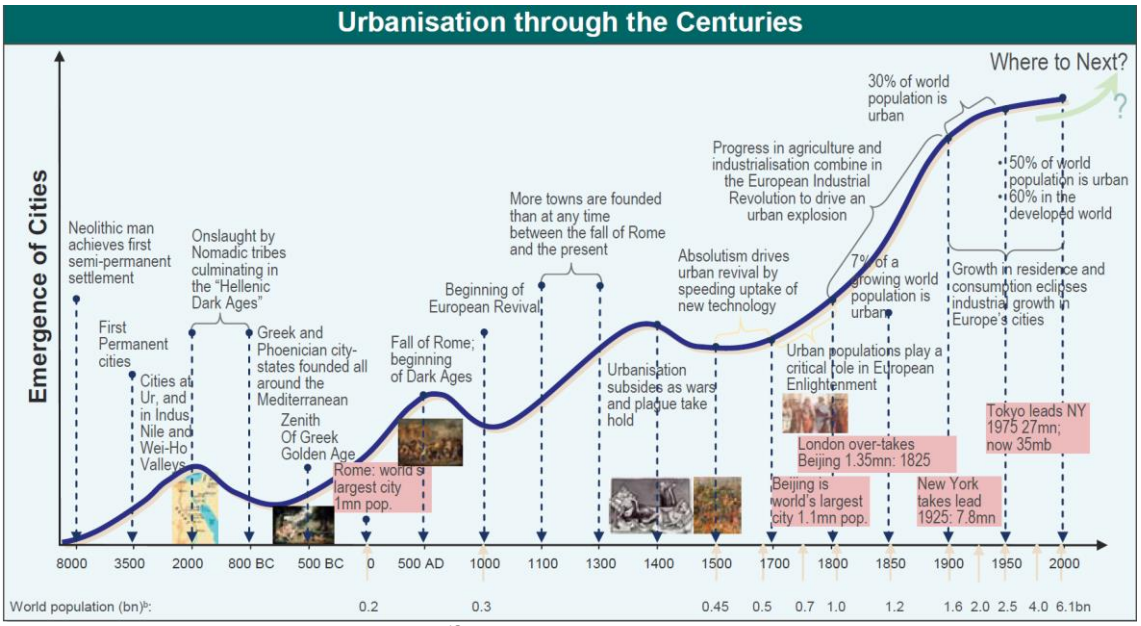

Figure 3. Urbanization through the Centuries. [19]

Healthcare burden have been on the rise around the world in the face of rampant public debt, stalled budgets, greater people aging, and increase of life expectancy. Although the definition of Millennial is not clear, assuming that it gathers those born from 1980 to 1996, it is pointed to a group of 1.7 billion people who can decide which is the ideal city to develop their potential. They are citizens of the world. The revolution and the price lowering of the means of transport makes possible the easy movement of population that does not have problems with immigration. I talk about talented citizens, with language skills, citizens that every city desire to retain and attract, with the aim to thrive and generate wealth. Find below a comparison between Millennials and its evolution: Generation Z. While I consider these differences as a nice curiosity, the main fact here is the unprecedented amount of people eager to explore the world, move to the best city to develop their full potential on one hand, and a fierce competition from main cities to attract those talented citizens on the other. An incredible demand vs supply people motion at global level. Main characteristics are mobility capacity, native use of technology, languages knowledge, lack of strong family or country roots, desire to grow (money, power or even notoriety), and cultural barriers abolition. All these factors

[19] "Urbanization thru Centuries" *CapGemini* https://www.capgemini.com/ Retrieved by Jan 2007

pave the way for a continuous flow of talent all over the world. [20] More than 80 percent of millennials believe that SmartCity technologies are positively impacting our lives. The number of current millennials is estimated on 1,7 billion, so it's a strong force asking for better places to live. "*Every ounce of logic says technology should have whipped geography by now, flattening the world*", in Thomas Friedman's words, by allowing people to live anywhere and still stay engaged and connected in the global digital economy. But place matters, and the decision about where to live is not only determined by the technology access. Millennials prefer specific cities with compelling attractive reasons behind.[21]

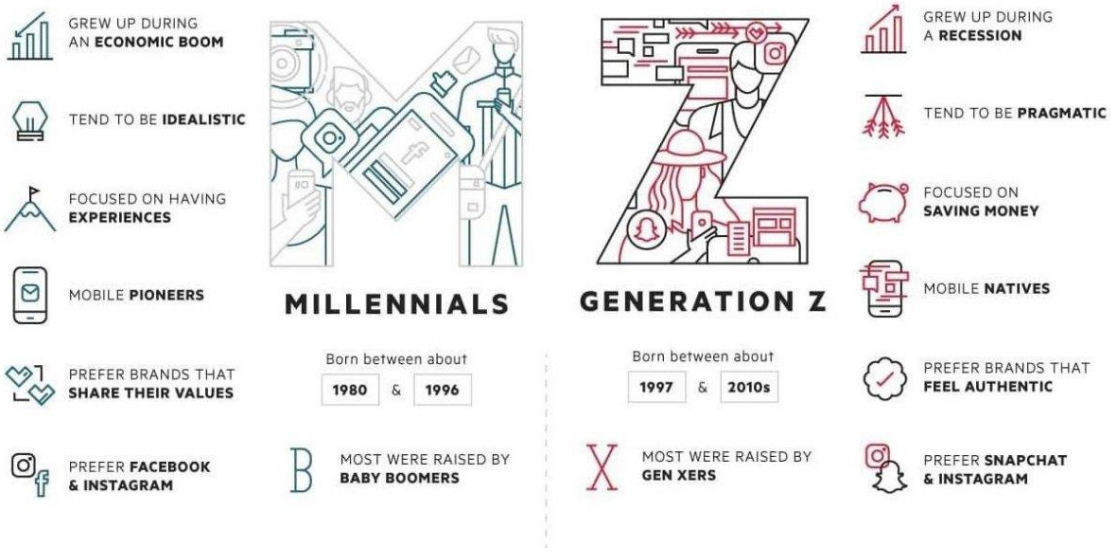

Figure 4. Meet Generation Z: The newest member to the workplace. Visualcapitalist[22]

While there is not an exact consensus, we can describe these live generations:

- Generation Z: Born 1997-2012
- Generation Y or Millennials: Born 1980-1996
- Generation X: Born 1965-1980
- Baby Boomers: Born 1946-1964

[20] DESJARDINS, J. "Meet Generation Z: The newest member to the workplace". *Visualcapitalist*, Jan2019, https://www.visualcapitalist.com/meet-generation-z-the-newest-member-to-the-workforce/ retrieved by 1 February 2019

[21] MANEY, K. "Why Millennials Still Move to Cities" *Newsweek*. Article, 30 March 2015. https://www.newsweek.com/2015/04/10/why-cities-hold-more-pull-millennials-cloud-317735.html retrieved by July 2018.

[22] DESJARDINS, J. "Meet Generation Z: The newest member to the workplace". *Visualcapitalist*, Jan2019, https://www.visualcapitalist.com/meet-generation-z-the-newest-member-to-the-workforce/ retrieved by 1 February 2019

- Silent Generation: Born 1925-1939
- Lost generation: Born before 1925

A good description of these segments can be found at SocialMarketing.[23]

And watch out next generation Alpha, as first generation completely born in XXI Century. Those born after 2010 have always been fully connected, fast data demanding, diversity – multicultural respectful, best educated generation ever and big taxes payers for previous generations retirement…[24]

Cities Transformation

After listening to the latest breaking news on the smartphone, a citizen gets notice from an augmented reality application that the building in front of him is a former Palace, now refurbished as the City Hall. He decides to apply for a census certificate because the University is asking him for and enters the building. To his surprise, he must handwrite some forms and papers, identify himself with his IDCard or Passport and wait some days for the Napoleonic-era-dated approval bureaucratic process to be finished and obtain the requested certificate by paper mailed at home. This is still the current situation in many of our cities. You can perceive the contrast between our digital citizens and the way they use technology with some still existing ways to connect and receive city services. But things are changing very quickly with new technologies as disruptive enablers.

Our cities are facing XXIst Century Challenges,

Responding with XXth Century tools,

Managed by XIXth Century bureaucratic Processes,

Based on XVIIIth Century Institutions.

I have drafted this numeric game to illustrate the modernization challenge. Historical reasons, reluctancy to change, traditional immobilism are stalling the process, but technology is helping to gain lost time and update city services in a

[23] "Marketing. Research. Strategy." *WJSCHROER* http://socialmarketing.org/archives/generations-xy-z-and-the-others/ retrieved by August 2018

[24] PERANO, U, "Meet Generation Alpha, the 9-year-olds shaping our future", *AXIOS*, published by Aug 2019, https://www.axios.com/generation-alpha-millennial-children-63438b10-6817-483e-8472-38810df77880.html retrieved by Aug 2019.

moderated time. But ancient Greek remind us "*The only thing that is constant is change*" -Heraclitus of Ephesus (c. 535 BC – 475 BC)

And we are humans, so, reluctant to change. But change is becoming the usual name of the game in the digital era. And it is always following the traditional Change Management formula: Dissatisfaction with current situation x Expectations of new paradigm x Leadership to move the whole organization x First steps to show value should be bigger or higher than the Natural human resistance to change.

Citizens around the world are moving to city centers at historical rates. This fast change paired with innovative technology solutions providing very critical problems resolution and basically impacting even the most remote cities, demonstrate that we are living in digital transformational times. It's impacting the way we live, work, live, relation, trade, meet and interact with the rest of humans.

Local leaders are extending the traditional boundaries of local government management to make their cities smarter, healthier, safer, more sustainable, more economically competitive and more efficient for their citizens and are looking to adopt technology to make a positive and inclusive transformation. It's time to elevate and combine the conversation around connected cities and citizens to work cohesively. When we think about connected societies, we must think across a broad range of services and citizen life including energy, water, transportation, buildings, education, healthcare and social services, housing, culture, urban planning and public safety. There is a need for city infrastructure and services to evolve and become more integrated and connected.

Cities around the world face a number of common challenges. Traffic congestion is increasing in most metropolitan areas. In the developed economies, physical infrastructure needs to be updated. In the emerging world, a massive new physical infrastructure needs to be built. Citizens everywhere have growing concerns about public safety and cybersecurity. The growth of healthcare costs seems to be accelerating with people aging. In education, we need to provide both our young people and adults looking to change careers with the job skills they will need to compete in the XXI century. And finally controlling our energy consumption and our resulting emissions to ensure sustainability in a context of finite resources.

But these challenges are not new. We have been wrestling with many of these issues for a long time. We've experienced some of them for hundreds of years: traffic,

clean water and air, crime, reliable power, education and employment, and the list goes on and on. Cities need to be strong enough to survive, adapt, and thrive despite the challenges they are experiencing. What is different is that we now have technology we can use to address most of these challenges in new ways. Rapid urbanization is exerting pressure on cities' aging infrastructure and available resources from power distribution, housing, fresh-water availability, and sewer systems to urban mobility, the environment, public safety, and health/social services.

One key aspect of this future connected society that is quickly growing today is urban mobility; transportation of both people and also goods, as retail options are soaring online challenging the ways those goods are finally reaching homes. This is a tough problem in the city of Amsterdam, where the narrow water-channel side streets are every day collapsed by courier small tracks delivering online purchased goods.

As civilizations have evolved, so have our means of transportation. First by foot, then by horse and now by an array of large and small, public and private vehicles. But the raise of new mobility options like sharing (cars or bicycles or scooters), Cars as a Service options, autonomous cars and other are completely changing the scene. Cars are integrating more technology to become 'smarter', taking advantage of latest connectivity technologies like 5G, allowing them to seamlessly interact with a smart city infrastructure and with the other vehicles and users. And the need of owning one or more cars per family will decrease. So, city infrastructures will need improvements to accommodate the smart car of tomorrow while reducing the needed space for cars and regain areas for humans, making cities more walkable. Mobility options will be available in real time, reporting incidences and providing alternatives, making the traffic more fluid, safer and easier than ever before. City transportation services will take advantage from predictive models to anticipate likely issues and reduce their impact.

A city that harnesses its capability, capacity and human capital to focus squarely on improving infrastructure is actually cementing a lasting impact for decades to come, not only in terms of the well-being of its citizens, but also on the economic potential and competitiveness of the city to attract talented citizens.

In addition to the technology, collaboration enables this connected society. City leaders, citizens, academics and utilities all working together to enable our neighbors and enrich our communities.

By leading this change in a thoughtful manner, cities are creating environments that are more sustainable, prosperous and inclusive for all. Through different initiatives, cities are working to eliminate the digital divide for elder people and people with disabilities.

By creating welcoming environments that attract new businesses and talented citizens from other places and also build up and retain existing ones, cities will thrive in global influence, reputation and attractiveness. This openness to external talent from other cultures is made of tolerance. And all this work is done for and by people.

People matter for thriving

"People come to cities for the sake of life, and they stay for the sake of the good life" [25]

When Aristotle refers to the 'good life', he does not mean enjoying a life full of leisure and pleasure. Aristotle speaks of the good life as that which enjoys the 'good citizen', who is the one who takes advantage of living in the polis because he has got the skills and the rationality to lead a 'good life', contributing to the existence of the polis. The polis offers the conditions for citizens to develop and exercise this 'good life'.

Cities will increasingly need to compete to attract the people they need to thrive. Migration from rural to urban areas is slowing, but city-to-city migration continues, talented singles with no family dependences are moving to new cities in large quantities and even whole family moves are usual. The modern digital era gives citizens the power of choice about where they want to live. In the past, they used to follow job opportunities; now those job offerings come to them. Employability is a key reason why to choose a city, but not the only one and not the most relevant anymore. I personally consider arrogant the negotiation as an auction that we have

[25] ARISTOTLE, *Politics Book I*, 1252b27-30, IV BC

seen from a large technology company to place its second headquarters in the US. Skilled employees won't go to any possible place to work and live, so they should better find a very attractive city for citizens and then settle up there, not the one which offers the best tax and logistics conditions for the company. Otherwise, their capacity to attract best workers will be diminished by the lack of city attractiveness. Manufacturing jobs tied to a factory location now account for less than one in ten jobs across developed regions; many retail and service-sector jobs, the largest and fastest-growing job categories, tend to follow people, not the other way. A rising number of digital jobs can be performed at a distance (teleworking), and older knowledge workers may choose more flexible work arrangements in their jobs as they approach retirement. Digital platforms enable people to be matched to jobs wherever they are.

Those cities that retain the talented citizens they have and attract others from abroad will thrive; those that fail to keep their citizens and make themselves appealing to new workers and families will not, lagging as elder people bedrooms, loosing young talent, with low competitiveness and dynamism. In the past, cities' economic strategy hinged on appealing to businesses; increasingly it needs to focus on what they offer to citizens and the services they provide. If they do, people will come, then businesses will as well.

There is much for city leaders to do to compete successfully for these increasingly empowered citizens, not least in creating stable, innovative employment, which requires mayors to broaden their focus from urban planning to genuine economic development and talent competitiveness, connecting to citizens and making them participants on city development.

It may, of course, be that people's expectations are rising beyond what governments are able to deliver within budget constraints. But it may also reflect the fact that urban management today is not set up to focus first and foremost on citizens. If it were, money might be invested more wisely, and results would improve.

Realizing the 'Smart City' vision

So, cities are investing on technology to work out many problems, improve the quality of service and becoming more attractive to talent. The considerable rewards

of smart cities will only be realized if they put citizens front and center of strategy and execution, and that means understanding them: who they are, how they spend their days, how the move along the city, what they love or hate, what are their scales of values and how they interact with city services, and then, design policies and services accordingly. Citizen-centric governance is, in many ways, no different from the way that corporations focus on user experience when delivering their services, always listening to customers feedback. A working mother of three who lives in a residential neighborhood will have very different needs to the 73-year-old widow who lives in a nursing home. They will interact with city services very differently. Change word citizen by customer and think about some of the well-proof marketing strategies…ok, but act responsibly and very respectfully, otherwise you will lose their trust (at next vote).

The more detailed the understanding of citizens the better for practical policy. Different citizen activities involve multiple touchpoints associated with different public services. Do they commute via public transport or do they walk? How much cost and time do they spend? How many times does a citizen visit the health center or hospital, and for what reason? What jobs do people do, and are they formal or informal? Such a data is pure gold to inform targeted and effective public services provision.

We have seen in all the Industrial revolutions how technology has always been the driving force of economies worldwide, but what about cities? Cities have to develop efficient operational models to provide infrastructure and physical and digital services to their citizens. However, most services and infrastructure are built on a mixture of investments that can span decades. New technologies adoption has been historically slow, frequently with investments that are far out of balance with other important community needs, always considered a priority. Information technologies started to play a relevant role into Municipalities from the taxes department. It took decades for these new technologies to manage the core of citizens contact thru the Citizen relationship management solutions (mainly Call centers only). Now, it’s impossible to manage a modern city with the complexity of systems, items, things, matter, people, buildings, generated data (structured in data bases or unstructured like WhatsApp or Facebook messages) without Information Technologies as the real brain of city.

Elected leaders are increasingly being asked about technology in the community such as residential broadband, how to welcome autonomous cars, and how to embrace remote home care technologies, to mention some examples. Citizens expect rapid development and adoption of technology in their daily lives and in their businesses. They don't wish to see lines drawn between the enterprise and the public services, just the opposite: they demand better quality systems serving them from the public domain than from the commercial sector. As constituencies, they demand quality services from the city managers. For residents and visitors, the expectation is for the city to meet ever-escalating demands. How do cities innovate and leverage technology to not only provide the services citizens need but also to build a model that supports the rapid growth required to attract and sustain highly successful inhabitants: talented citizens?

Urbanization is therefore crucial for achieving sustainable economic growth. At the same time this development is creating major challenges related to natural resources, environmental impact and the liveability of cities. These challenges are not only dedicated to serving (or retaining) current citizens, but to attract new citizens coming to the city with the expectations of better life conditions.

City as a creativity catalyst: Wittgenstein's Vienna

Cities are positive or negative catalysts of human creativity, and therefore, of economic and social development. They are the breeding ground where art can be expressed, science developed, society can advance in equality and ethical values, or it can be the furnace where all this is destroyed with war, hatred and inequality. Let's study the best example of how a city can empower its citizens by taking them to the category of geniuses: Wittgenstein's Vienna[26]. This city, at this time, end of XIX century, together with the Athens of Aristotle, represent the two culminating moments of our human culture: the two moments where a single city could collectively foster development in all the arts and human sciences, and therefore, generate the wise and geniuses who led the ethics, aesthetics and human sciences since then.

[26] JANIK, A. and TOULMIN, S. *Wittgenstein's Vienna* ATHENAICA, Sevilla, 2017. Originally published 1973

The Vienna of the late nineteenth and early twentieth centuries (end of century or fin-de-siècle) brought together an enormous, almost unrepeatable concentration of talent, creativity and human development, comparable only to the Aristotle's Athens. More than one hundred of the best creators in Philosophy, Writing, Theater, Music, Painting, Architecture, Applied Sciences, Engineering, Mathematics, Physics, Mechanics, Medicine lived and met every day in Vienna, many of them still today great references in their disciplines[27]. And they met, grouped together, discussed about the current issues of that time, and most importantly, about humanity, the essence of man and the meaning of existence, the reality, the ability of language and science to explain it, and the most relevant, what is not expressed in words, what is transcendent, what is essentially human. All were philosophers in their own way, more or less pure, and all from their area of knowledge proposed advances in the conception of man and his existence, many disruptive, which marked a new way of living, a new humanity after the death of the previous. Aesthetically, a Kantian base was breathed, of essential knowledge, on which the search for new forms of expression, of knowledge and artistic development was erected, in a city of dreams[28] on the edge of a historical precipice: the destruction of the world as such and as it was then conceived, by the barbarism of war and deranged authoritarianism. Vienna was a Gaia Big mother cooking a ratatouille of geniuses in a pan about to burn. Fresh and tasty vegetables of different colors and disciplines mixing, bringing flavors and intensities to each other, under the fire of an Empire on the verge of collapse, with the threat of nationalist dismemberment, war and the totalitarian social currents that were being born at that time: the Nazi anti-Semitic fascist totalitarianisms on one hand, and the Marxist proletariat dictatorships on the other.

And that process kept flowing, in a small Vienna frying pan, with little space and little available housing, so small that it made it unbearable for many, who opted for suicide, but so intense and rich in creativity that it made a dense, excellent, best chef worthy result, something unique and sublime, brutal and overwhelmingly human. All seasoned with the spices and salt provided by the hallucinatory waltz, the Sachertorte with cream, and the peppered touch of grüner veltliner (wine) to

[27] Ibid p.39
[28] Ibid p.50

escape from the reality of a decadent empire displaced by liberalism, opening minds and relaxing the moral consciences.

A Vienna above all human, critical, moral, ethical, creative, but also a deranged social sink of hypersensitive people, with an enormous capacity to move from press manipulation, with its front pages signed by the best writers, to the back ones, announcing prostitution, in a slide of avant-garde creativity to the transcendent on one extreme and the most dirty and self-destructive on the other.

A dizzying aesthetic collage of contrasts, a "*Kakania*"[29] (as Musil calls it), with its real, imperial K's, of greatness, and its sense of excrement, fecal hole, baseness. A city plenty of aesthetic contrasts: the new architecture of the 'Wiener Werkstätte', opening lines, concepts and spaces and revaluing natural materials, inspiring the subsequent Bauhaus, developed by the great LeCorbusier or Mies van de Rohe; the new expressionist painting from the 'Secession', with the Academy rules breaking and the arrival of the sensation of what is not seen directly, which later the great French expressionists developed; new writers and critics of the current social swarming movements by the 'Young Vienna' group; the new medicine that tried to understand the human mind with Freud and his school psychoanalysis; the Vienna Circle, where philosophers as remarkable as Wittgenstein, influenced by Nietzsche, Schopenhauer, Brentano, Husserl, Kafka, discovered that the value of the human is beyond what language can say, that the meaning of life is under the obvious, below reality, what is important is not said, but done, shown; a scientific revolution where the material accompanies the Hertz and Mach's immaterial waves, the Newtonian positivisms are overcome by Einstein's relativity; from the crammed, cold, dirty houses, to the heat of the cafés, the friends and lovers, the castles and mansions with their parties and pageantry; from imperial splendor to revolution, destruction and annihilation, to the 'last days of humanity'[30] as it was then conceived; from a matrix of cultural creation to the nightmare of degenerating into a 'world destruction testing field'[31]; from the human greatness of avant-garde creation, to despair, and suicide; from ethical and disciplined rigor, to seek a mental order in psychoanalysis; from Wittgenstein's "*Tractatus*"[32] transcendence to the abyss of the most sordid

[29] Ibid, p.73
[30] Ibid, p.45
[31] Ibid, p.113
[32] Ibid, p.241

prostitution; from the covered woman made an object of a mercantile contract[33], that goes away from home tasks and procreation, to a new valuation and fight for her rights, from the Klimt's spider woman devouring the man, to lead, forever since then, the way of world humanization around gender equality. And these contrasts coexisted with the Kraus' sharp pen in the local press, criticizing society and even the language itself, in case someone was not yet aware of the moment he was living. Is anything missed? Of course, under the cloudy sky, over the Danube, the always present in every place in Vienna background music and exceptionally and majestically, in the new Opera, with the new Wagner compositions, conducted by Bruno Walter's wise hand. Can there be anything more comprehensive, intense and beautiful? And by the time the head lost its sense of reality they had two options: give up and leave it all or go to the psychoanalyst.

If someone invents the D-leap (inter-dimensional) machine, I already know the space-time moment that I want to travel to: this 1905 Vienna, to a gathering in the Wittgenstein castle, listening to Ludwig talking about what you cannot say anything but only show facts, his sister on the piano playing Wagner, with Boltzmann explaining Thermodynamics, Frege and his mathematical analysis, Hertz with his waves, Loos talking about his new building, Klimt portraying the scene bringing golden tones to the dark night, and Kraus writing everything in the next magazine, and as guests, Lou Andreas-Salomé talking about psychoanalysis with Freud, in poet Rilke's arms, or both ...

Vienna is the symbol and beacon of humanity at that time.

The book makes us think about cities leadership in the different transformations that have taken place in our world. After the imminent war to this Vienna, we observed the disappearance of the traditional Empires. Then, after the Second World War, we saw how the world was consolidated in countries, grouped in the United Nations. Today, in an environment of economic stability and peace, we see again the cities leadership role in the wealth and technological progress creation. The most cutting-edge cities in this revolution in the information society and Artificial Intelligence are, as it happened in Vienna, those that manage to gather talent and generate the conditions for this to happen (social environment,

[33] Ibid, p.87

investment / patronage, openness to new trends, access to culture with leading universities and an extreme sensitivity to ethical and human values).

A city is a space-time point where humans meet. If a good number of talented citizens are gathered for a good education, and that talent is fostered from power and investment (patronage at that time), then the city is attracting even more talent. There is an acceleration as a positive feedback effect, where some enrich others and complement them, and therefore, the total capacity for wealth creation and generation soars exponentially, as in this end of the 19th century Vienna, attracting both local talent, and that of all Balkans, Germany, and even England.

I learned from Dr. Joan Clos (UN-Habitat ex-director, Spain ex-minister and ex-Mayor of Barcelona) that when choosing, talent always moves to the largest possible city, and that city density is closely linked to its capacity for development and wealth generation. It is not a matter of extension or quantity, but of meeting (in a mile radius circle around the city center) by the highest density of talents. There they lived, they dreamed, they had coffee together, they shared even lovers, they met in the University or at the Secession or in the Wittgenstein's' castle, more than 100 of the most qualified human talents who lived at that time. Unfortunately, the war stopped it all and destroyed everything.

What made this unique and magical combination of talents possible? On the one hand, the German-Austrian intellectual leadership, with a leading university in Vienna. On the other hand, an innovative bourgeoisie with the ability to take advantage of the latest technologies and innovations and do business with them. And not only that, a culturally advanced society that gave success not only to business, but to the ability to patronize with the obtained money. To get social recognition, you had to be innovative and successful with business and use your wealth to develop more culture, more innovation. This is a virtuous circle of cultural and scientific progress and development. This requires political and economic stability in general. Nobody discussed power to the emperor, considered as almost divine. It was not expected of him more than just not to bother and provide stability 'laisser-faire', but in the case of Emperor Franz Joseph I of Austria we find another great patron, who reconstructs and enlarges the city, transforming it. It refuses the

advances from telephone, the car, the typewriter or the electric lighting[34] ... it could not be perfect and for all these advances the private investment from the Viennese bourgeoisie was exceeded.

This situation reinforces the value of the middle class. As already anticipated by Plato in "*Republic IV*"[35], the middle class is fundamental for the development of a city, because it does not compete for power or for survival, what it does is to build and thrive the city. This bourgeois middle class was the engine of Vienna. Fortune with and for business to invest in patronage, which in turn attracted more talent and pushed even more business and culture ... unstoppable? No, we are humans, and we also invent the self-destructive, the separation and the war.

In the Ortega y Gasset's logic "*I am me and my circumstance*" the city resembles the 'circumstance' where the ego moves around, to the pan where human activity is cooked in, ones next to each other. This ability to stay together, to relate, to have 2 + 2 adding more than 4 is possible by urban mobility and means of transport, that is the reason why urban mobility is the citizens most appreciated public service. Because, in essence, as Julián Marías said once, a city is a "*sum of collective past and present experiences*"[36] that make up the city past identity and present dynamism. That was Vienna, with a strong difference in the quality of those citizens who were constantly speaking in terms of Kant and Schopenhauer, well versed in language, ethics and logic, with philosophy at all conversations center. As Wittgenstein explains in his "*Tractatus*", what is important is what is not said, what is just shown, the facts, your actions. I think that in these meetings in the cafés and halls of Vienna, the most important thing was not the wine, but with whom it was drunk.

Two reflections finally arise from the book reading: one on the effect of anxiety, of urgency, of living on the abyss edge in human cultural production, and another on the power of press and media.

It seems that circumstances push us to give the best of ourselves in circumstances of need, risk, and to comfortably relax when we do not have that stimulus. And in that Vienna, there was capacity for investment and patronage, good life and good

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[34] Ibid, p.80

[35] PLATO, *Republic, Book IV,* 380 BC, 422a1to 425a

[36] MARIAS, J, RIDRUEJO, D., CHUECA, F. *Ciudades* Editorial Prensa Española, Toledo 1983, p. 231

conditions for human development, but you also had to earn it with effort and talent, with hard study, all in this crammed into substandard housing society, with the woman very much displaced to the kitchen or to the brothel, with a frivolous political power, weak and threatened by the insurrections, nationalisms and behind the imminent war and social revolutions shadow. It is clear to me that this also stimulated Viennese artists.

Another reflection assails on me about the press power, and its ability to connect, relate, attract new voices and different and stimulating movements, to communicate and influence people and to keep the whole community at the knowledge and innovation forefront, favoring collective progress. The Karl Kraus and more than 50 other important writers and journalists work made this possible in Vienna. The power of daily communication (written in this case) is evident in the Vienna's accelerated development as the world cultural center of the moment. Something that today seems obvious to us, but at that time it was very revolutionary, because over the usual pointer knowledge from books, the speed of daily impact was added. The diffusion and connection speed began, something that we permanently experience today.

This exceptional situation reaffirms the value of the city as an enhancing and cohesive element of human development. The city as an enabling space for the talented citizens potential, a magnet for those who seek values and a development base for those who seek fortune.

But it also suggests the concept of contribution (and not only in the form of taxes) to the city. We live waiting for the city to give us public services and offer us perfect conditions for prosperity. But what do we do for the city? Can we, as President Kennedy urged his country, do something for our city? Of course, we can contribute with our time, our opinion, our work, our use of resources, spaces and possibilities offered by the city. We can create with all this a more prosperous, advanced and attractive city for talent, for the benefit of all.

It was told that new technologies were going to encourage cold, dispersed, wide cities, with distant people. Quite the opposite. New technologies connect, but the wealth of a city is still associated with its density, the people closeness and contact, and social life. One lesson that we obtain from this book is the value of the social gathering, of the group of friends and experts talking about a common theme, of the

sharing experiences and knowledge enrichment. Social networks connect us and multiply our ability to meet people and create an environment with which to learn and share, but the city continues to provide the space and conditions to broaden our life and our wisdom thanks to our colleagues. Another way to build a city is to use it, occupy it, take advantage of its spaces to meet. The cultural development continues leaning on these bases: the family, the University, the city, with the new technologies contributing with speed and proximity, but with the need to connect us no matter where we live, or where we meet.

This suggests to me this question: what could I do to make my city look more like that Vienna, on the good side, once the bad things it had are already well over? Of course, by entering into the artistic and cultural circles, of people and spaces, where the city artistic and human development is cooked, at the University, where talent is formed, and meanwhile paying attention to the family, where I find calmness and love. And if my city is governed by ineptocracy, despises talent, it is blind to the future, and it is not rich in this spaces and development environments proposal, then obviously I should reconsider my 'citizenship contract' and look for another city, another place where I could develop my human potential. Vienna is going by, it's a matter of finding yours at this moment.[37]

Current main challenges for Cities where technology has a significant role as solution enabler are descripted in the next subchapters.

[37] Note to reader: Please find at Appendix I a document with the detailed description of the 104 great thinkers that took place in Vienna at the same time, permanently or occasionally, but with enormous influence on thought and work onwards. Find highlighted in colors the most influential groups such as 'Wiener Werkstätte' in Architecture, Vienna Circle in Philosophy and Sciences, 'Secession' in Painting, decoration and art, 'Young Vienna' in Literature and in pink, the circle of Lou Andreas-Salomé lovers.

1.1 Impact of Industry 4.0 Revolution. A quantum leap.

Each industrial revolution has had associated a key invention or disruptive technology, its inventor or inventors and a flagship city/area where all these factors merged.

In the first one, we can remember the steam engine, with its inventor Watson, and London/England as the leading city/area. The impact on cities came with the emergence of factories, attracting a massive number of workers from rural areas, creating workers' suburbs around traditional urban centers. The impact on society was tremendous, with the birth of the class struggle, and the movements as well-known as Marxism, socialism and communism. The massive shift from rural to urban areas is still present today. It constitutes one of the main factors of the descent of the birth rate and, therefore, of the current ageing of the population.

In the second one, the main innovation was electricity and above all, the electrification of the territories, being able to transport energy over long distances. As the main inventor, I want to highlight Nicola Tesla. Serbian immigrant, he moved to NYC where he installed his famous laboratory. The impact on the cities meant their electrification. The availability of home appliance machines made it possible to live in buildings and not only in large houses with enough space to wash and do other manual tasks. The use of electricity as a heating element allowed a good alternative to burn coal and reduce the horrible pollution existing in industrial zones. At the same time, one of the owners of our cities appeared: the car.

The third industrial revolution came hand in hand with computers. I have several favorite inventors for this revolution, like Alan Turing (computing algorithms mainly), Tim Bernes-Lee (the World Wide Web or current Internet), John von Neumann (Digital Computers Architecture), Bill Gates (Microsoft, Windows, Office) or Steve Jobs (Apple, Macs, iPhones). And as a place of explosion and development, it is obvious that we must think about the cities of Silicon Valley (San Francisco) and Seattle (US). It brought the automation of many city functions, the mechanization of administrative tasks such as the issuance of taxes, the installation of automatisms for traffic control and the opportunity to show the city to the world

through the www. This made our cities 'informational cities' as described by Manuel Castells.[38]

The fourth Industrial Revolution could well be considered as an evolution of the third, if not for its tremendous impact on society. The incredible improvement in the computing capacity and in the acquisition and handling of enormous amounts of data make possible the effective development of the Artificial Intelligence and one of its most important applications: robotics. This impact is very well descripted in the related Schwab's book[39].

Cities Prosperity Recipe: 3T's: Technology + Talent + Tolerance

Professor Florida describes into his book[40] the equation of worldwide leading cities success. All these cities: London, NewYork, Amsterdam, Paris, Berlin have developed a profound social transformation due to the past industrial revolutions. In all of them, technology has been the main motivating factor. A surge of new disruptive technology in the way we work, manufacture, trade, and develop the human activity that attracts talent. Talented citizens are attracted by this new technology and the possibilities and advances it entails because they see a new way to develop their potential and creativity. From research to the development of new products and their marketing, talented citizens can use their creativity and skills to achieve a breakthrough in society. In addition, this new technology entails the creation of highly qualified and well-paid jobs, making the attraction for a given city to reach its highs. With a new rampant technology in place and talented people developing on it, we only have to allow them to connect at the same place: a city. The way to make this happen is the exercise of tolerance, opening the door to anyone who demonstrates talent and willingness to contribute to the development of the city while respecting local laws and customs. Thus, we can say that the recipe for the prosperity of the most advanced cities has been determined by the rule of the 3 T's: Technology, Talent and Tolerance. Technology as the main trigger of

[38] CASTELLS, M. *La ciudad informacional.* Alianza Editorial, Madrid 1995 p.67

[39] SCHWAB, K., *The Fourth Industrial Revolution*. World Economic Forum. Penguin Random House, New York, 2016

[40] FLORIDA, R. *The Flight of the Creative Class.* Collings. New York, 2007 p.37

each industrial revolution and as the main enabler. Then, talented citizens approaching that technology in a prominent city/area, and finally the tolerant civic conditions that allow this human development.

Artificial Intelligence (AI) = Massive DATA + CLOUD Power + TALENT

And now we are at the beginning of the fourth Industrial revolution. And in this one, there is not a single city/area winner, or at least, not a clear one. It seems clear that the epicenter of economic growth derived from new technologies moves eastward, owing to the strong thrust of the 4 Asian Tigers, plus China, fueled by a strong investment on AI and new advanced communications: 5G.

Most relevant countries in the world have recently announced massive AI Country Plans like France 1.5 bEUR, UK 1 bPounds, EU 20bEUR, and China 150b$ in less than 15 years. Competition to lead this race is clear.

Data is the new fuel; AI is the new engine of 4th Industrial revolution.

Artificial intelligence (AI) is the ability of a machine to mimic intelligent human behavior: from data collection, analysis, learning, reasoning and problem solving, and much more. Through artificial intelligence, machines can analyze data, texts, videos and images, understand speech, interact naturally and make predictions using data such as when a machine needs maintenance or what type of product the customer wants to buy next time. In fact, machines simulate the way we perceive, react, process information and think.

From the first moment when a scientist or a philosopher (roles interspersed up to the modern age) speculated with the assumption that the process of human thinking could be mechanized, to this day, many algorithms and projects were carried out. AI is not new: we can study early mid-Age thinkers like Ramon Llull, Gottfried Leibniz, Thomas Hobbes and René Descartes. The term 'AI' itself was first mentioned by John McCarthy in 1956 at the famous Dartmouth Conference, considered the birth of modern AI.[41] Scientists have been talking about artificial intelligence (AI) for decades, but in many applications, including cities, AI is already impacting. Some smart systems are already optimizing themselves and the

[41] "History of artificial intelligence" *Wikipedia*, https://en.wikipedia.org/wiki/History_of_artificial_intelligence retrieved by January 2019

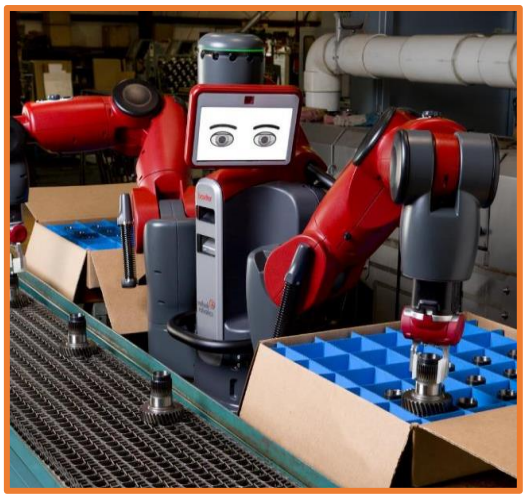
benefits are real on improving the quality of services, reducing risks and predicting undesired situations.

But If there were already algorithms, programming languages and certain tools, what has happened for the AI explosion to occur? We had and we have talent, but the means were missing. Today we have the two components that we lacked in the equation: a huge amount of data on any element to model. Data that come from sensors, things connected to the Internet (Internet of Things or IoT), human production as social networks, etc; and a great computing capacity, unimaginable a few years ago, derived from the use of large public data centers (Cloud).

For this reason, now is the time when these algorithms have an exhaustive amount of data and a capacity to process it in an almost immediate time, which facilitate new technologies that simulate the human way of thinking (neural networks, deep learning), to perceive the reality and to function like our senses (cognitive algorithms). Thus, we can complete the equation and deploy the full potential of this new technology (AI), impacting with such a capacity for change and disruption in our society that it does not seem to be just an evolution of the use of computers (3rd Revolution), but a full new revolution itself. Massive Computing power from Cloud Systems, plus low-cost Analytics for the huge amount of data available from sensors and social networks is making this revolution to happen.

A special category within Artificial Intelligence is machine learning. Machine learning is a data science methodology that allows computers to learn from existing data as they are obtained, without being permanently adapted by human intervention, only by applying a previously programmed model, rules of inference or neural models for, finally, foresee future behaviors, results, and trends.

Main impact is that all non-creative jobs could potentially be done by machines/robots. All those agricultural, working ‘old-style’ manual mechanics or so, and even services (like cooks, waiters, taxi drivers, etc) jobs can see their days coming to an end. Most jobs manage tasks that are more or less subject to automation. Everything repetitive can easily be delivered by a machine, 24 hours a day, tireless, complain-less, workers union-less, and by a fraction of man-hours cost.



"My name is Baxter. I was born in 2013. I am a multipurpose robot that can be trained simply by manipulating my arms through a sequence of tasks. Once trained, I learn to adapt to variations like different size boxes. I cost approximately ***$4/hour to be acquired, installed & operated."***

Figure 5. Very famous Baxter robot developed by Rethink Robotics. [42]

According to urban theorist (and Citylab cofounder) Richard Florida, a rising 'creative class' of workers is fashioning an economy in which "*the creative ethics is increasingly dominant*"[43] As for the below figure 6, Prof. Florida describes that only the 'Creative Class' (just 30% of total Labor force) remains untouched. By chance, 8 out of 10 of most demanding jobs today didn't exist by 2000, and it's said that 80% of next 20 years new jobs are still unknown today.

All of us are more or less creative by DNA, as creativity is into the essence of human being. What is not creative is most of our jobs, so let's change them, inventing new creativity-intense jobs for humans, delivering a value that AI can't or can't easily provide.

Let me dream for a while of a new revival of culture due to the increasing appreciation of human work, the arts and the essential principles of human beings as creative: beauty, goodness, truth. In fact, everything that makes us more human and more differentiated from robots.

Previous human destiny was labor. Human future points to an overhead mission with creative value. But we need to unlock the full capacity of every human, as a creative mind.

[42] "Baxter (robot)", *Wikipedia*, https://en.wikipedia.org/wiki/Baxter_%28robot%29 retrieved by January 2019

[43] FLORIDA, R. *The Flight of the Creative Class*. Collings. New York, 2007 p.26

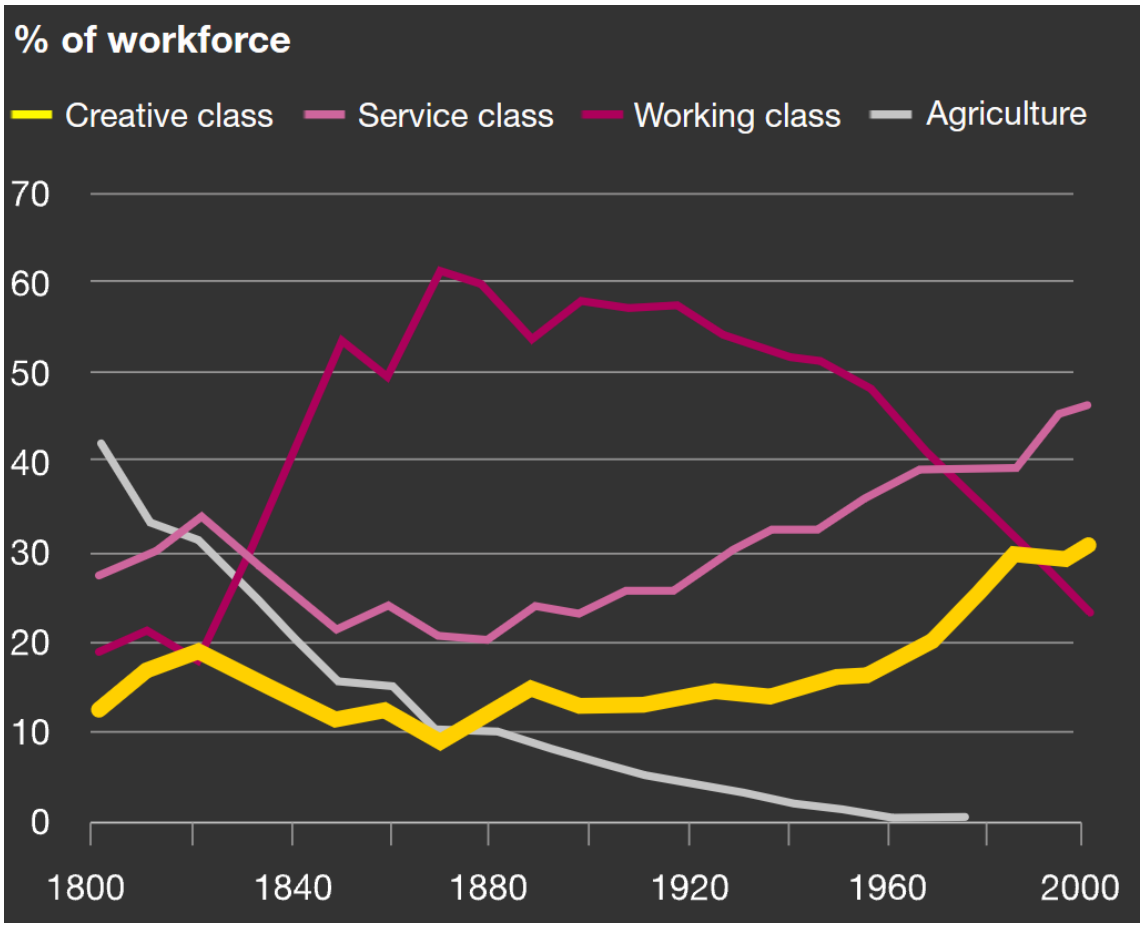


Figure 6. Share of workers by Florida's Classes [44]

But in any case, the labor market will be severely impacted, with many jobs disappearing without a replacement, mainly in aging workers, due to the lack of skills and qualification in the new needed technologies. Then, most governments will take into account the UBI (Universal Basic Income), with the obvious controversy associated with it. The UBI will give a salary to those jobless people because there is a machine that simply makes it cheaper, and probably with better accuracy. On the one hand, some will find in UBI the easy answer to the problems of unemployment, while on the other, some will consider it a trigger for a 'lazy' class, simply living off the other more creative workers. The social debate is served.

[44] FLORIDA, R. *The Rise of the Creative Class-Revisited and Expanded*. Basic Books, 2014 p.402

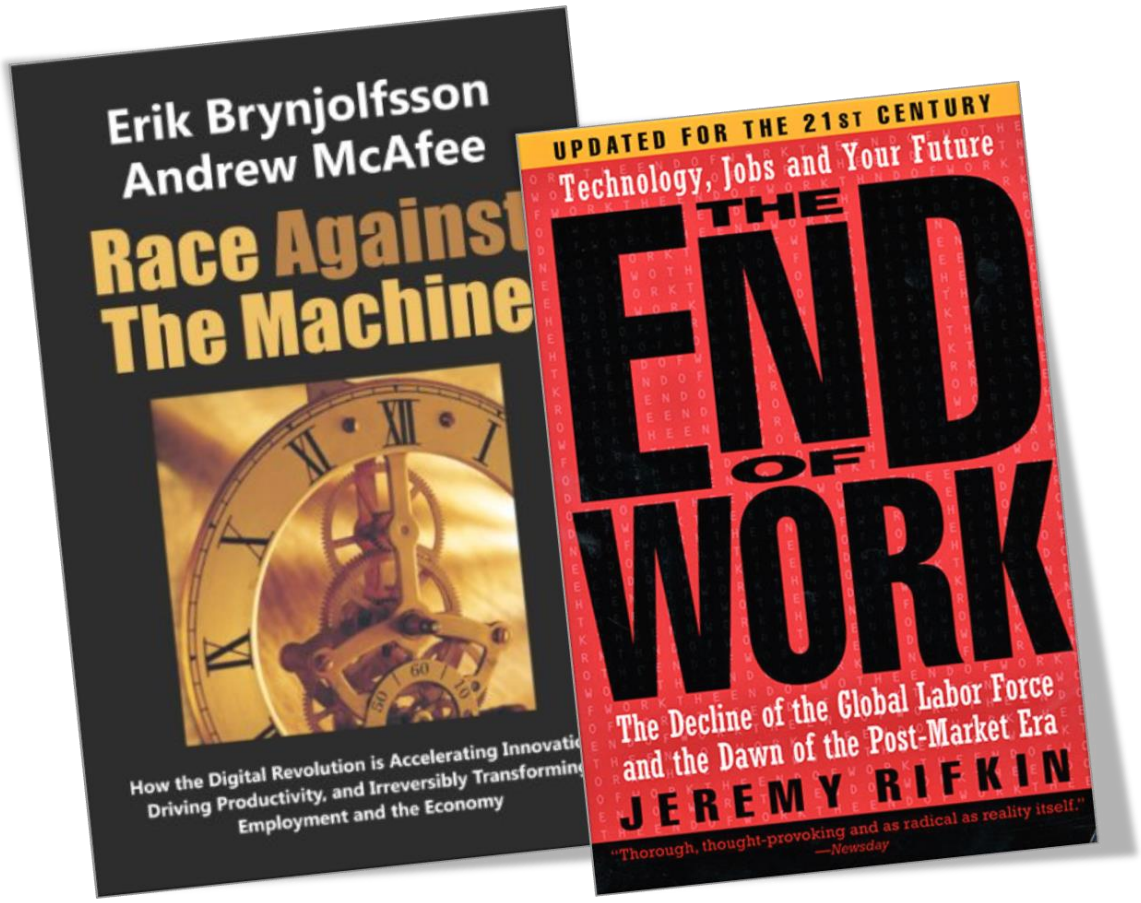


Figure 7: "*Race Against the Machine*" and "*The End of Work*" books

Many other consequences of Artificial Intelligence and Robotics onto our skills, wages, and jobs could be found into these two books.

In their book[45], BRYNJOLFSSON, E, and McAFEE, A. explain why current median income and working population are stalled or declining. And reason is not the popularly accepted technological stagnation. Just the opposite, we are starting a new digital revolution with many positive implications like productivity increase, costs reduction, and overall economy growth. Traditionally, employees able to handle computers had greater employability and wages. But workers whose skills have been designed to handle computers in an automated way now have less to offer the job market, and see their wages and future shrink. Only if they improve their

[45] BRYNJOLFSSON, E. & McAFEE, A. *Race Against The Machine: How the Digital Revolution is Accelerating Innovation, Driving Productivity, and Irreversibly Transforming Employment and the Economy*. Theoklesia, Llc. NewYork, 2012

skills to perform more advanced tasks, or better to say, more creative tasks on the computer like data scientists, designers,…, then their market appreciation will rise. Jeremy Rifkin[46] describes the beginning of the 4th Industrial Revolution as a new era in history. It is marked by a steady decline in jobs and a society divided into two radically opposed classes: one that controls the economy based on high technology, and uses that technology with great efficiency and productivity, and another made of workers with no future and no hope of finding it in a completely automated world where all non-creative work is delivered by an automaton. This will lead to the creation of a different future world and the disappearance of our civilization as we know it today. A new society with a great revaluation of the human spirit. This points to my dream of a Cultural renaissance because of the rebirth of human values and human creativity appreciation, making arts, creative-intense works to gain higher value, wages and recognition.

[46] RIFKIN, J. *The End of Work: Decline of the Global Labor Force and the Dawn of the Post-market Era*. Warner Books, NewYork, 1996

1.2 Citizen at Center. A Copernican Shift

Modern SmartCities are investing in technology to improve the quality of their citizen services and their attractiveness to retain and attract talent.

But they are not connected to their citizens. They try to connect, with more or less success. The problem is that everyday affairs require concentration and that leads to a certain despotism. We can't compare it to a new edition of XVIII-century Illustrated despotism 'Everything for the citizen, but without the citizen', but the fact is that for most citizens, they miss a connection, a conversation about city future with their managers and politicians except once every 4 years, to gather their confidence in the form of a vote.

Therefore, one of the most important and urgent challenges of modern cities is to reconnect with their citizens and make them part of their city, contributing not only with taxes. It is a return to the Greek city-state model. In Athens, a citizen, on average, participated up to 4 times in the direct management of the city. There were drawn roles, the juries were made up of 501 citizens, etc. That participation was very high, especially considering that their life expectancy was barely 40 years.

Most of the investment in SmartCities is focused on obtaining data to improve the control of the city, develop a predictive analysis, anticipate potential problems, be more resilient and improve management. Data is the center of innovation. It is therefore necessary to make a Copernican shift and reposition the citizen at the center of all activity in the city, with the data as an instrument at his service, providing the necessary knowledge to improve the city performance. Once again, data and technology should be enablers servicing the citizen.

There are three main aspects on this citizen-centered city: The people aging (a massive problem approaching soon); Create new ways or links to connect to citizen; Gain citizens trust on technology while preserving their virtual identity and privacy.

People Aging. The coming tsunami.

By 2050, 80% of older people in developed countries will live in urban areas[47].

[47] "Governing Cities" *OECD* http://www.oecd.org/gov/cities.htm retrieved by January 2018

Many challenges must be faced to provide the legitimate everyone's right to have a long, happy and healthy life. Chronic and infectious diseases and microbial resistance due to the abuse of antibiotics are increasing. Pandemics spread to other areas is favored by global mobility. Demographic data on aging are increasing the demand for social and health services. Health services are usually offered by national or regional entities, but social services remain on the shoulders of cities. And cities are not prepared for this tsunami, neither budgetary nor in provision of services or necessary infrastructures. The current demographic curve in the advanced countries is shaped like a 'baobab', with a large proportion of people in its central zone, threatening with a massive incorporation of elder people into the retiree area, with a high demand for services and no contribution to Social Security. This situation will undoubtedly mean an exponential increase in service costs, which will lead to the collapse of the current system.

The direct effects of population aging should be addressed: the number of people in the EU[48] aged over 65 will have increased by 70% by 2050, and the population over 60 is growing 3.5 times faster than the overall population. It is expected that the proportion of the population aged 65 or older will increase from 17.4% in 2010 to 30% by 2060 in Europe. The share of those aged 80 or over ('oldest-old') is growing faster than any other segment of the population and is projected to triple by 2060. The old-age dependency ratio (population aged 65 years or over in relation to that 20 to 64 years old) is projected to more than double, from 28% in 2010 to 59% by 2060. The implication is that by 2060 there will be almost a person at working age (labor force) for every dependent person (under 19 years or over 65) in the EU-27. Japan leads global life expectancy at age 60[49] with 26 years, which points to a total expectation of 86 (data from 2012 with an upward trend). It is followed very closely by most modern countries with 85 and 84. If you reach retirement age at 65, this means that, on average, our population expects an average of 20 years receiving a pension, social and health services and many others, without

[48] "People in the EU - statistics on an ageing society" *EUROSTAT* published Nov2017 https://ec.europa.eu/eurostat/statistics-explained/index.php/People_in_the_EU_-_statistics_on_an_ageing_society retrieved by April 2018

[49] "Life expectancy at age 60 (years)" *UNDATA* http://data.un.org/Data.aspx?q=life+expectancy&d=WHO&f=MEASURE_CODE%3AWHOSIS_000015 retrieved by January 2019

contributing to the maintenance of the system. This trend also contributes to increasing the total cost of benefits.

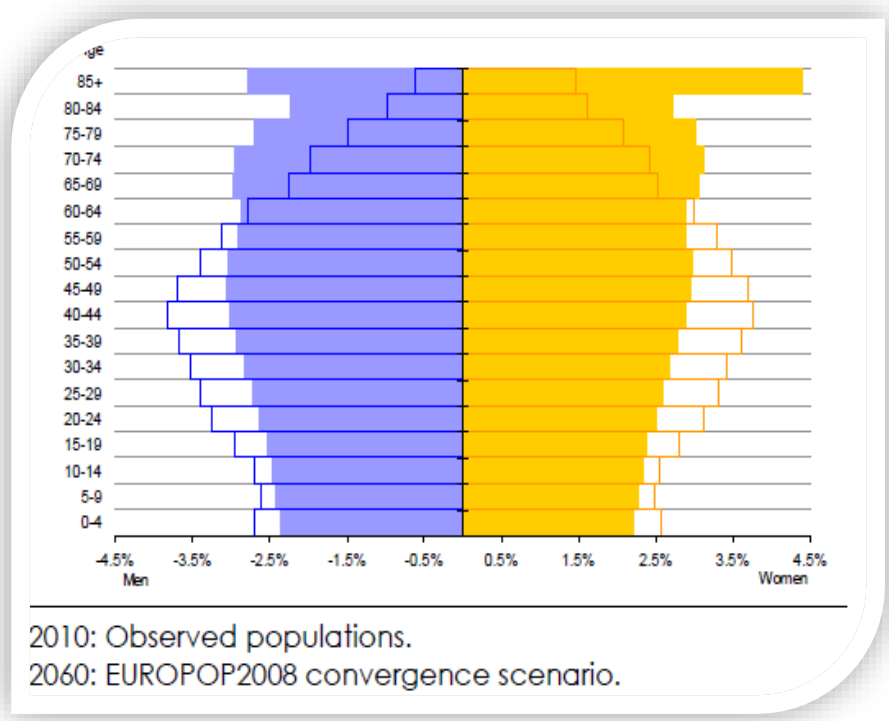


Figure 8. Demographics evolution Europop2008. Source Eurostat[50]

According to the United Nations[51], the number of elder people globally is expected to reach nearly 2.1 billion by 2050. Not only are older people increasing in number, but they take an increasing share of total population in every country. This has implications for most sectors of society.

These new age distributions will conclude to fewer workers per elder person. This trend will continue for the next 60 years because of small fertility rates. In rural environments, all hands are welcome, and fertility is higher than urban sites, where children and harder and more expensive to raise. The number of potential workers per older person is projected to decline at approximately the same rate between 2000 and 2020 as it did between 1960 and 2000.

[50] "Archive:Population projections" *EUROSTAT* published by June2011 https://ec.europa.eu/eurostat/statistics-explained/index.php?title=Archive:Population_projections&oldid=59201 retrieved January 2019

[51] "UN World Population Ageing Report", UN, 2017, p.1 https://www.un.org/en/development/desa/population/publications/pdf/ageing/WPA2017_Highlights.pdf retrieved by January 2019

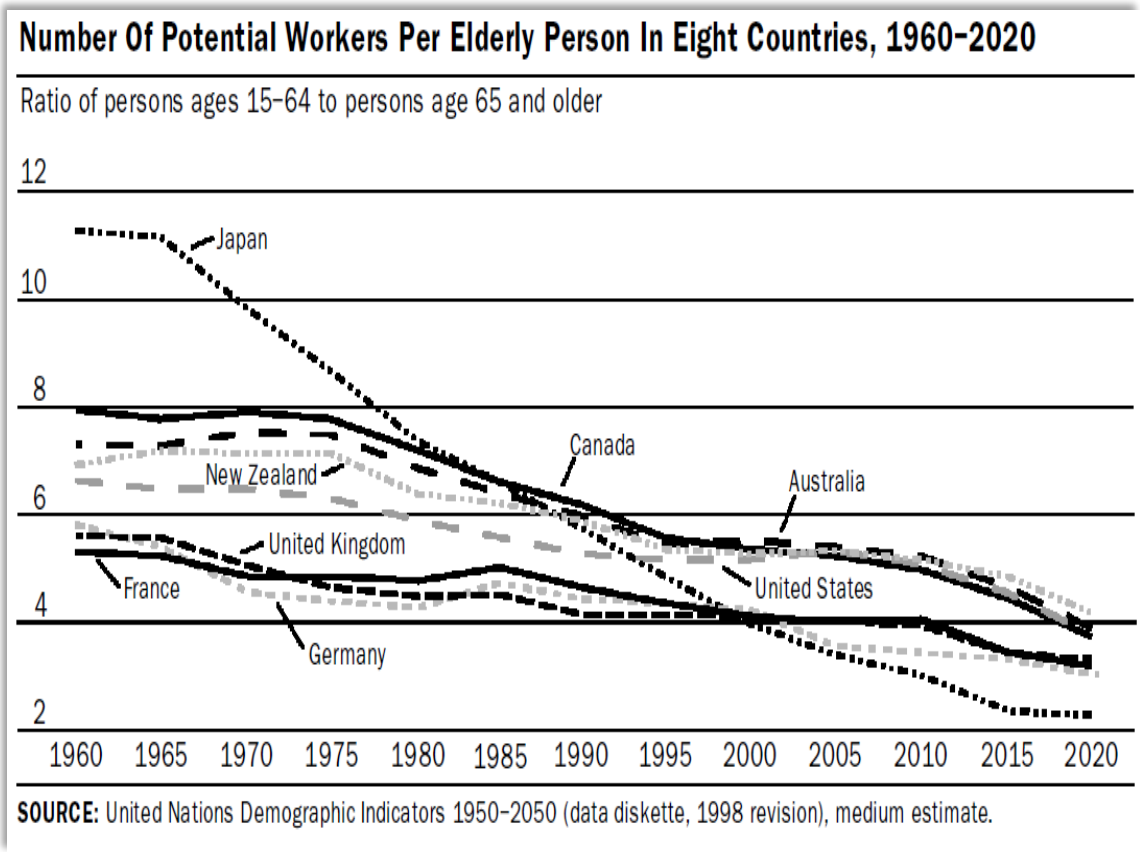


Figure 9. World Population Ageing: 1950-2050. United Nations[52]

The number of face-to-face doctor visits per year in advanced countries exceeds 10 and rapidly points to 15 (already 17 in South Korea)[53]. This trend is unaffordable and unpayable. Most of these visits are made, obviously, by seniors. With technology investments, mainly on remote care and devices to monitor patients at home, Nordic countries are reducing this to 4 or less (Sweden 2,8).

There are only two ways to contain the cost in social and health services: simply cutting them, assuming the impact on the modern welfare society and the political cost; or rationalize their use, by adding technology to get people to use the services strictly only when they really need them. Visiting a doctor to renew a chronic prescription or simply to socialize and walk out home for a while is untenable. Some governments are considering setting up a basic minimal fee per visit, to avoid this

[52] "World Aging". *Archive:Population projections* www.un.org/esa/population/publications/worldageing/19502050 retrieved by Sep 2017

[53] "Number of doctor visits per capita in selected countries as of 2018" *STATISTA Reports* https://www.statista.com/statistics/236589/number-of-doctor-visits-per-capita-by-country/, retrieved January 2018.

behavior. There are much cheaper ways to achieve those purposes. Our services continue to collapse with every flu season. Technology can help us stay healthy without having to physically go to the doctor. First things first: prevent and maintain healthy habits with the advice of a personal monitoring. Then, with unattended remote care for minor illnesses to avoid visiting the doctor if health indicators are under control and basic prescriptions are working, and finally, with remote specialized care for serious but chronic diseases, such as dementia, Alzheimer's, Parkinson's, ...

Keep them at home.

A citizen at a hospital with any disease is a patient, and the responsibility leans on the Healthcare system. Same person with same non-urgent disease at home is a citizen who needs some care or with some dependencies. Then the responsible authority is mainly the city. This is an exponentially demanded services which cities are not prepared for. Anyway, it’s widely proven that the best way to support a person with a chronic disease is by keeping him at home. It’s cheaper for the system, and more convenient for his health. Other alternative for elder people is a nursing home.

With the aging of population, are we all going to end up in a nursing home? Home care should increasingly become the best option to keep the costs of care for the elderly under control. Keeping the elderly at home with remote assistance is more beneficial for seniors and their families than keeping them in a nursing home.

As 90% of older people prefer to live at home, that means they link their happiness with living at home, surrounded by family, neighbors and friends while maintaining access to community centers where they can connect to other seniors.

Some of the **benefits:**

•When the elderly can no longer live in their own homes, they can be taken in by family members and get external assistance from caregivers while family members are at work. Many Nordic families build extra rooms at house garden to keep elderly closer.

•Home is more familiar, therefore if they are kept in their homes as long as possible then they remain happy.

•At home the elderly people maintain some of their independence and confidence even though they may need assistance with certain things. They know where things

are, routines are easier, everything is friendlier. Homes can be adapted to become age friendly.

• It will always be more dignified to live (especially the last years of your life) at home than in a nursing home or hospital.

•Technology can provide with resources at home to assist the elderly. Advanced remote monitoring devices plus modern communications and Artificial Intelligence solutions can provide excellent service while fully respecting privacy.

•Different new technologies help avoid undesired loneliness, connecting people.[54]

Elderly people will have different requirements, depending on their mental and health condition. Intention is to always provide the most positive attitude, balancing:

- Socializing instead of isolation. Avoid undesired loneliness.
- Focus on health more than illness. Enjoy life, every day.
- Activity over inaction. Activity is always better (heart rate, blood pressure, glucose, cholesterol levels are very dependent on activity)
- Better to work on prevention than on treatment.
- Freedom of choice instead of coercion. Always respect human dignity.
- Monitoring to prevent problems or to quickly react against alerts vs 'Big Brother' continuous watching. Privacy right as a must. Avoid cameras when possible.

I can identify four fundamental scenarios where technology can provide a clear, direct benefit in making the welfare society which we live in affordable, when the wave of population in their 50-60's reaches the age of retirement and massive demand for benefits.

1.- Better budget and anticipation of the amount of service to be provided. Currently, most social grants are offered without having analyzed exhaustive data on potential beneficiaries. Goodwill is used… If last year this grant was requested by n people, this year I'm going to increase it by 10% and launch it. This means that many grants are not known, not requested or asked for by those who really need them, but by the readiest and best prepared to request them. With the new massive

[54]COLLIER, C. "Lonely People in Big Cities: How Technology Is Both Creating and Solving the Isolation Crisis" *SmartCitiesConnect* May2019, http://smartcitiesconnect.org/lonely-people-in-big-cities-how-technology-is-both-creating-and-solving-the-isolation-crisis retrieved by May 2019

data technology systems, named Business Intelligence Data Analysis, we can exactly know who is target for a given situation, and we can analyze multiple sources of data that identify the potential beneficiaries one by one. So, instead of publishing a grant on the web, we can proactively go to each potential recipient's home and offer it. And by the way, have a better track of the impact of such grant in few months.

2. Publish the grant and offer a simple, reliable, and fraud-proof method so that citizens can easily apply for such grant. This scenario is the best resolved today. Citizen Relations Management (CRM) systems allow you to register each application and handle the entire approval process. These systems are multichannel and allow all ways of connection (including face-to-face). For each application, a process is opened which culminates in an approval or a rejection, after the verification of data, authentication of the citizen, etc. The main barriers come from citizen knowledge about that grant release and basic computer skills to apply (avoid the digital gap).

3.- Deliver the service. This social service delivery varies from country to country. From the Nordic model where civil servants are directly delivering it to citizens homes (this is very exceptional as only the richest countries on planet can afford this large group of permanent workers cost, making the share of civil servants over total labor force to rise 31% or more), to other models where external companies deliver or NGOs in the poorest countries. Quality of service provided varies accordingly, from well-trained specialized caregivers to low paid almost unqualified ‘visitors’. Here technology is critical to manage that community of caregivers, tasks, appointments, schedules... Another CRM where caregivers’ agendas are managed is needed. This way, the caregiver’s efficiency is maximized while cost of overall service is kept under control. Today, main used technology is SMS and WhatsApp messages.

4.- Technology at home. It’s clear that best place to live for elderly is home, but they need remote aid. Most advanced cities and systems have started to place some technology at home in the form of devices and sensors. The purpose is to know more about current situation there and get alerts on specific conditions. That way, with better info quality, decisions are better informed, service could be more targeted and always scarce caregivers service could be more efficient. And alerts

can save lives, obvious. But filling an ender home with sensor hasn't proven to be a right decision. Two main bad consequences arise: one about data, another about caregiver's service. More sensors don't mean better knowledge. A massive amount of non-integrated info is meaningless. The input from the sensors must be processed with specific tools to provide meaningful information and here, Artificial Intelligence algorithms are critical. It's not a question of getting more data, but recognizing activities, because the neurologist is prescribing activities (taking pills, doing exercises, sleep well,…) and those activities determine the desired quality of live improvement. So, the way to analyze the improvement on happiness and quality of live is not just by asking the monitored person, but to observe that the prescribed good healthy activities are done. Second is about caregivers' service. We can make their duty more complicated or try to assume that they can maintain or operate devices or sensors. Equipment at home must be simple, easy to install once and integrated. Caregivers should only notice that those systems are on place and working, nothing else. Otherwise, they will be the first to reject these new technologies because of the distraction on their main duties. Finally, these technologies must be non-intrusive (avoiding cameras), respectful (could be switched off at any time), and ethical, always considering that at end, they are managing humans and human dignity should always go first and ahead. That way, the value provided by technology will be superior: alerting about any urgent circumstance while creating a home behavioral model (with deep neural networks) to report performed activities, so caregivers can better adapt their service based on real medical knowledge, not only based on citizen answers.

Society's challenges

This ageing population, however, is not the only common city challenge impacting public care services. Other challenges at the center of most political agendas include:

Funding. The ratio of retired to working people is shifting towards the former, leading to fewer taxes to pay for services. Public debt is already outrageous and can't be the solution anymore.

Technology also improves the medical science and healthcare tools (new drugs, visualization tools, less intrusive operations, better diagnosis, preventive care...).

Social inclusion, or desire that none is excluded from accessing public services, due to age, disability, race, ethnic or religious profile.

Expectations of high-quality healthcare, and access to medical advances are not only ever rising, but considered a vital right, whether that be financed and provided by the state or the private sector.

Loneliness (and specifically undesired loneliness) is an increasing problem for elder people in modern societies. Children go out every day for work or move to other city to work, study or follow other opportunities. Mobile communications and online services are also eliminating social contact. Most people aged more than 70 are living alone, which increases the risks and dependency.

Digital inclusion (avoid digital gap); the shift towards online services from public sector is creating the risk of leaving a significant share of people behind, especially among the elderly, the disabled, the poor and the low technical skilled communities.

Access to quality housing; a key bedrock to maintaining good health is also to enjoy decent quality homes.

Migration, with many people moving from the developing world to escape conflict or persecution, or just in pursuit of better life opportunities, the demands on public services and housing are inevitably increasing.

One could write a complete book only on the enormous amount of statistics on these concepts. This is not the purpose of this document; however, some points of reference may be: The UN Enable program published that 650 million people, approximately 10% of the world population, live with a disability, and more updated reports points to 1 billion.[55] The United Nations Population Fund reported that in 2017, 65 million people had been forcibly displaced[56] from their homes around the world. The International Labor Organization World Social Protection Report indicates that 4 billion, more than half of the people in the world, are left

[55] "Resolution 2008/21" *ECOSOC* https://www.un.org/en/ecosoc/docs/2008/resolution%202008-21.pdf p.1

[56] "51st session of the Commission on Population and Development" *UNFPA*, April 2018 https://www.un.org/en/development/desa/population/pdf/commission/2018/documents/openingstatements/Opening_Statement_UNFPA.pdf, p.2

without social protection[57]. Only in the UK, according to AgeUK, 3.6 million elder people live alone, and 1.9 million say they often feel ignored or invisible[58].

Elder people are at greater risk of cognitive deterioration, frailty and multiple chronic health conditions with implications for their independence, their quality of life (and that of their families), but also for the general sustainability of social assistance systems. The challenge now is to develop safe, intelligent and respectful digital solutions for integrated care that guarantee a truly personalized provision of health and social assistance, while consolidating advances in the efficiency of service delivery, and guarantee the trust of users and public officials on access, privacy and data exchange.

Connecting/Listening to citizens. City Co-Creation.

"*Cities have the capability of providing something for everybody, only because, and only when, they are created by everybody*". [59]

Citizens new language is digital and flows thru social networks and instant messaging tools. So should cities use to communicate to them. Citizens are more and more digital humans, savvy technology-enabled people and they expect their cities to react and provide same quality online services (or even better) than those they might get from private sector companies. On the other side of the digital divide, those isolated from or non-familiar with technology are struggling to operate in an online world.

Many cities are investing on capturing data, but not on connecting to citizens. Many city electronic services are provided from a website, and this website is organized by the different areas or city departments responsible for each service or task delivery. This could be an easy to understand model for civil servants, who know very well who does what and what department can serve us at any time. But citizens problems are not organized by that schema. Citizens experience life facts and needs

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[57]"World Social Protection Report 2017" *ILO* published 29 Nov 2017. http://www.ilo.org/global/about-the-ilo/newsroom/news/WCMS_601903/lang--en/index.htm retrieved by Feb2018

[58] "Loneliness". *ageUK*, https://www.ageuk.org.uk/information-advice/health-wellbeing/loneliness/ retrieved by February 2018

[59] JACOBS, J. *The Death and Life of Great American Cities*, Random House, 2002 (first published 1961), republished Entrelíneas, 2013, p.238

associated to them. So, it seems obvious that city services should be designed, organized and presented to match those life facts. Citizens wants their cities to 'put on their shoes' and tell them what to do, who to talk to when the want to move to a new house, or get married, or when they have given birth to a new citizen. Imagine a civil servant knocking on a house door with a bouquet of flowers at hand. Suppose that a couple living at that house have very recently had a baby. They open the door to the identified city civil servant, who immediately says '*Congratulations for the new citizen you have brought to our city. We knew from the hospital. Please, accept this modest bunch of flowers and allow me to help you. Because of your the live fact (you had a baby), you are entitled to receive some city services. Then, she opens a portfolio and suggests: May I offer you registration, vaccination schedule, a kindergarten? What about booking for a school in advance? Just let me know and sign these forms'*. This could be a great example of Zero Administrative model. A proactive way to provide services based on the previous information management or predictive data analysis. Science-fiction? not at all, a fact at City of Hollands Kroon (The Netherlands)[60]. This 48,000 inh coastal city in the North Holland province of the Netherlands is the result of a recent merge from several smaller cities to improve efficiency. First decision was not to build another city hall, but reusing previous buildings and work in a very innovative way: All civil servants telework from home, or in virtual teams and service is delivered as closest as possible from the citizens.

Main six largest cities in Finland work together into an innovation consortium called 6Aika[61]. The objective of 6Aika group is to develop more intelligent services for the citizens to create new economy models, businesses and jobs in Finland. Espoo, the second largest city in Finland with 275k inh, is one of most proactive members in 6Aika. Espoo uses latest Artificial Intelligence technologies for design thinking to proactively predict and anticipate the citizens service demand. Espoo manages around half-a-billion rows of data through its 'datalake' and applies Bayesian methods to make this prediction and provide proactive guidance for citizens. In other words: 'Based on all the data we already have about your past

[60] Hollands-Kroon Video, Youtube https://youtu.be/62f_ktSSMIs . Watch from 1:08 to 1:22 published Jul2016, retrieved by Jan2019

[61] 6Aika https://6aika.fi/en/frontpage/ retrieved by January 2019

experience with city services and your current personal info, we predict that your most probable next service demand will be that one. Accordingly, we proactively provide you guidance and quick access to that service.' The city main goal is to maximize the quality of public services while improving efficiency and cost savings.

Citizens are massively relying on social networks for real-time news, information sharing, and interaction with one another, so they hold large expectations of government's adoption of these same technologies to connect to them.

Here, most of applicable communication methodologies are same as those used by commercial retailers to engage with their customers, creating a community of loyal customers. Four main approaches can be used here: Social Listening, Social Intelligence, Social engagement and Social Citizen Relationship Management.

Social listening. Technology helps to listen to what everybody, and especially your citizens are saying across main social media networks like Twitter, Facebook, YouTube videos, WordPress, and around 4000 existing news publications and other digital sources. It's important to determine main patrons and key words, key influencers, and also alert specific city managers when something especially relevant is on the talks. Sometimes, you don't know previously what you are looking for. The technology will tell you about the main conversational topics, semantically associate them to your hot topics and adapt the search to find what's relevant. The citizens may have been talking about something critical for you in a way, language, code or slang that it's not obvious at first moment. Knowing the key influencers in your city could be important to connect to your community. These people can help city managers to resonate main messages or to stop fake news or other undesired misunderstandings, controlling the message. When Mayor wants to reach all population, especially young people, this link and the viral effect could be of amazing help. To reach for influencers, there are popularity indexes like Klout.

Social Intelligence. Main technology here is Sentiment Analysis. Using Artificial Intelligence algorithms, the tools understand the citizens feelings about a particular topic. The information to analyze includes multilanguage, emoticons, symbols, phrases, specific language nuances and terminology. Imagine how relevant it could be to know the citizens reaction to any breaking news about the city or spontaneous opinions about main projects or activities, not to mention the overall city and

Mayor's popularity. Sentiment Analysis helps cities to prioritize resources, track performance and connect with their communities. 'Automated triage' tools detect intentions to do whatever. With this info at hand, city can react and proactively propose those services or give guidance. If demand seems to be high, capacity to deliver can be extended or increased in advance. Finally, you can obtain a 'Buzz Analysis' to watch a dashboard with insights and rich analytics about location, volume, share of voice, content and sentiment analysis.

Social Engagement

You can participate as well! Apart from listening and analyzing the voice of your citizens out there, Social networks help you to interact from the city own accounts, or Mayor's or other main city leaders' ones. But here you have to play with care: use rich multimedia tools to provide a trustful image and easy to connect message. A strong suggestion is to hire a community manager or social media manager to make a great impact here. Social conversations can trigger internal tasks to provide what's needed or to react to a good suggestion with a new kind of service or just to respond to one question. You can start communication and using all the networks power to share what you want to highlight or announce. This interactivity can build end-to-end complete interactions, from a citizen post to an answer from the city.

The small Spanish municipality of Jun (Granada) has served as a model for MIT on the effective use of Twitter to permanently communicate citizens and civil servants[62].

Social Citizen Relationship Management. You can use social networks as another main channel into your integrated citizen services platform. You can perform social marketing activities, identifying segments of population with specific needs, monitor social movements or track social trends. You can try to control your city reputation, nurture influencers, measure city actions effectiveness and strengthen your citizen engagement, creating the sense of 'belonging'. You can't imagine how much surprised a citizen could be if after complaining on the social web about a particular city service or condition, he receives proactively a response from the city. Comments like 'wow, they are listening, and they respond' are excellent to gain

[62]VENTAS, L. "España: Jun, el pueblo que se convirtió en modelo para MIT por su uso revolucionario de Twitter" *BBC NEWS* published by Jun2015 https://www.bbc.com/mundo/noticias/2015/06/150625_tecnologia_pueblo_espana_jun_twitter_lv retrieved by February 2018.

citizens trust. You can set up alerts as well to help you quickly activate the first response emergency teams.

Most times citizens are reluctant to accept new applications into their smartphones, as they are very much worried about privacy, security and identity misuse. Recent massive data leakages, security breaches, and abuses from companies like Facebook are not helping here. It's even harder to trust on your city services when you have lost confident on the whole network security. Connecting to citizens is not just a question of proposing a new app, it's a question of providing significant value to citizens by using their own communication flows, or create a nice new way to engage with them, making them feel proud of their city (use the sense of belonging to awake their participation and cooperation to collectively build a better city).

And service provided must be as personalized as possible. The more we know our citizens the more personalized that services provision should be. In the latest EU eGov Services Analysis,[63] three main challenges remain for EU countries Government services to match citizen expectations: Mobile-Friendly (only 1 in 4 public Services is fine here); Open&Transparent (only 41% websites are transparent about service process, estimated duration and response times; only 35% websites inform visitors about their ability to participate in policy making processes); Personalized & Simplified (only 45% online forms are prefilled with already known personal data, and in only 4% of cases, services are proactively offered to citizens).

Cities are using creative ways to engage with citizens and make them participate in the city activities. Gamified creative proposals to reward civic behaviors with 'CityPoints' like in the award-winner (World Summit Award APP)[64] application from Cascais[65] (Portugal) are a good example. Those points can later be used for discounts on services and mainly on private purchases due to PPP (Public-Private-Partnership) agreements like discounts for the movies or restaurants. That way, participation is encouraged and rewarded. There are many other examples like Istanbul offering free transportation tickets in exchange of recycling items, or

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[63] "Future-proofing eGovernment for the Digital Single Market." *EU*. June 2015 https://publications.europa.eu/en/publication-detail/-/publication/465ec58b-e6ab-4043-9a72-5cccd2d5b270/language-en retrieved by January 2017

[64] "City Points Cascais", *WSA*, 2017 https://www.worldsummitawards.org/winner/city-points-cascais/ retrieved by March 2018

[65] "CITYPOINTS" *CASCAIS* https://www.cascais.pt/citypoints retrieved by March 2018

Rotterdam rewarding workers with cash in salary per km when go working by bicycle. Copenhagen is providing creative grants for citizens who contribute to the collective task to become carbon neutral by 2025. Gamification on recycling is a clear trend. City of Santander (Spain) 'CityBrain' Active App to interact to citizens and generate ideas crowdsourcing is another clear example. [66] Madrid holds a nice initiative "*Madrid te abraza*" or "*Madrid Hugs you*" to try to connect and engage to citizens, highlighting its sense of hospitality and capacity of reception, easily integrating expats, as new city icon.[67]

In Seoul, citizens gather in squares to talk. In Vancouver they do it in gardens and civic centers. In Madrid and Seville and many other cities, a significant % of municipal budget is allocated to collective decisions (participatory budgets). While these initiatives are not yet popular as they should and many times we can observe the 'same 10 people attending to the same meetings' phenomenon, it's clear that this is a growing trend, empowering citizens.

One of most innovative Artificial-Intelligence (AI) based recent tool to interact with citizens is a bot (or chatbot). Very popular at main commercial brands websites, a bot in a city is like a virtual civil servant or a virtual robot which responds to queries or chats from citizens or visitors. Fueled from a knowledge database made of questions and answers, an AI engine to get trained and enhance accuracy with every interaction, a bot is a virtual assistant designed to operate 24x7 providing information or advanced services from the city. Interaction is made by natural language. Many cities are testing or providing services with this new technology like Copenhagen, North Charleston (US), Kansas City, LA, Boston, Birmingham (UK), Vienna among many other.

A final reflection on connecting to citizens: Same as US President John F. Kennedy once said, "*Do not think what your country can do for you, but what you can do for your country*."[68], we should question ourselves what we can do for our city, not just demanding services. Ok, we pay taxes, but it's not only about money, we can contribute with our time, dedication, giving, philanthropy, or just by reporting things that must be fixed, or providing our opinion about what's working well or

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[66]"CITYBRAIN" *Santander* https://www.santandercitybrain.com/ retrieved by April 2019
[67]"MADRID TE ABRAZA" https://www.esmadrid.com/madrid-te-abraza retrieved by May 2019
[68] "President John F. Kennedy Inaugural Address 'Ask Not What Your Country Can Do For You'" Video Jan 1961 https://www.youtube.com/watch?v=P1PbQlVMp98 retrieved January 2018

not. Cities are putting on place eDemocracy solutions and offering participative budget assignments. eDemocracy solutions are fine to get a pulse on citizens' opinion, but cannot replace voting as full population reach is not guaranteed. Even with the best electronic identification systems to certify the identity of the user, we cannot guarantee the impersonation (the granddaughter who votes on behalf of the grandmother or just placing herself right behind saying 'what to do' to exercise the vote). Anyway, the modern tools to pulse citizens opinion must be used and considered. Its capacity to improve community participation and engagement, take real-time pulse, interact with city officials (even directly to Mayor), explain city projects, influence city decision making, and raise awareness is unquestionable. Another reflection is about who's best to connect to for city cocreation. Mid-Class citizens are here hyper relevant: first because societies with larger mid-class are proven to be the wealthier and most developed, and most relevant, because mid-class citizens are eager to improve and contribute for city development and cocreation. Plato[69] wrote that a city needs mid-class because that group doesn't fight for power or against poverty, but to create a more prosperous city. In our times, this is still very patent: richest don't take care about city but about their properties, poorest just fight for survive, mid-class citizens want to create a better city, so they will thrive as well. They want to enjoy the best conditions to grow, and the city sets the conditions for that to happen.

Citizens Trust (CyberSecurity, Privacy, Compliance). GDPR

But if we want the citizens to trust on our cities managing and handling their identity, data and services, we must ensure a proper use of them, with the maximum security and privacy respect, while observing the strictest compliance laws (most important in Europe – GDPR).

McKinsey Cybersecurity report describes the main digital technologies threat: Data breaches.[70] Since 2011, mayor cyberattacks have successfully obtained access to all

[69] PLATO, *Republic, Book IV*, 380 BC, 422a1to 425a

[70]POPPENSIEKER, T and RIEMENSCHNITTER, R. "A new posture for cybersecurity in a networked world" *McKinsey*, published by Mar2018 https://www.mckinsey.com/business-functions/risk/our-insights/a-new-posture-for-cybersecurity-in-a-networked-world retrieved by October 2018

kind of data, identities and intellectual property. Names like Dragonfly, WannaCry ransomware, NotPetya ransomware, Meltdown and Spectre to mention some and also the recent Facebook data exposure scandal are creating the feeling that our virtual world and the overall www is an unsecure place. Only 16% of main world companies say they are well prepared to deal with cyber risk. According to Gemalto's 2017 Breach Level Index report[71], approximately 4 million data records were compromised every hour during the first half of 2017, growing 164% versus prior year. Identity theft was the most frequent type of data breach. Cybercrime alone costs global economy over $445 billion every year and growing. [72] Data privacy issues have impacted (and causing full project to fail) many city projects like first eVoting in Barcelona by 2010 or Quayside, a conceptual Google's smart neighborhood in Toronto.[73]

A modern protection strategy in a data sensitive entity such as a city must use the available tools to build the right defenses and reject attacks, but it must assume that hackers have already entered and look for where the hole is and what information they have achieved. It is clear that a virtual war is happening worldwide, where some try to seize information and / or control over others. A large entity can receive hundreds of thousands of attacks every day. Although there may be surprises due to breaches in the security of current systems, we can assure that the good ones are always winning the battle, although we must always be prepared for an unexpected problem or human error (misuse of passwords,..). Risk is present and growing. If we consider that by 2020, 46% of all Internet-thru interactions will be machine-to-machine, without any human operators, security must be unbreakable. Main technology companies are cooperating with government agencies to monitor network security. Main large Datacenter providers offer extreme security to all

[71] Gemalto https://www.gemalto.com/press/pages/first-half-2017-breach-level-index-report-identity-theft-and-poor-internal-security-practices-take-a-toll.aspx, published Sep2017, retrieved by November 2018

[72] "Cyber crime costs global economy $445 billion a year: report" *Reuters Technology News* https://www.reuters.com/article/us-cybersecurity-mcafee-csis/cyber-crime-costs-global-economy-445-billion-a-year-report-idUSKBN0EK0SV20140609 published Jun2014, retrieved by April 2018

[73]SUMMERS, N. "Google's smart city dream is turning into a privacy nightmare" *engadget* published by Oct2018, https://www.engadget.com/2018-10-26-sidewalk-labs-ann-cavoukian-smart-city.html Retrieved by Dec 2018

entities. This is especially relevant for those which can't afford the needed systems and personnel to protect by themselves.

In terms of Privacy, most governments are taking citizens sensible data with the expected care. Legislation varies from country to country, but worth mentioning GDPR. GDPR[74] or General Data Protection Regulation is a mandatory European law since last May 2018, which protects any European citizen data privacy managed by any company or Government organization. Citizens have the right to know which data any entity has about them, they can order to delete, forget, or transfer to other entity. Owning data without express consent or transferring or dealing with it without permission may lead to fines worth the maximum between 20 MEUR or 4% of annual turnover. That way, the cost of not observing the law is bigger than investing on a methodology to keep citizens privacy protected. We can say that Europeans enjoy the most protective privacy system in the world. Many non-European companies and governments are endorsing that rule.

Privacy is Human Right[75], recently said Microsoft's President Satya Nadella. One of most common controversial discussion topics here is facial recognition. It's clear that this advanced AI technology has an immense potential to solve society problems like finding missed children, diagnose diseases or identify bad guys even in a crowded space, but legislation and regulation must be placed to avoid undesired dystopias like George Orwell's '1984'. In this article[76], Microsoft President's Brad Smith explains that governments could follow anyone anywhere by 2024, in a scaring real implementation of a 'Big Brother' concept same as shown at '1984'. So, many civil organizations are rising their serious concerns about this possibility. It's clear that regulations and an ethics code are more than needed at global level. A new revision of UN Human Rights declaration? Microsoft's leader is also pointing to another serious topic: facial recognition and other AI-Ethic issues are developed by the technology companies as part as their continuous race to innovate, compete and release the most advanced products to market. This may collide with

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[74] EU-GDPR https://gdpr.eu/ retrieved by May 2018

[75]"Privacy is human right: Satya Nadella" *India new England News* http://indianewengland.com/2018/11/privacy-is-human-right-satya-nadella/ published by Nov2018, retrieved by January 2019

[76]NICKELSBURG, M. "Could '1984' become reality by 2024? Microsoft's Brad Smith calls for regulation of facial recognition" *GeekWire* https://www.geekwire.com/2018/1984-become-reality-2024-microsofts-brad-smith-calls-regulation-facial-recognition/ Published Dec2018, retrieved by January 2019

citizens consent and privacy. So, another Ethics-code at development phase should be agreed between all market actors, including fairness, privacy respect, allow other parties testing…to avoid the legitime commercial interests to prevail over citizens privacy or force companies to decide whether to stay competitive with intrusive solutions or simply loose market. And this must be another global decision as ethics and commercial scruples also very much vary country by country.

Privacy (physical or virtual) is a right and an exercise of our human dignity. We must trust in well-used technology, for it frees Man from the bondage of the environment. Technology allows us to avoid natural evil, controlling the elements and overcoming diseases, allowing us to enjoy more time of creation, its beauty and other humans, taking advantage of that extra time for the good of humanity. It is us and not technology, those who use it in an improper and tortuous way, we pretend morally bad ends, such as the manipulation of information, the theft of virtual identity, the control of the world from the web, transhumanism, etc. By its intention, technology is good and makes us live in the most developed and perfect moment of human being entire existence.

1.3 DATA: XXI Century Gold

Data is to this century what oil was to the last one.[77]. If Data is the fuel, then AI (Artificial Intelligence) is the engine of 4th Industrial revolution. Data means knowledge, knowledge means power. For a city, data means capacity to generate services and value to citizens, control the environment, anticipate to risks, quickly respond to natural or human-provoked disasters, create a better place for living, a more competitive an attractive city and a more efficient one, saving time and resources from citizens and also, saving lives because of creation of better environmental conditions and reducing crime and traffic accidents. Data is gold, it's needed, mandatory, but it's not the objective, it's the enabler to create modern services and make well informed decisions in a city. In the use of data, Cities must think as women, in the way Chad Eastham explains in his book "*Guys are waffles, Girls are spaghetti*"[78] where cities should operate by a more interconnected way (same as women brains) and less split into isolated data silos (as men brains do).

Power Shift to DATA. Internet of Things (IoT)

Intelligent (smart) cities use information technologies to create a better place for living, developing new businesses, caring for the environment, attracting investors, and raising high standards on Education, Healthcare, Safety, Justice, Democracy and Wealth. With Cloud datacenters power and scalability, data management systems costs are decreasing, while capacity is exponentially lifting off. In parallel, we are spectators of a data explosion phenomenon, with huge volumes of data daily created by myriads of devices, sensors, smartphones, gadgets, … things? According to IDC[79], our datasphere (global amount of data stored into digital systems) will reach 180 Zettabytes (Zb) by 2025. A Zettabyte is an incredible amount of data, far

[77]"The world's most valuable resource is no longer oil, but data" *The Economist*, published by May2017. https://www.economist.com/leaders/2017/05/06/the-worlds-most-valuable-resource-is-no-longer-oil-but-data retrieved by January 2018

[78] EASTHAM, C. *Guys are waffles, Girls are spaghetti*, Thomas Nelson, Nashville, US, 2009

[79]KANELLOS, M. "152,000 Smart Devices Every Minute In 2025: IDC Outlines The Future of Smart Things" *Forbes*, published by Mar2016 https://www.forbes.com/sites/michaelkanellos/2016/03/03/152000-smart-devices-every-minute-in-2025-idc-outlines-the-future-of-smart-things/#469096cf4b63 retrieved by February 2018

more than what our brains can understand, exactly 10^{21} bytes. If just one byte is a combination of eight 0s or 1s and can represent one of the letters of this document, try to think about how massive that number is. This will happen thru an accelerated ratio, growing from 4,4 Zb by 2013 to 44 Zb by 2020. Today (2019) growth is mainly due to massive generation of multimedia data from smartphones (72% of all that newly generated data is multimedia). Another approach to that acceleration could be the fact that we are generating in one year more information than in all past human history. Future massive acceleration will mainly come from information generated by sensors (at cars and other large number of items) and transmitted by next generation high speed networks: 5G. This new world is named as Internet of Things, (IoT) as we are connecting everything which can be controlled or monitored to Internet, generating data. In a Cisco report[80], mentioning Gartner as data estimation source, it's stated that 1 Million new devices will go online (adding over the IoT) every hour by 2020.

We are spectators of our cities being sensorized. Millions of sensors are installed in our cities to capture more and more data about everything measurable there. The IoT sector was born by 2008-2009 and is growing into a trillion-dollar industry in this next decade.

Looking to the future, Cisco IBSG predicts there will be 50 billion devices connected to the Internet by 2020. See figure 10.

So, Cities can be ruled based on data, and make better informed decisions, as Barcelona's Major Mr. Trias once said, '*I want to rule my city based on data, facts, not rumors, isolated opinions, partial surveys or wishful thinking'*. To allow this, new Predictive Analytics tools facilitate them to anticipate issues, become more resilient and deliver a better service, saving money, time and lives. Because of this relevance of data in the city governance, all cities are seriously considering hiring Data Scientifics.

[80] COLUMBUS, L. "Gartner's Top 10 Predictions For IT Organizations In 2017 And Beyond" *Forbes* published by Oct2016, https://www.forbes.com/sites/louiscolumbus/2016/10/19/gartners-top-10-predictions-for-it-organizations-in-2017-and-beyond/#758d541d59fd retrieved by October 2018

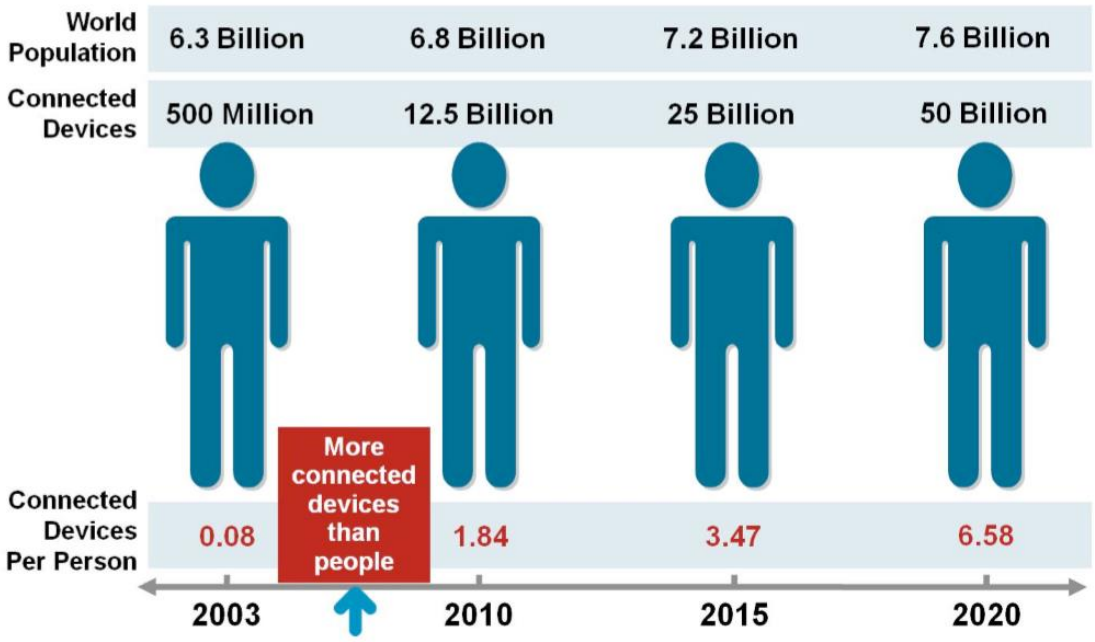

Figure 10. Cisco prediction about IoT Connected devices. Source: Cisco IBSG, April 2011[81]

IoT will help make life in our cities more comfortable, safe and sustainable. On the safety area, cities are among the largest users of IoT enabled cameras. They use other IoT devices to track environmental conditions such as temperature, humidity, air pollution, gases and fog density, or to manage traffic status or make parking an easy task. There are many available parking apps for your smartphone to save you time finding a free spot nearby your destination. Another very popular use is Streets lighting. Replacing old bulbs or yellow sodium-vapor lamps by modern LEDs improves quality of light while reducing energy consumption to a fraction. But if you equip those light poles with IoT technology, then you can take control and improve savings even more. With sensor technologies capabilities, the light can dim down at night if nobody is around or no movement is detected, then dim on when needed. In parallel, you can remotely control them to provide extra illumination to a particular area if needed, to better manage an emergency or special event. Savings are so clear that these projects are obvious examples of Energy savings performance contracts (ESPCs) or projects which pay off by themselves.

[81] EVANS, D. "The Internet of Things. How the Next Evolution of the Internet is Changing Everything" *Cisco* published by Apr2011 https://www.cisco.com/c/dam/en_us/about/ac79/docs/innov/IoT_IBSG_0411FINAL.pdf Retrieved by March 2017

Since we are connecting cars and those cars are smarter, so much that they are becoming autonomous, the impact on urban mobility will be enormous. Connected cars, streets and roads are among the largest next generation IoT users. When we are driving, we watch and process many different images, places, road works, other cars, traffic signals, weather conditions, road conditions, pedestrians, bicycles, other vehicles, emergency vehicles, etc. All this massive amount of information must be processed into an autonomous car in real-time to make precise decisions in a tiny fraction of a second. And more, the autonomous car will interact and share info with the city (road, traffic system, traffic management) and other users/cars. All of this should flow thru the IoT network. Two examples: In one way, 'the road' will inform the car about the presence of a patch of ice in the short distance, or an ambulance approaching in the same way. On the other, the car can report unexpected slow traffic or congestion or the beginning of raining. These connected cars/roads will make life easier and safer.

Artificial Intelligence (AI) needs a massive amount of data to take into account all potential aspects of a particular topic to model or simply to have sufficient experience (data from same process observations) to create a model or understand patterns and behaviors. IoT is the main source for that needed data.

Modern C-ITS (Cooperative Intelligent Transport Systems) integrates IoT information from cars, roads, and traffic systems, and makes possible to prioritize green lights for an ambulance fast drive while slowing and placing apart all existing traffic managed by intelligent-enough or autonomous cars.

All citizens hate red traffic lights and with the speed at which our society moves, it looks like an irksome waste of time. With AI[82], the traffic lights and autonomous cars are interconnected informing each other about their proximity and speed. This will make it possible for the stops and delays to be the minimum and strictly necessary to avoid accidents, maximize the use of space, prioritize their use for emergencies, etc. So, each intersection will manage itself and synchronized with

[82] McCANEY, K. "4 Examples of How AI Can Make Cities Smarter" *governmentCIO*, published by Mar2018, https://www.governmentciomedia.com/4-examples-how-ai-can-make-cities-smarter retrieved by September 2018

the overall system. Predictions point to wait times at intersections reduction by 40% and overall traffic time improvement by 25%. [83]

Cities started to gather data from all city-related items sometime in the 80s, but that info very much depended on the owner department and was managed on an isolated way, on-premises, siloed solutions. When Internet came in the 90s, cities were enabled to use webpages and portals to present data from all city in an integrated way by a unified view. But the backoffice data wasn't really integrated. Websites were just a presentation layer over those multiple scattered systems.

Then, at 2010s, large external (public) datacenters started to offer massive computing and data storage rental services at affordable prices to cities, which made possible the dream of knowing everything about everything potentially connected to internet. Cities start to proactively publish data of general interest (opendata) and embrace the Internet of Things (IoT) revolution. Most deploy a large number of sensors to 'sensorize and control the city'. First models were sending all taken information to the Cloud. A second generation does some aggregation of data first, then sending it out. Latest generation of sensors and devices are intelligent enough to do some kind of data processing directly, which is referred as 'the edge', so they have some intelligence and sometimes some artificial intelligence to provide very advanced capacities to the overall system. This intelligent edge allows to connect items to items without the need to pass through a central brain at the Cloud, so they can work very independently and quickly react to special circumstances. Cloud intelligence will process complex tasks or supervisor the full service. In other words, rather than placing an autonomous car sending data to the Cloud and then wait for a response, the car and the traffic pole can communicate to each other directly. Next step will be to replace the red light (saving energy on lights) by an intelligent pole that is connected to and allowing the car to pass or not according to the context, so the chance to have to stop (wasting energy on the break) will be very little, and the traffic flow will get improved. Who needs lights if cars are 'talking to each other' alerting about their presence, speed and intentions?

Artificial Intelligence will change our lives, that's clear.

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[83]EBI, K. "Three new ways AI is helping cities to become smarter" *SmartCitiesCouncil*, published by Aug2018, https://na.smartcitiescouncil.com/article/three-new-ways-ai-helping-cities-become-smarter retrieved by August 2018

With all this data, we need to create a model to watch it all and extract the slice of information needed at every moment for different purposes. That model is commonly named as a 'Digital Twin'. A Digital twin is a digital model or 'avatar' of a physical thing, maybe a building, a factory, a house, a company, or a whole city. The concept relies on gathering all available data for that particular thing, apply data analytics tools and AI algorithms to better understand how that thing operates to increase its performance, predictability and profitability. For a city, a key first step is to choose a way to place everything at the right place, as all services and city management decisions are always geoposition dependent. So, first we need a cartography system to position things over. Then, we need a way to visualize those things, using images, 3D draws to create a virtual city layout like on a 3D canvas. Once we have this virtual representation of everything, we need to define what kind of data we want to use to describe every item. It's not a question of available data, but the one informative or relevant for our final management purpose. There are some standardization initiatives to create semantic models for city items or processes. That way we can define what's relevant to be measured and compare cities to cities talking about same items. For example, to compare waste management efficiency between different cities, we have to use same data (number of dumpsters, collection frequency, waste weight, recycling share, etc). Some models are CityGML[84], ISO TC211[85], Ancha[86] model developed by City Protocol Society (See figure 11), and FIWARE[87] data models, to mention the most relevant. With these models ready, all we need is the data. Data will be permanently collected from the IoT world (sensors, drones or other IoT devices). This raw data will be preprocessed on origin (edge) or later at the Cloud, with advanced analytics and Artificial Intelligence (AI) algorithms or advanced version of them like machine-learning or deep-neural systems to gain real-time insights. These insights deliver very valuable knowledge about any city item or the city as a whole system. We can analyze the performance, profitability of any item, but also we can interact with it depending on the conditions (ie we can modify the patterns for red lights according

[84] "CityGML: An Open Standard for 3D City Models" *dm*, published Jul2006, https://www.directionsmag.com/article/2898 retrieved by February 2019
[85] ISO/TC211 https://www.isotc211.org/ retrieved by February 2019
[86] Cityprotocol http://www.cptf.cityprotocol.org/ancha-public-comment retrieved by January 2014
[87] FIWARE DATA MODELS https://fiware-datamodels.readthedocs.io/en/latest/ retrieved by February 2019

to the circumstances). Very important to know that the main benefits from this approach are coming from different items integration and cooperative tasks. Due to the information from sensors in one area, I can decide to increase the service frequency in other or reduce risks by actuating on the items in another. And finally, if we add the most critical information: all we know about our citizens (taxes, properties, vehicles, water, energy consumptions…personal health information…or why not, bank cards transactions…and their postings into social networks) we can create full integrated city services. For example, alerted by our sensors about a fire in a drugstore, we can immediately send the emergency services, prioritize the traffic routes, analyze the wind direction and alert the citizens who live around to not to open the windows in the next hours to avoid potential toxic smoke, etc. And we can deliver this service instantaneously and automatically, without any human decision in between, again, due to Artificial Intelligence systems in place.

So, the IoT world is clearly a revolution in the overall city management and operations. Some additional examples of challenges where IoT benefits are clearly helping to tackle could be:

"*More than 500,000 people dead prematurely every year due to poor air quality in Europe*." (Libelium IoT Applications Report [88])

2.1 billion people do not have access to clean and safe drinking water at home, water demand is expected to increase by 33% by 2050, and a long list of water related huge challenges (United Nations)[89].

Weather natural disasters such as storms or extreme drought caused between 2005 and 2015 world-wide losses of $26.5 billion and biological disasters, such as pests and infestations, caused crop losses of $9.5 billion[90].

In San Francisco, a report concluded that a smart parking solution could reduce a 43% the time wasted looking for parking**,** a 30% the miles traveled with a vehicle

[88] LIBELIUM http://www.libelium.com/resources/white-papers/ retrieved by April 2019
[89] "Water" *UN Peace, dignity and equality on a healthy planet* https://www.un.org/en/sections/issues-depth/water/ retrieved by April 2019
[90] Libelium report inspired by FAO. http://www.libelium.com/libelium-summarizes-the-most-demanded-features-of-iot-technology-for-smart-agriculture-in-a-new-quick-report/ FAO: http://www.fao.org/home/en/ both retrieved by March 2019

searching for a parking, the 8% of the overall traffic volume and the 40% of greenhouse gas emissions. [91]

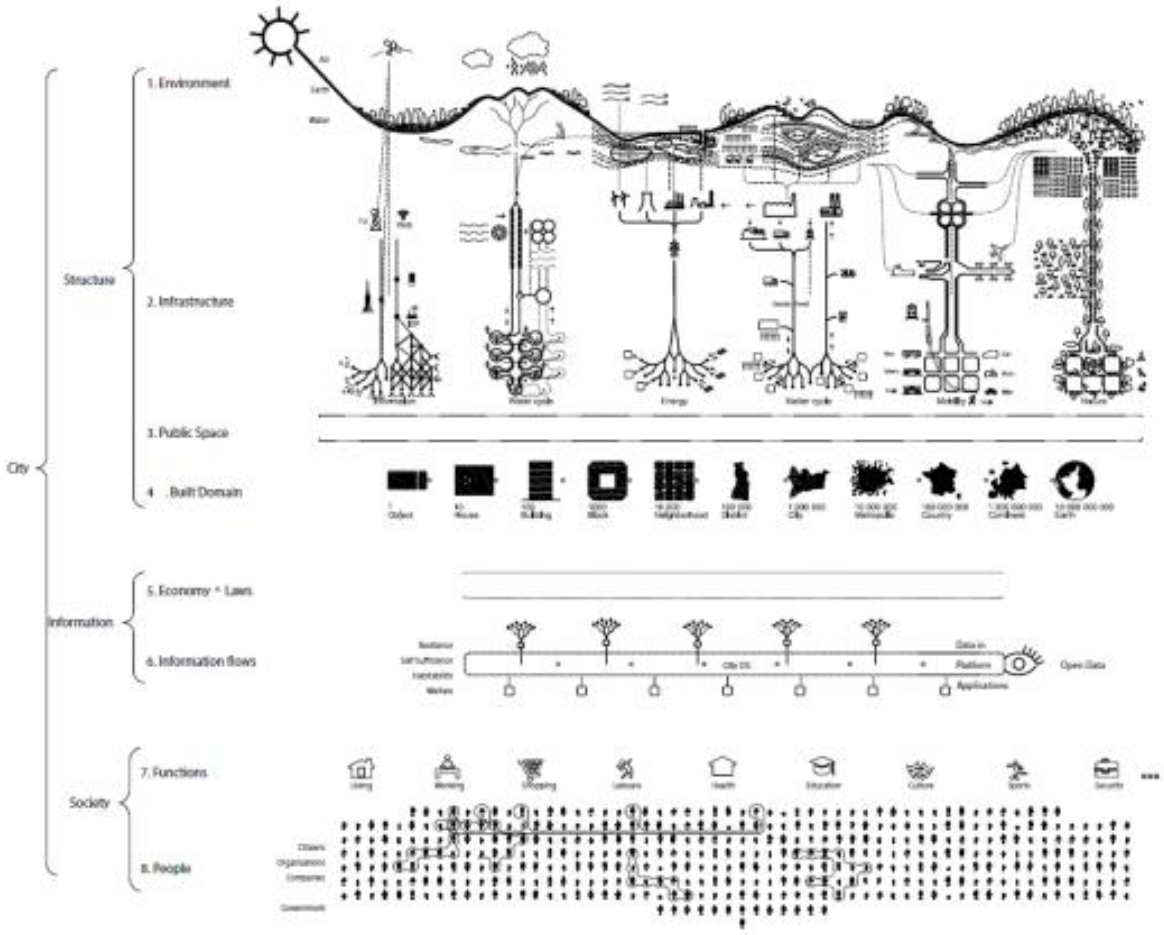

Figure 11. ANCHA City model as descripted by City Protocol Society

A reflection about data and sensors everywhere.

Massive sensorizing is creating the confusion that Information Technologies departments should capture whatever data they can, by installing millions of sensors everywhere, just because they have enough power to process that huge amount of data. But the real question is: how much of that obtained raw data is transformed into insight, knowledge to provide a better service or better informed decisions?

[91]"Benefits of Smart Parking: How Smart Parking Reduces Traffic" *parkingnetwork*, published Nov2018 http://www.parking-net.com/parking-industry-blog/get-my-parking/how-smart-parking-reduces-traffic retrieved by April 2019

Should we better first think about which applications and analysis we want to perform, then get the needed data? Currently, most cities are not even extracting the value from the data they already have. Should we start from this? Info about our citizens, their interactions, payments, opinions, grants, reports is already there, ready to provide pure gold conclusions for a better governance.

It's not about installing a plethora of sensors across the city, but obtaining relevant info which could produce knowledge with some rules in mind:

- Data acquisition cost must trend to zero.
- Prioritize data sources and types.
- Avoid exponential costs. (Avoid those sensors that imply using a phone id, or an IP address, as an example)
- Keep install, and especially maintenance costs under control (ie. Think it twice about installing battery-powered sensors buried into asphalt...)
- Get ready to cope with ambiguity, as no standard is defined for them all.
- Be careful with sensitive data. Stay GDPR/Other applicable regulations compliant.

While a sensor to measure water quality seems vital, a sensor on each and every light pole will hardly pay off. We can easily identify many other more priority/useful locations/functions for that sensor.

Connectivity. The 5G Revolution.

There are more mobile phones in the world than humans, and almost all of them are smartphones that allow you to connect to the Internet. At the most basic level of data transmission we have telecommunications infrastructures. Traditionally, these were wired infrastructures, with copper cables, then fiber, but increasingly we have enjoyed wireless infrastructures also where the capacity is increasing exponentially (name, year of launch, main new standard, maximum speed of data transmission) 1G (1979, AMPS, 2.4 kbps), 2G (1990, GSM, 64 kbps), 2.5G (2003, GPRS / EDGE, 384 kbps), 3G (2000, UMTS, 2Mbps), 4G (2010, LTE, 100 Mbps), WiMax, WiFi, satellites, and now 5G (2015, OWA / OTP, 20 Gbps). By looking at these numbers, it is easy to calculate the accelerated capacity increase ratio from 30 to 50 to 200 times every 10, then 5 years. All this requires constant improvement and renewal

of the telecommunications network and infrastructures through which these data are transmitted. This phenomenal growth in capacity must be accompanied by a global network that connects the information from where it is stored (Servers connected to the World Wide Web) with the users that require it at every moment. Wireless technologies cover short distances. For long distances fiber optic cables are used. These elements have also been improving exponentially in recent years. As an example, one of the latest most advanced submarine cables installed: MAREA.

MAREA[92] has been called the 'mother of all cables'. Costed by Microsoft and Facebook, this 4,100-mile cable can transmit up to 160 Tbps, which makes it the largest capacity on Earth. Connecting Virginia Beach (US) with Sopelana (near Bilbao in Spain), MAREA aims to improve communications between the US and Southern Europe as a gateway to a growing demand from Iberia and even further South, from Africa, alleviating the traditional mass traffic between the US and the British Isles and contributing to offer a reliable high-speed connection for online and cloud systems (Cloud, or large datacenters). MAREA main innovation is the use of eight pairs of fiber instead of the traditional two in this type of cables.

I understand that for many people this type of figures seem great, but most times one does not really perceive its dimensions. By doing some calculations, we can estimate that this cable can transmit the entire National Library of Spain (about 20M books or all ever written in Spanish throughout the history) 3 times every second.

In short distances, connecting the elements of a city, the new 5G technology represents a revolution in capacity and connectivity. It is about extreme speed in short interaction. Very little of the instant information transmission activity is going to require cables like MAREA. If we think of an autonomous car, it will fundamentally interact with the infrastructure of the city: traffic lights, traffic management systems and other relevant local data. In these short distances is where 5G will develop its full potential.

If we compare it with the current 4G, this new technology allows transmission speeds of up to 20 Gbps (x100 - x1000 vs 4G) (x1000 Number of concurrent devices), latency or time between communications <1ms (/ 30 to / 70 vs 4G), which

[92]KRISHNA, S. "Microsoft and Facebook's massive undersea data cable is complete" *engadget* published by Sep2017 https://www.engadget.com/2017/09/25/marea-data-cable-is-finished/ retrieved by January 2018

is really needed to connect the exorbitant growth of the IoT. These improvements will pave the way for many new smart city applications, including, but not limited to, smart buildings/homes, excellent traffic improvements, city resiliency and ability ti quickly respond to alerts or natural disasters and autonomous vehicles. To achieve these parameters, you need many more antennas (x10 - x100), which although smaller and discreet 'Small Cells' (Pizza Box size) with a range of 200 m will not avoid controversies on aesthetic aspects, not demonstrated impact of radiation on health, etc. In addition, by increasing both its number and its cost, so the decision to massive deployments based on profitability will be more questioned than ever. The telcos are still trying to make their return of investment and profitability from past 4G investments and the fees they had to pay to governments for their licenses. In addition, most of them drag a huge debt. The increase in cost due to the higher density required in 5G antennas will make the implementation decision obvious in business centers and commercial centers in the cities, and unprofitable out of there, relegating rural areas to inferior, cheaper, or more outdated technologies. 5G will not reach these areas, or will not do so for a long time, increasing the technological gap, and therefore diminishing the possibilities of development and attracting talent from those rural areas and small cities. Access to broadband is been considered as important as human rights. Not enough bandwidth means no chance to grow/thrive, no opportunity in the new postindustrial knowledge era. I could listen to some US rural areas during last President elections campaign claiming for the inclusion of 'good-enough bandwidth' as a Constitutional right. Linked to this, city connectivity is considered as one of key city attractiveness attributes.

5G is not only better speed and connectivity, it includes many advanced features to improve the way devices communicate, use the network, prioritize and operate. A great advance for IoT.

Teleworking on Duty. Place Civil Servants closer to Citizens.

New technologies can also empower civil servants, helping them to deliver a better service while improving efficiency, satisfaction on duty and proactivity. The new technologies availability together with the continuous renewal in city workers,

replacing retiring servants by native-digital educated young people who are willing to build careers in civil service are creating the conditions to seriously think about teleworking as a valid public function working option. To my observation, 75% of civil servants could telework (25% already serve out of offices, 25% should stay on traditional duty because of the service nature and requirements). With new technologies like smartphones, portable computers, and applications and data fully accessible from anywhere, anytime from the Cloud, civil servants could easily get mobilized and telework, with the aim to deliver their duty closer to citizens, improve efficiency and work-life balance.

The already mentioned city of Hollands Kroon (The Netherlands) example, designing a new way of work for civil servants, with all of them organized into virtual teams, working from home or wherever, has demonstrated the expected increases in efficiency and servants/citizens satisfaction. Municipality employee's morale is up, labor absences and costs are down (saving on space and electricity, not to mention transportation costs and emissions). In parallel, the employees have access to all the information they need from the cloud, under a fully digitized service, being able to analyze the data when needed and improving decision making. "*We are well aware that society is changing, so we are focused on strengthening the accountability and self-reliance of both our employees and our citizens*", said Jaap Nawijn, Mayor. In the explanatory video[93], we can see a civil servant approaching a house with a municipal electric car. She knocks on the doorbell and opens the door to a young couple with a newborn child. Surprised, they ask if something goes wrong or maybe a tax has not been paid on time. Just the opposite, the official gives them a modest bouquet of flowers and congratulates them on the birth of their son. (Note: This area of Holland is mainly dedicated to flowers agriculture). Being informed by the hospital of the birth of their son, the official offers them the set of services appropriate to that moment, to that particular life fact. Then, in the home, the employee opens a folder and offers newborn registration services, vaccination calendar, kindergarten, prebooking school, etc. It is a clear example of how a proactive administration anticipates and offers the services that match to the life fact that citizen is living.

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[93] Hollands-Kroon Video, *Youtube* https://youtu.be/62f_ktSSMIs . Watch from 1:08 to 1:22 published Jul2016, retrieved by Jan2019

In the same way, a city official could go proactively to visit groups of companies which need some permits or have access to new grants or certain people who need social services and offer them proactively.

Transforming the employees of the city into 4th Industrial Revolution workers requires a transformational and cultural change, as well as an investment in technology. Most public workers are vocational and want to explore what new technologies can help improve the quality of their service. Therefore, they are willing to face the challenge. In a survey conducted in 2017 by Thornton Review, it was found that although 90% of the city's employees seek to improve their productivity, only 55% believe that they have the necessary skills and resources.[94]

The benefits of a digitally equipped workforce are enormous. These investments improve the ability of city employees to do their jobs and increase public satisfaction. They allow to offer better services with the same personnel. Equally important, the opportunity to break new ground with modern technological tools also makes it easier to attract and retain talent.

When I have talked about teleworking with public administration directors, I have always encountered the same objections: efficiency will be hard to measure, we will lose in coordination, the public function law does not allow it, etc. With the bad public image that government officials have in many countries, where citizens very unfairly think they have a great absenteeism, work little and we should not hire more, imagine if we send them home to work without control ... I firmly believe technology has already shown in the private sector that teleworking is excellent and can be executed with all the controls and efficiencies, and that in the public sector we should learn more from the Dutch pragmatism and simplicity applied in Hollands-Kroon.

New DataCenters. Cloud Computing

[94] "*Public Sector Innovation and the Culture Factor*", *The Thornton Review*, published by Feb2017 from https://www.cisco.com/c/dam/en-us/solutions/industries/docs/scc/digital-cities-value-at-stake.pdf p.6 retrieved by May 2019

Managing huge amounts of data and obtaining insights and knowledge from them while controlling a very complex ecosystem of people, processes and items in a city requires an equally massive amount of computing power, storage and analytic tools. So, cities have two options: the traditional self-operated datacenter, investing large amounts of money on machines, tools and people managing them; or trusting on external huge datacenters managed by the largest computing specialized companies in the world (Cloud computing) like Microsoft, Amazon, Google to mention the top. Main advantages favoring Cloud Computing are:

- The total cost of ownership falls to a fraction of the previous on-premises system (it depends on the case, but reductions up to a 90% have been observed)
- In the Cloud computing model, the user pays for what he uses at all times, (pay per use) and does not need to make upfront investments that he does not permanently use. A typical example is the payroll application for a large government agency or city. This application may require a large processing capacity during the last three days of each month, while the rest of the days is only handling the few ins and outs, promotions, changes, with a minimum needed capacity. Why to pay for maximum capacity permanently (with a real machine in our offices) if it is used only a fraction of time? With Cloud computing you will pay exactly for the services you have in use at any time.
- There are new intensive applications such as massive information analytics, AI algorithms, or retransmitting live (live streaming) city council sessions that would require a huge investment in resources for a limited time of use. Why to buy a supercomputer that could cost several millions if I'm going to use it for a few minutes? Cloud computing allows us to provision in an elastic and scalable way as much capacity as needed and pay only for the time used. For example, broadcasting a live soccer game to 80,000 simultaneous users without network problems requires a few hundred servers and a very large bandwidth capacity. This is unaffordable for a municipality, but this same task from Cloud could cost a very few thousand dollars, making it affordable.

- Systems depreciate and become obsolete quickly. In Cloud computing that is not your problem, since you pay for services / benefits. You are not the systems owner. That's not your business.
- Maintaining an own datacenter means paying for a room, space, refrigeration, personnel, managing applications and software and hardware updates, making backups, preventive maintenance, etc., all tasks that do not have to do directly with the public service we are offering. In Cloud computing all these tasks are carried out by the cloud provider, and city specialists can devote themselves to thinking and developing new services, or improving existing ones, to what really matters for the city.
- With the new advanced and constant threats in cybersecurity, a city does not have the tools or the qualified personnel to keep the citizen's information safe without overinvesting. Cloud providers do know how to handle this challenge (their reputation and business depend on it)
- Moving from fixed costs to variable ones has unquestionable advantages.
- In security and reliability, Cloud systems offer the needed redundancy, resilience, multisystem based, or even multilocation. They are the safest information systems on earth, with the best experts and tools operating them.
- Cloud systems are much more efficient and environmentally friendly (Green), so the carbon footprint provoked by the city decreases. We can talk about efficiencies about PUE (Power Usage Effectiveness)[95]: 1.05, ie, 1.05 Watt used from total datacenter input power to feed processors with 1 Watt to execute real tasks. So, Cloud datacenters are extremely efficient in refrigeration, backup, resilience and general operations.
- Governments demand greater compliance with regulations such as GDPR, privacy, security, etc. Meeting their own demands can be very costly in resources for a public institution. Cloud systems along with a methodology in the operations and use of data make it possible to comply with these regulations at an acceptable cost.

[95] "What is PUE / DCiE? How to Calculate, What to Measure" *42U Solutions for the next Generation Data Center* https://www.42u.com/measurement/pue-dcie.htm retrieved by April 2019

On the other hand, an increasingly small number of cities still pose objections such as the location of the data out of institution walls (data sovereignty), the use of the same for commercial purposes (some Cloud providers are mainly dedicated to sell ads or retail goods), the loss of control perception, allow foreign hands handling my citizens information, etc. Main Cloud providers are hugely investing on Datacenters inside the borders for same regulated territories like a country or EU.., complying with strictest regulations, hire local people for operations, sign contracts with clear no data movements out of country and provide accurate information on where data is located at any time, no other commercial use of data, no external exchange except is a judge requires, etc to overcome these objections.

1.4 Urban Mobility: Cities blood

"Urban mobility is one of the toughest challenges that cities face today as existing mobility systems are close to breakdown." Arthur D. Little Report "Future of Urban Mobility 3.0"[96]

Urban mobility is considered the most important public service provided by the city. We conducted a survey among those attending the most important event worldwide in SmartCities, (the SmartCityExpo & WW Congress in Barcelona November 2018) and urban mobility turned out to be the most relevant service for this city experts and the Information Technology sector community. (See figure 12). This preference is not coincidental. If we reflect on the role of the city, facilitating that citizens meet, as a meeting, connection and interrelation place, public transport is the means that makes everything possible. Thus, urban mobility connects people, families, businesses, experiences, economies and processes.

If we think again of the image of Vienna as a ratatouille of geniuses, urban mobility would be personified in the cook, who puts each ingredient in connection with the others.

CITY SERVICES - SCALE OF VALUES	RK
URBAN MOBILITY / TRANSPORTATION	1
SOCIAL SERVICES / HEALTH	2
SUSTAINABILITY / ENVIRONMENT	3
SAFETY (PHYSICAL/VIRTUAL)	4
EDUCATION	5
EMPLOYABILITY	6
URBAN PLANNING	7
GOVERNANCE	8
CONNECTED CITY	9
CULTURAL SERVICES / TOURISM	10

Survey conducted at 21.300 Nov2018 SmartCity Expo (Barcelona) attendees. (Confidence: 95%. Error Margin 2,4%)

Figure 12. Source: Author. Nov 2018.

[96]VAN AUDENHOVE, F-J. et al, "The Future of Mobility 3.0" *Arthur DLittle*, Published by Mar2018 https://www.adlittle.com/en/insights/viewpoints/future-mobility-30 retrieved by November 2018

As we studied, citizens need to meet, and the city downtown takes a prominent role in that capacity for meeting. We also talked about the importance and the direct relationship between density and prosperity. Therefore, cities should make it easier for citizens to access city downtown by the fastest and most efficient way. Citizens are welcome, not their cars…In our information era everything happens at an accelerated speed. It is true that the car took more than 50 years to become popular, but in our era, modern transport systems are very quickly adopted. Three years ago, I was able to attend the launch of the first autonomous bus at SmartCityExpo, and it is already in operation (as a pilot) in several cities such as Barcelona and Stavanger (Norway). This past year I saw the first autonomous taxi, and it will not take long to have a massive presence in our streets.

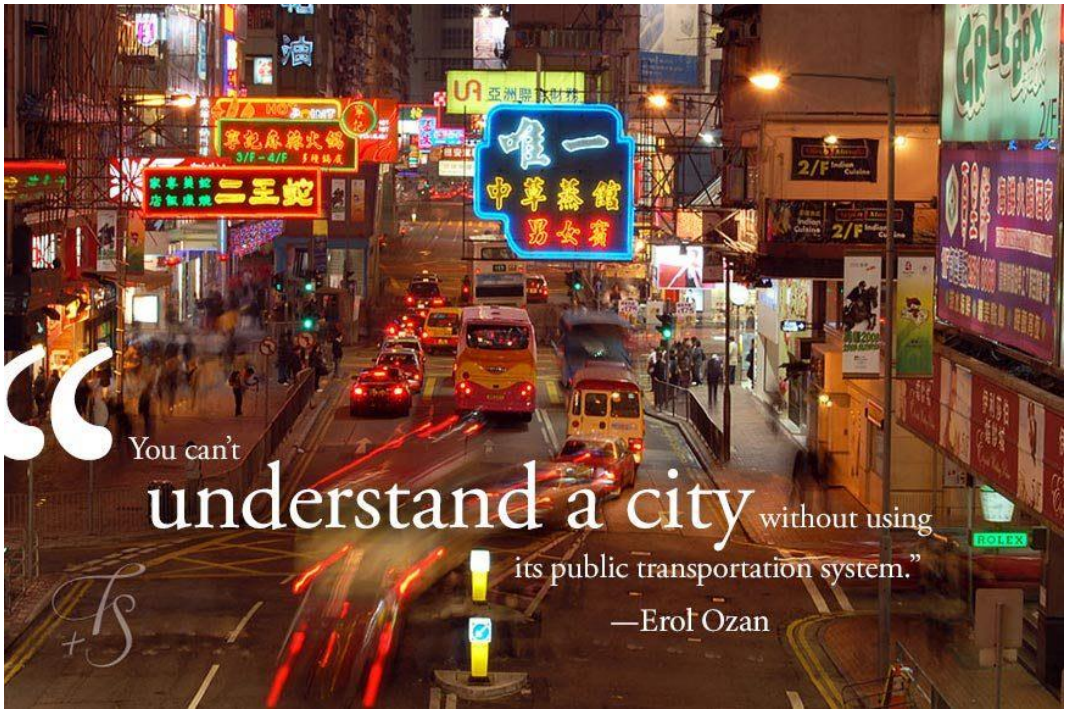

Figure 13. Photo from 10 Best Travel Quotes of all times. Hoodaki. [97]

There is, therefore, a massive change in the use and expectations that our citizens have about transportation systems. This change is fueled by the revolution in electric transport, justified by environmental, economic and health issues. The new technologies in batteries efficiency are making possible the dream of an efficient

[97]"10 Best Travel Quotes of all times". *Hoodaki* https://www.hoodaki.com/blog/index.php/10-best-travel-quotes-of-all-times/ retrieved by Aug 2018

electric transport, faster, cheaper and more sustainable than the traditional internal combustion systems. And private transport moves in the same trend.

More and more people are moving around the city and they do it with a car. The amount of cars will more than double by 2050 to 2.5B, so if you think the roads are now at the limit of their capacity, consider the situation will only get worse. Urban development and traffic congestion are now global problems. According to the INRIX 2018 Global Traffic Scorecard, traffic congestion cost the economy of the United States $87 billion in 2018, and citizens lost 97h/y on average inside a traffic jam. Per the INRIX 2018 Global Traffic Scorecard[98], traffic congestion cost the US economy $124 billion in 2018. In Dublin, with the slowest city center traffic speed, a human can roughly walk at half the cars speed (5.9 mph compared to 3.1 mph). (see figure 15)

A very illustrative indicator of transportation efficiency is the Transportation mass efficiency ratio, which is calculated by dividing the effective weight that is moving compared to the total weight that needs to be moved. The most efficient thing is walking, where to move a human body of about 75 kg, one really moves 75kg, which gives an efficiency of 1 (100%). If we go by bicycle, we move our weight plus that of the bicycle, say 75/75 + 5 or 75/80 or 94%. If we drive alone by car, we have 75/1275 or 6%. Think of the worst case where we go alone in an empty train wagon that weighs 30 tons or a full train or an airplane or a boat ... (75/30075 or only 0.2%). And this relates to the energy needed to move that mass, space needed, regulations, time spent, …

Another excellent analysis is the cost for citizen and society associated to each mean. City of Calgary has found the below facts in figure 14.

Main urban mobility challenges where technology is the transformation enabler:

- Reduce pollution.

This is the main reason to eliminate traffic from the city center. The harmful effects of pollution on health are more than demonstrated[99]. Many cities have a pollution alert protocol in place when minimum limits are exceeded. As an example, let's cite

[98] INRIX Scorecard http://inrix.com/scorecard/ retrieved by March 2019. Hours Lost in Congestion: The total number of hours lost per year in congestion during peak commute periods (6-9 am, 4-7pm on 240 working days per year).

[99] KAMPA M. & CASTANAS, E. "Human health effects of air pollution*" Environmental Pollution*. Volume 151, issue2, Jan 2008, p.362-367 http://dx.doi.org/10.1016/j.envpol.2007.06.012

the Valkenburgerstraat street in Amsterdam as one of filthiest and unhealthiest streets in Europe. Breathing there is the equivalent of smoking 6 cigarettes a day as a result of a narrow street at the exit of a heavy traffic tunnel with long time red lights making the cars to stop by there long time.[100]

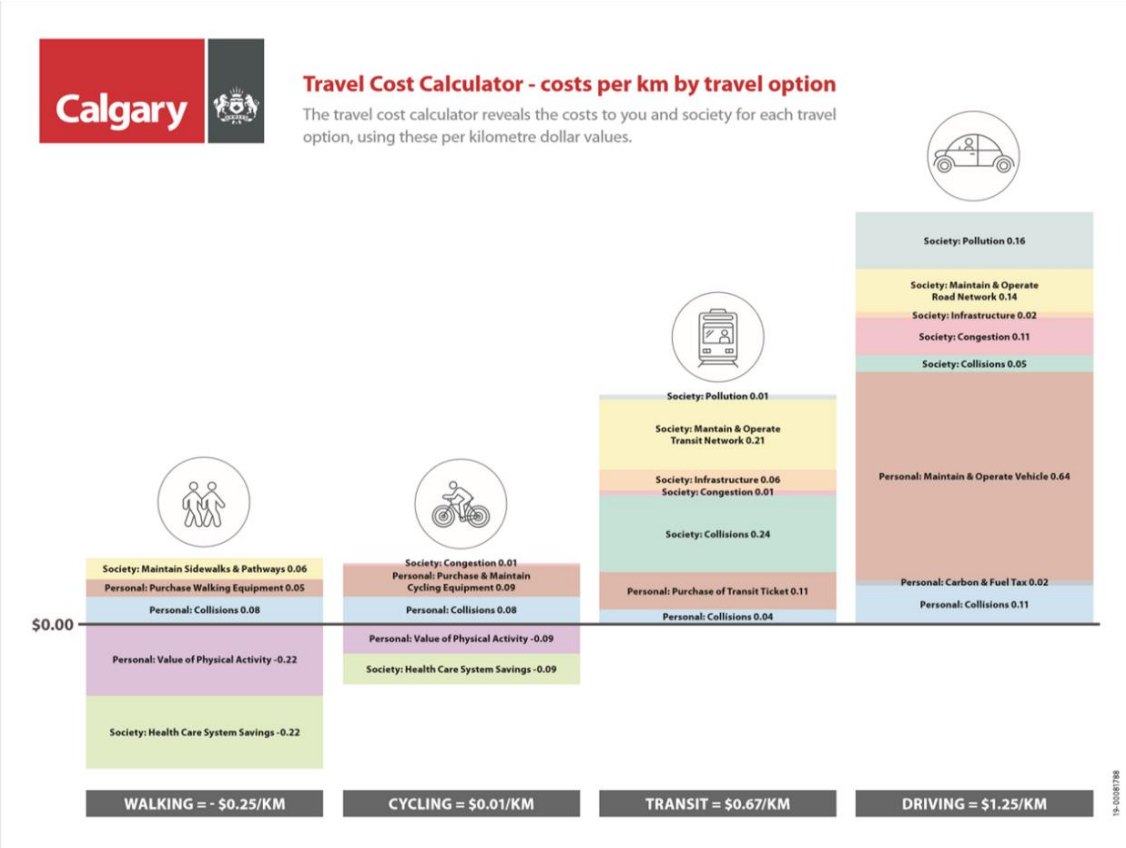

Figure 14. City of Calgary Travel Cost Calculator.[101]

Solutions are not unique. There are creative proposals such as panels that act as air filters, plant more trees or wait for the weather to change and receive rain or wind to clean the atmosphere. But obviously, the clearest and obvious solution is to replace the internal combustion engines by electric ones, both in public and private transport. Electric transport begins with the electrification of all vehicles (public such as buses, taxis and private vehicles such as cars or even bicycles, motorcycles and e-scooters) and the necessary recharging points (in public spaces such as taxi

[100] VALKENBURGERSTRAAT https://valkenburgerstraat.wordpress.com/ retrieved by Sep 2018
[101] "Travel Cost calculator results". *City of Calgary*,
https://www.calgary.ca/Transportation/TP/Pages/Travel-cost-calculator/Calculator-results.aspx
retrieved by Nov 2019

stops (Norway and Holland are leading this) or at homes, so the city will be cleaner, less noisy and the transport cheaper.

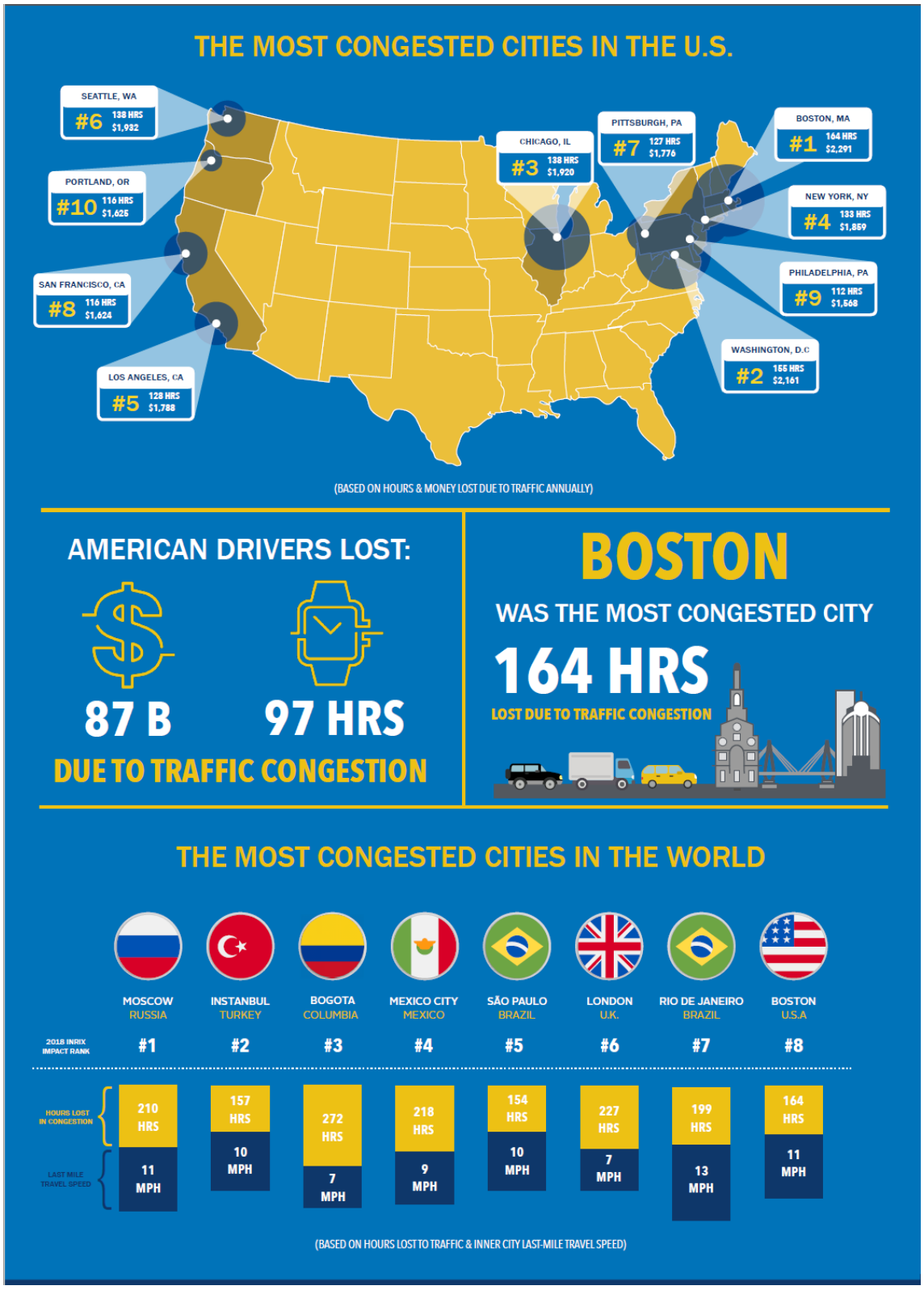

Figure 15. US most traffic congested cities. INRIX Scorecard 2018

In terms of energy, it is well known that the problem is not to produce it (we have a wonderful sun that provides almost all renewable energies) but its storage (and here the technology is doing its job by developing batteries capable of storing energy at a comparable cost to using the energy stored in an oil barrel). Cities see that their future is cleaner, quieter and less expensive when it is electric. New technologies in autonomous cars can only scale when the vehicle is electric. In addition, governments have established different regulatory environments that prioritize electricity and entrepreneurs who innovate in this area. The most advanced cities have already a plan to have all public transportation electric (California, 2029, for example). C40 organization[102] made a public announcement at Paris (France) by October 2017 from 12 top relevant city mayors (London, Paris, Los Angeles, Copenhagen, Barcelona, Quito, Vancouver, Mexico City, Milan, Seattle, Auckland & Cape Town) to commit on a list of targets to make their cities greener and healthier by signing the "C40 Fossil-Fuel-Free Streets Declaration". This declaration mainly states that all buses must be electric (or zero-emission) by 2025 and a main city area to become zero emission by 2030. The belief that electric vehicles will not work well in cold environments has been proven false with the example of Norway. Norway is well known for its rapid adoption of plug-in EVs (VEP). The Norwegian government was very ambitious and has put in place policies that promote and incentive these vehicles. Thus, its market share has reached 50% in 2018[103]. And they are continuing to do so, with the firm determination to achieve a complete transformation from conventional fossil fuel vehicles into electric by 2025. Very soon the VEP and battery EV (BEV) will be available in all vehicle segments. As vehicles have a higher utilization because their use is shared (and especially those vehicles used in commercial functions where staying stopped means losing business) the need for fast charging is more important. Current technology using plugged-in chargers provides a load rate of 6 miles/min, 17 if we use ultrafast (and more expensive) chargers. If we compared this with the charge rate of fossil energy (gasoline, diesel) of about 250 miles/min, then we can

[102] "Mayors of 12 Pioneering Cities Commit to Create Green and Healthy Streets" *C40 Cities*, published Oct2017, https://www.c40.org/press_releases/mayors-of-12-pioneering-cities-commit-to-create-green-and-healthy-streets retrieved by June 2018

[103]SHEPARD, S. "Oslo Innovates to Make 100% EV Market Possible" *Guidehouse insights*, published by Apr2019, https://www.navigantresearch.com/news-and-views/oslo-innovates-to-make-100-ev-market-possible retrieved by May 2019

observe a large gap. This problem is being creatively resolved by taking advantage of idle downtime. Again, Norway leads this innovation with Oslo by implementing a wireless fast-charging solution for taxis while waiting for passengers. It is not a definitive solution, but providing a charge of 4 extra miles/min helps to give more life to this public service. Another smart solution is the use of fast replaceable standard batteries (such as F1 pitstops). These types of improvements are becoming popular in cities with clear decarbonization efforts such as the C40 mentioned above. London has a plan to renew its curious taxis fleet by early 2020s. Some US cities such as NYC, LA, Seattle or San Francisco have committed to change to 100% of the urban transport by battery by 2025. This is not only due to the emissions reduction, but also because the total cost of ownership in the twelve years of life of a bus saves about $200,000 each. In NYC alone, with about 6.000 buses, this equates to an annual savings of $74 million.

- Infrastructures capacity is reaching its limits.

  We have been able to analyze it with the extensive INRIX[104] report. The solution to the problem is not to build more capacity. In many cities, the costs and annoyances, including direct citizen protests on the almost permanent works on the streets, make it unviable to continue building traffic capacity. The solution must come from a more efficient use of the existing infrastructures capacity and the private traffic use reduction. Only a notable increase in population in a particular area (or its new urbanization) justifies the construction of more streets, roads and capacity for traffic.

- Zero traffic deaths. Vision Zero Initiative

  Deaths from traffic accidents represent the leading cause of death in modern countries. Most countries and cities are adopting the Vision Zero initiative[105]. Vision Zero is a project originated in 1997 in the Swedish Parliament that aims to achieve a traffic system without any death or serious injury, and establishes the ethical principle "*life and health can never be exchanged for other benefits within the Society*" (such as urban mobility). Improving the traffic network (like any other resource) follows the

[104] INRIX Scorecard http://inrix.com/scorecard/ retrieved by March 2019
[105] TINGVALL, C. and HAWORTH, N. " Vision Zero - An ethical approach to safety and mobility" *Monash University*, Sep1999, https://www.monash.edu/muarc/archive/our-publications/papers/visionzero retrieved by May 2018

conventional cost/benefit rules. This ethical principle puts over the achievement of avoiding fatalities to any economic question. It can never be ethically acceptable to have people killed or seriously injured while they move into transportation system.

- The real 'human' size of a city is determined by the urban transportation efficiency. If we use as limit the maximum commuting time that a citizen takes to reach his city downtown, let's say for working or shopping (Case of Los Angeles, with an average of 90') then we have that our city reaches a radius of 100 miles or 160 km or a surface of 8 mHa, and growing… Growing not only due to urbanization development, but because of the improvement in public transportation, which makes cities merge into metropolis. City corridors are established, sometimes international. Cities merge with their regions. Paris is the same as Ille-de-France, Madrid surpasses the current Madrid Region, Brussels-Antwerp-Amsterdam-Rotterdam merge, big London reaches half of England's area ... (see figure 16). And this must be taken into account, since from the psychological and human point of view, and well over all the political borders (established a century ago, or more?), all this reachable space is, in fact, the same city. In a context of political, economic and military stability, my vision of the world by 2050 could be summarized in a set of 8 cultural blocks (civilizations), 50 megacities (cities larger than 20 min) and around 1500 major metropolises. Advanced high-speed trains and improvements on road transportation is creating these cities grouping on corridors, or areas of intense trading and relationship. As an example of this, look at figure 17, where you can study the 'South European Diagonal' concept developed by Fundación Metropoli, a high-reputed urban planning strategic think tank. This 'European Diagonal' as mega-region at the South of Europe, is connecting a very high economic potential creative Mediterranean area from Lisbon to Venice, with Milan, Marseille, Barcelona, Madrid and Lisbon as main cities and Seville, Porto, Valencia, Bilbao, Zaragoza, Toulouse, Bordeaux, Montpellier, Lyon, Turin, Genoa, Venice as mid-sized contributors. This diagonal plus the NorthWest European 'pentagon' (Paris,

London, Hamburg, München, Milan) constitutes the core planning area of Europe and the two main mega-regions.

- New 'creative' transportation solutions: Air, orthogonal buses, TEB (Transit Elevated Buses), Drones (not only for moving goods, but also humans), tele-cabins,… helping to leverage space where it simply doesn't exist.

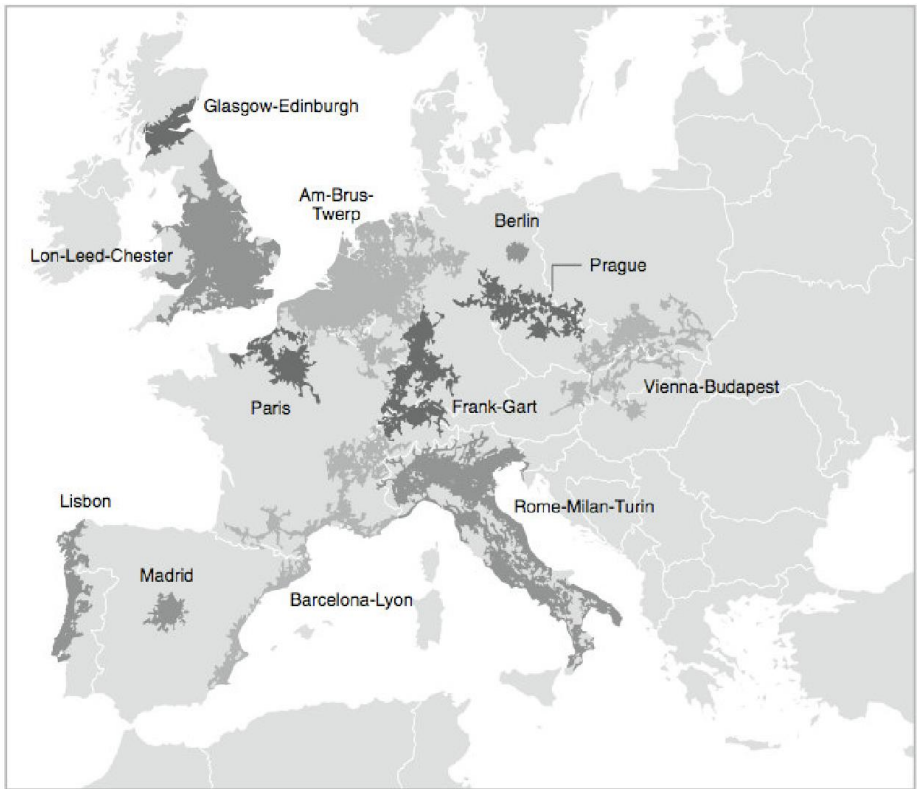

Figure16. Megaregions of Europe[106]

[106] FLORIDA, R. *Who's your City.* Basic Books NYC 2008. p.49

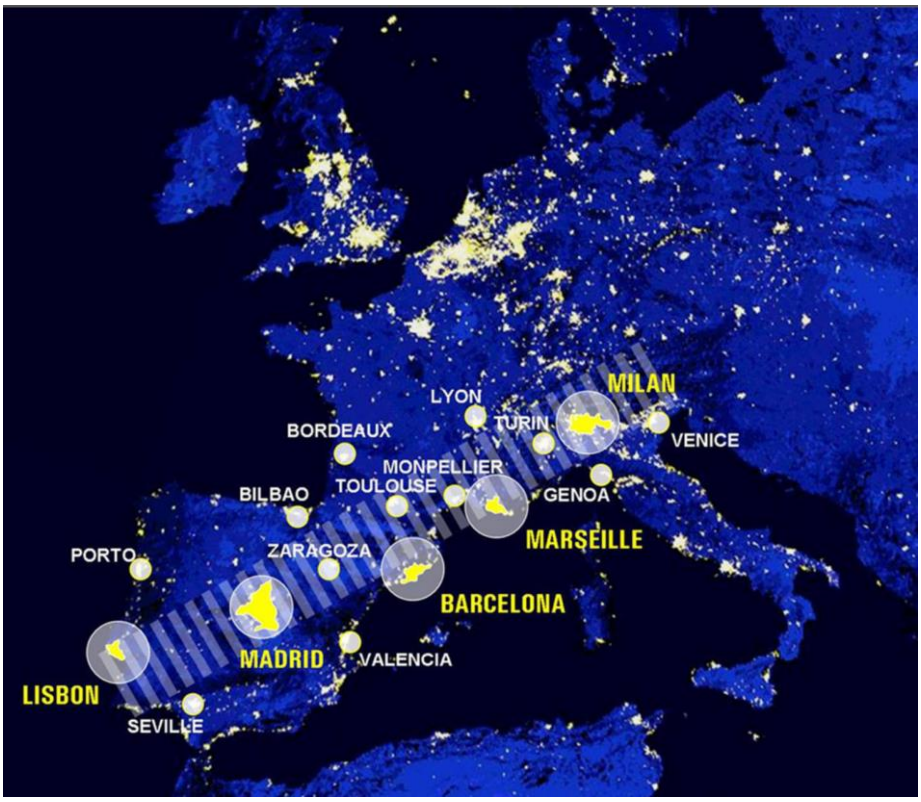

Figure 17. European South Diagonal. Fundación Metropoli.[107]

- Intelligent transportation. Advanced Traffic Control (ATC) and traffic analytics.

  In addition to the already mentioned at the world of Data and IoT, C-ITS (Cooperative Intelligent Transport Systems) which made possible the direct communication to and between vehicles to improve the overall traffic patterns, the Advanced Traffic Control provides an integrated city, region, country way to manage traffic flow. These technologies help improve road safety, significantly reduce levels of traffic congestion, speed up rapid response for emergency services and reduce greenhouse gas (GHG) emissions. The development of intelligent intersections, which makes it possible to streamline the flow of vehicles, prioritize public transportation and synchronize communications with connected vehicles means solving one of the most important challenges in the city: maximizing efficiency in the use of public space assigned to transportation. In addition, these technologies allow solving the traditional problems arising from the

[107] "Territorial Diamonds" *Fundación Metropoli* http://www.fmetropoli.org/en/cities-lab/territorial-diamonds/european-diagonal/ retrieved by March 2019

different government structures and responsibilities: city, province, region, country, which create silos of management and lack of coordination. In this way, the dream of an universal intermodal transportation system seems closer, with all the integrated possibilities (cars, buses, trains, ferries, bicycles, etc) interconnected to provide an end-to-end service, even integrating with medium and long distance transportation. These systems have a different implementation level depending on the city. Basically, all cities start with the collection of data from existing traffic, level, quality, routes, schedules, capacities, etc. This data is analyzed so that administrators can develop improvement strategies in the network operation (such as optimizing the traffic lights timing, adding or decreasing capacity in one direction or another, etc). Prior knowledge, historical patterns and predictive analysis are fundamental tools in this decision making. The most advanced cities use artificial intelligence systems to analyze these situations in real time, allowing direct communication with the intelligent vehicles and infrastructures and optimizing the overall mobility ecosystem. A description of this can be studied from figure 18.

Figure 18. Stages of Advanced Traffic Management in Smart Cities. Navigant Research[108]

- Autonomous vehicles. Legislation. Ethics. MIT Survey

[108]CITRON, R. "Advanced Traffic Management Is Emerging as a Key Pillar of Smart Cities" *Guidehouse Insights*, published by Apr2019, https://www.navigantresearch.com/news-and-views/advanced-traffic-management-is-emerging-as-a-key-pillar-of-smart-cities retrieved by May 2019

A final challenge in urban mobility is the rise of autonomous vehicles. Its advantages are unquestionable in terms of comfort. Although there has been much debate about their security and the maturity of the technology that supports them, it is clear that their massive adoption is very imminent, and their security is far superior to that of human skills. This makes me think of a future where authorities will prefer automata to humans as drivers, with the objective of Vision Zero that we covered earlier. Its advanced communication capacity with traffic infrastructure, improved with the new 5G networks, will make them indispensable for optimized traffic. Being able to synchronize the speeds of several vehicles so they do not collide at the next intersection is something that surpasses us as humans and that today could only be reached by professional drivers with great reflexes and overall context information (just the opposite of a relaxed trip ...). If technology is ready, what prevents this disruptive proposal from massively reaching the market? The price does not stop going down as it becomes popular. The main problem is the lack of legislation. It is a question of responsibilities. Our legislative and judicial system assigns responsibility for any unnatural event to a human or group of humans. But in the case of an accident with an autonomous car, who is responsible for? Its owner, the manufacturer, the algorithms designers/programmers...? At the moment, the manufacturers clearly indicate that the steering wheel should not be released and thus assign the responsibility to the driver. This is an irony: why to buy an autonomous car if I cannot use it autonomously? Technology is ahead of legislation and requires an effort in this regard. A major problem is that this legislative effort should have some international consensus as car manufacturers are international and so do many roads.

By putting our lives in the hands of technology in an autonomous car, ethical issues arise. Imagine that the autonomous car is in a critical situation: there has been a mechanical failure and it has no brakes or not enough to avoid running over someone in its path. The decision on the prioritization of which people to kill over others is a severe ethical problem, which has long been debated for humans, and which now arises for an autonomous car.

Formulated for the first time in the late 1960s, the "Trolley/Tram109 Problem" is a famous philosophical dilemma. A tram car without control advances at full speed. On his direct path there are five people who can avoid it. You can activate a lane change lever and move it to a different path where there is only one innocent person. Should you activate the lever to save five lives by killing one? Should you let fate continue? Who are you to decide about life and death? This decision, is it a matter of quantity? Should other considerations be taken into account such as who these people are, age, sex, status, etc?

In 2014, researchers from the MIT Media Lab proposed a kind of survey in the form of an experiment called "Moral Machine"[110]. It asked people about their moral decisions in different variations of the 'trolley problem'. There was a lot of speculation on the different moral scales according to different cultures. The experiment lasted 4 years and got a massive response, with some 40 million responses from 233 countries, the largest ever on moral issues. The user was exposed to the "Moral Machine" on nine different situations where the autonomous car's computer would have to decide: prioritize humans vs pets, passengers vs pedestrians, number of lives - more lives or less, women vs men, seniors vs young, healthy vs sick, social status high vs low, criminals vs honest. And finally, the basic question, is it necessary to decide or not, to let fate continue on its way or take control and decide, action or inaction? Dr Edmond Awad (MIT Media Lab) concluded[111]: "We found that there are three elements that people seem to approve of the most. They are:

- Sparing the lives of humans over the lives of other animals.
- Sparing the lives of many people rather than a few
- Preserving the lives of the young, rather than older people"

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[109] CASSANI, L. "Would You Pull the Trolley Switch? Does it Matter?" *The Atlantic*, published by Oct2015, https://www.theatlantic.com/technology/archive/2015/10/trolley-problem-history-psychology-morality-driverless-cars/409732/ retrieved by January 2018

[110] "MoralMachine." *MIT* http://moralmachine.mit.edu/ retrieved by March 2019

[111] BUSH, S. "MIT surveys driver-less car ethics, and learns three things" *ElectronicsWeekly.com* published by Oct2018, https://www.electronicsweekly.com/news/research-news/mit-surveys-driver-less-car-ethics-learns-three-things-2018-10/ retrieved by March 2019

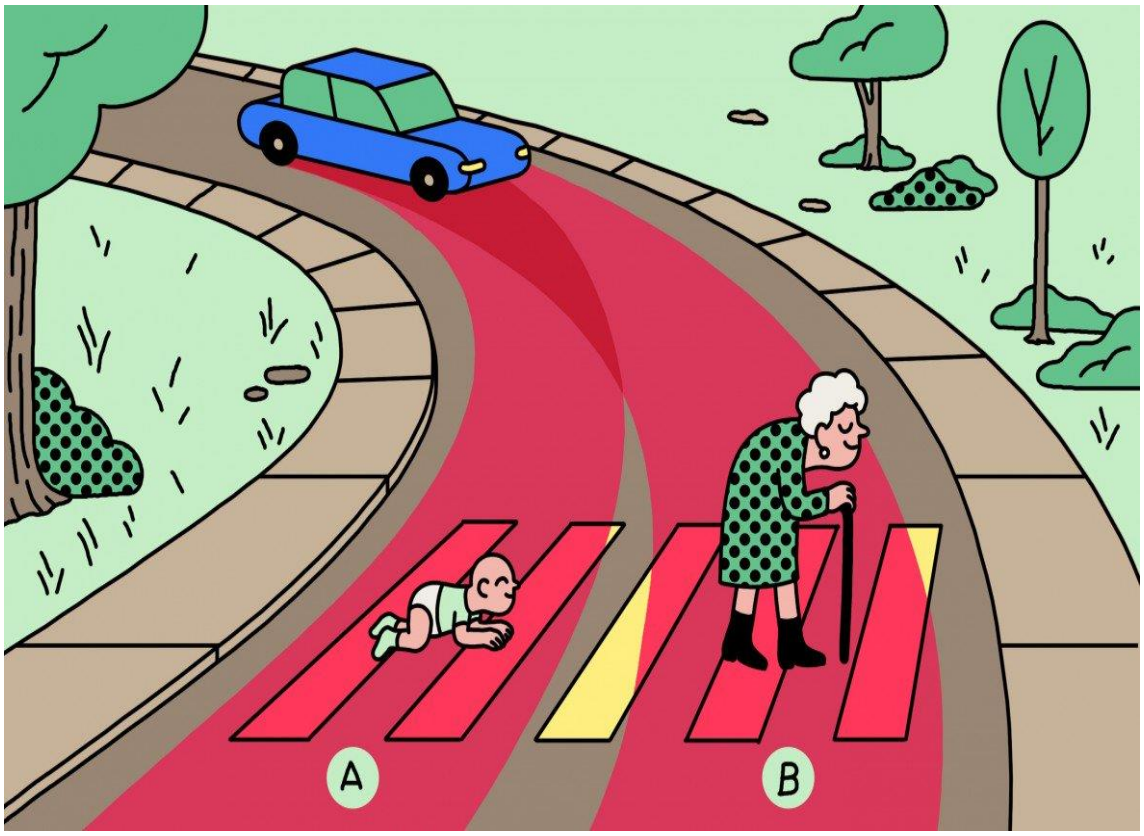

Figure 19. MIT "Moral Machine" Ethics experiment [112]

While the first two seem clear to everybody, there are variations about the third, and many alternatives on the other questions like passengers vs pedestrians, gender, etc. In figure 20, we can understand the different value our different cultures assign to live depending on age.

Western Culture assigns larger value to young while Oriental cultures do the opposite. The researchers speculated on the reason for this clear distinction. It is about individualistic cultures over collectivists, or it is a question of Eastern respect to the elderly, or the development potential that is given to young people in the West, or the value of a young person in a low birth ratio place like the West vs one of high as East? Do we respect more experience or potential, life already lived or life to live ...?

[112]HAO, K. "Should a self-driving car kill the baby or the grandma? Depends on where you're from." *MIT Technology Review*, published by Oct2018, https://www.technologyreview.com/s/612341/a-global-ethics-study-aims-to-help-ai-solve-the-self-driving-trolley-problem/ retrieved by December 2018

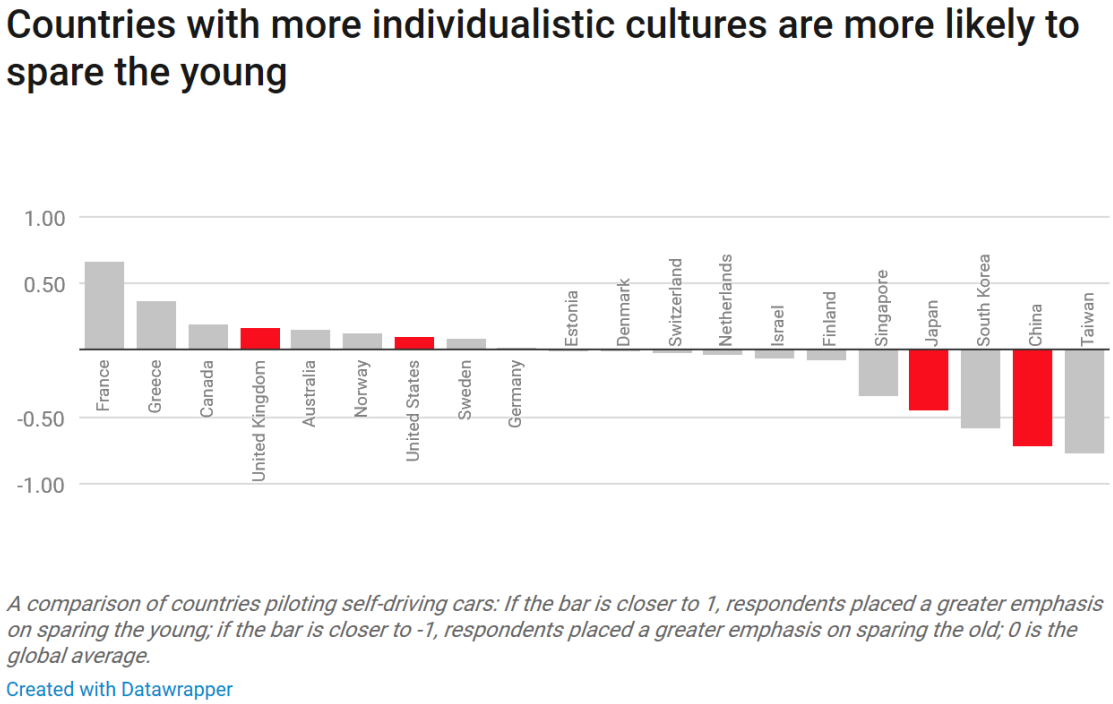

Figure 20. MIT "Moral Machine" Ethics experiment. The age question

The poorest countries with the weakest legal systems tolerate more the passers-by who cross the road improperly than the pedestrians who cross the zebra crossing legally. Economic inequality also influences the morality applied to people with high or low social status. Individualist cultures, such as Western countries and the USA gave more relevance to the number of lives saved than others. This was recognized as the value of the individual and the person as a concept and the collectivity as a power. In the East, culture is collectivist, but each individual puts himself ahead of others, especially in China.

In figure 21, we can see how Chinese consumers would more easily enter / buy a car that protected itself (and by the way, the passengers) from pedestrians. High respectful Japanese place innocent pedestrians front and ahead. US is tied about this question as a consequence of its deep social unbalance, with individualism as success signal in one hand, and giving, altruism and philanthropy on the other.

So, should we adjust each autonomous car for each country / city, or according to the legislation (nonexistent until now), or personally, having each buyer indicate its ethical values scale?

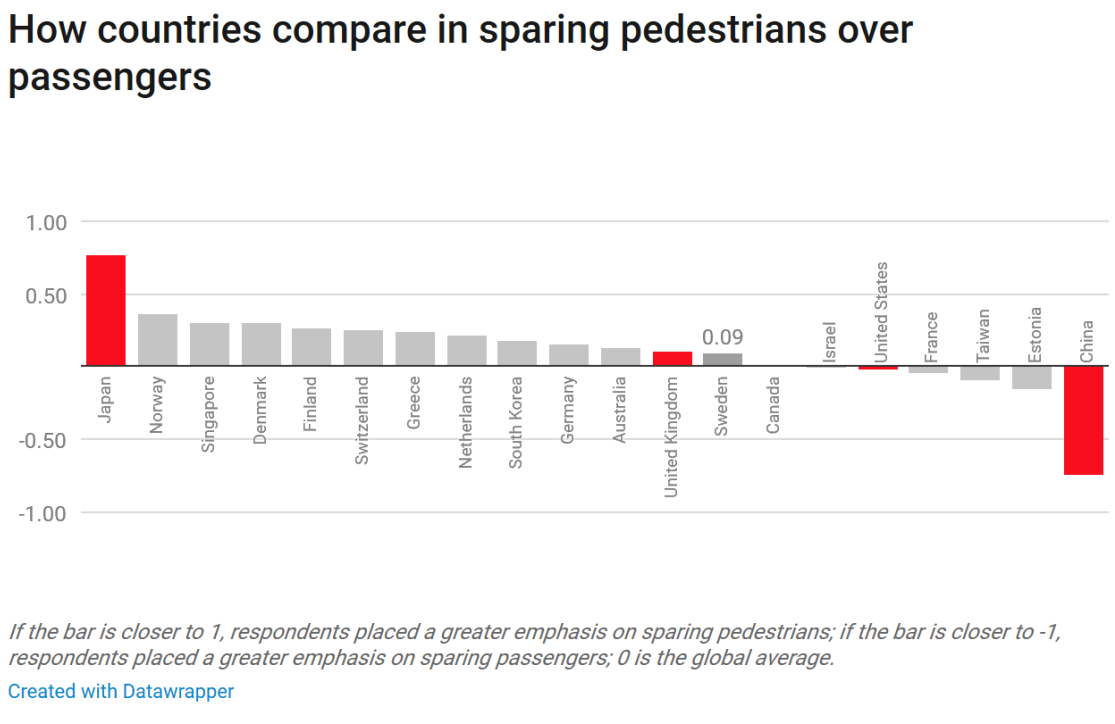

Figure 21. MIT "Moral Machine" Ethics experiment. Pedestrians vs Passengers question

Car manufacturers are trying to produce specific cars to each market preference, but this level of personalization goes beyond any market benefit. This leads to other questions: If I have defined the ethics to apply, I should also be responsible for the legal consequences. If ethics is defined by a country (or is universally accepted), then, the car owner cannot be held responsible for the applied ethical decisions. If, as shown clear, the ethical considerations have different valuation according to the place and the user's culture, should the manufacturers make a car adjusted differently for each country / city, and what happens if the car moves to another country or is sold internationally? It should auto-load the new configuration when you move to another place. With the difference of laws on the death penalty in different states in the USA, will there be different criteria, and will cars have different behaviors when crossing the state border?

And if I hire an autonomous taxi, should the taxi respond to a legally established ethical scale or change according to my values as user? Can I change the configuration if I do not agree with existing, accepting the responsibility?

The MIT test also points the similarities between nearby countries and three clusters: East, West and South. I would say that it is a question of civilizations / cultures. Western civilization is present in America, Europe and Australia, so it is not a matter of geographical orientation. The main determinant of each civilization

/ culture scale of values is the religion on which it is based on. Thus, we would have about eight different models, applicable to different areas and describing a different scale of ethical values.

This debate on the question of "Moral machine" shows that a legislation on the ethics in Artificial Intelligence is more than necessary. For example, can a company legitimate market interest put a unique solution that provides a great competitive advantage ahead of the citizens privacy? This debate is now on everyone's lips regarding the face-recognition technology. To what extent can a company whose headquarters land in a lax privacy morality country to take advantage of that fact? In order to compete, companies in the same sector will think about moving their headquarters to that country and avoiding obstacles, all for the company benefit.

The question of ethics in Artificial Intelligence is broader than a country's legislation. It should be agreed at U.N. or similar broad agreement and involve the manufacturers themselves. Some leading companies like Microsoft are starting to seriously think about AI Ethics[113] code.

As soon as technology improves, we are closing the gap to build the first self-conscious machine. In that case, would the car brain 'opinion' count? Car will obviously try to protect itself as another option.

Strategies.

At a recent session at largest SmartCities WW Event (SmartCity Expo & WW Congress, Barcelona), figure 22 infographic was released describing the three main Urban Mobility strategies the cities are taking depending on density, status, available budget and political leadership.

1.- For large super populated and polluted areas, SHARING is the key word. This is the easiest and cheapest way to reduce the amount of cars. Cities like Cairo, Mexico City, Mumbai, Delhi apply to this strategy.

2.- For wide areas from high-income developed cities, private car is still a must-have, so let's use it ELECTRIC (or EV, for Electric Vehicle). Wide-extended American cities like L.A., Detroit were public transportation is poor and citizens are highly car dependent apply to this group.

[113] "Responsible AI" *Microsoft*, https://www.microsoft.com/en-us/AI/our-approach-to-ai retrieved by April 2019

3.- For dense concentrated developed cities, there is no space left for cars, so MULTIMODAL efficient and clean transportation is the main driver. Intensive use of Public transportation and sharing (Mobility as Service). Hong-Kong, Singapore, and most European cities land here. Space is limited and car use is in decline.

So, different strategies are put in place to achieve similar objectives. These strategies vary according to the most suitable and affordable means to be used in each case. A city not easy to fit on any on these groups will take a mixed strategy between the described main three.

But there are also strategies according to their application immediacy or urgency. In that way, we consider three strategies: short-term (eliminate external private traffic in the city downtown); in the medium term, develop a strategy of MaaS (Mobility as a Service) that encourages the use of public transport, end-to-end mobility and vehicles sharing; in the long term we have the chance to change the shape of the city because we will not need so many vehicles: the dream of turning a city built for cars into a city built for humans.

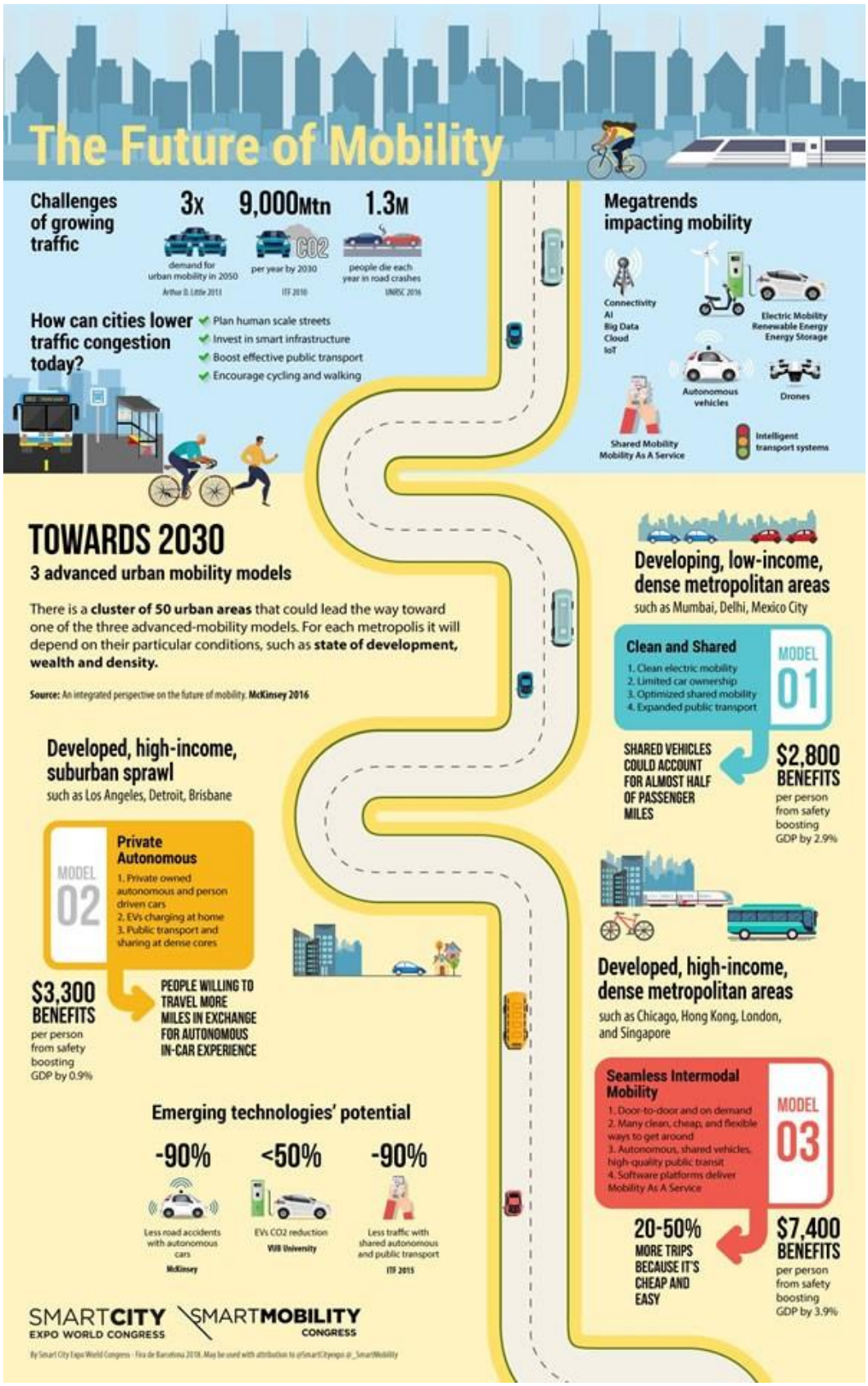

Figure 22. SmartCityExpo / SmartMobility Future of Mobility infographic.[114]

[114] SMARTCITYEXPO www.smartcityexpo.com retrieved by January 2019

Short-term. Avoid private traffic downtown.

The main and immediate cities objective in relation to urban mobility is to reduce (or avoid as much as possible) private non-resident traffic in the city center. The reasons are clear: pollution, lack of space, loss of time and productivity, noise, etc. Cities that create new opportunities and alternatives for pedestrians and cyclists and have a greater reduction in the use of energy, reduction of greenhouse gas emissions, improve air quality and health and mental well-being. The war on the car[115] for some time in European cities is clear, where the question of space is fundamental. Areas have been defined where the use of the car is penalized, or even prohibited. These limitations start with the most polluting vehicles. The cities of Madrid, Brussels and Paris forced the European Union to set the agenda for the end of diesel, when it is more than questionable if the excessive production of NOx is worse than the CO-CO_2 produced by gasoline engines. In any case, the electric car is favored, which seems good for the city and the planet in general. The future has some clear ACES (Autonomous, Connected, Electric and Shared) cars or vehicles. But the authorities cannot simply place a few banning signs to get rid of traffic. Citizens do not go with their polluting cars to downtown for pleasure, but because of duty and they do not have the purchasing power to change to a wonderful and expensive autonomous car immediately. The process must have its rhythm. And here, once again information technology is key. First, analyze, then provide or build alternatives, then set policies and impact.

- Analyze the traffic and commuting patterns.

By using sensors, cameras and IoT devices, we can determine the quantity and quality of traffic approaching the city center every day. We all this information about number of cars, paths, commuting patterns, time to go, time spent on road, on destiny, occupancy, kind of vehicle (car, moto, van, small or large truck, bus), estimated pollution contribution, where bottlenecks occur, etc. Powerful Analytics are finally converting all massive data into insights. If we can determine that every day between 7:30 and 8:00 several thousand cars leave a certain area and go

[115] SABATINI, J. "The War on Cars Is Real, and It's Being Led by Cities" *CARANDDRIVER*, published by Dec 2018, https://www.caranddriver.com/features/a25634960/the-war-on-cars/ retrieved by January 2019

downtown, arrive before 08:45 and return to that area between 19:00 and 20:30h, then we can certainly think about offering or encouraging alternatives to the car (or the highly polluting car) for that group of citizens. We want them to go to the center, of course (remember that density means prosperity), but NOT their cars. Weather conditions, seasonality life facts, city officials' holidays, special events, and all other historical data is also very powerful information to consider. As an example, the city of Antwerp (Belgium) is analyzing these patterns with the objective to reduce as many as 20.000 cars downtown during rush hours every day.

- Provide alternatives

Following the example, in Antwerp (Belgium), the "Slim naar Antwerpen"[116] tool offer these alternatives, by combining different means (car, train, tram, bus, shared bikes, foot) to citizens. Rotterdam is offering 50cents EUR/ per km ridden by bike-to-work downtown. This incentive is under consideration in Paris and other cities.[117] A clear alternative is to offer parking solutions at the most convenient places, secured, cheap or free, connected to efficient public transportation, so citizens can approach the city, leave the car there and get into the inner one-mile radio area by public transportation, riding bicycles or e-scooters, or other creative solutions. Some studies point to an average of 30% of current traffic is just looking for parking (with exceptional peaks like Freiberg (Germany), with 74% moving cars trying so).[118] So, parkings are very relevant resources and city governments are setting strong rules to spaces dedicated to parking into new buildings…ok to the new buildings, but your cars must be placed under it… It is a precious asset, adding as much as 67% to the cost of building a new shopping center in Los Angeles.[119] Then, we can see the rise of multiple intelligent applications to help drivers find a parking slot. These new apps are so smart than they can lead the driver to the exact location of a free slot and automatically charge him for the time used, avoiding

[116] Antwerp https://www.slimnaarantwerpen.be/en/home retrieved by March 2019
[117] "France experiments with paying people to cycle to work" *Reuters* published Jun2014, https://www.reuters.com/article/us-france-bicycles-idUSKBN0ED1O120140602 retrieved by March 2019
[118] Reinventing Parking https://www.reinventingparking.org/2013/10/is-30-of-traffic-actually-searching-for.html retrieved by March 2019
[119] "The perilous politics of parking" *The Economist* published by Apr2017, https://www.economist.com/leaders/2017/04/06/the-perilous-politics-of-parking retrieved by March 2019

complex transactions and delays. EasyPark or ParkHelp are among the most popular apps.

Cities are investing as well on Car Sharing concept, Bicycle renting, e-Scooter renting, well directly or indirectly by allowing private companies to use the public space for parking these vehicles, reduce or avoid taxes, provide free parking spaces, facilitate charging stations deployment, and many other incentives. The car sharing (or temporal use of vehicles) or its evolution as Car as a Service concept is a clear disruptive motion. Car sharing is in its early stages, but it will become the standard for medium-distance mobility in the coming years. All main cities have a bike rental system, and this is not a touristic benefit, it's a very commonly use service. As an example, NYC offers around 12.000 bikes from its system. [120] Favoring cyclists is a constant, so cities are looking to the masters here: the Dutch and the Danish. In many Dutch cities, the bicycle is so popular that building parkings for them is risen as a problem. In Copenhagen, even traffic lights have been adapted to favor cyclists vs cars, reducing 17% commuting time and 57% CO_2 emissions[121], something critical for this city in its journey to become Carbon Neutral by 2025.

- Ban private non-residential traffic downtown.

Then, when the traffic has been analyzed and alternative measures and proposals have been put in place, so all citizens can avoid using the private car to go to the city, it is when you can think about limiting or prohibiting the use of the private car to go downtown. Not before! Not before unless the citizens dissatisfaction and its political price is assumed. Some examples of these policies are London, one of pioneers in traffic congestion charging, which has reduced up to 70.000 cars downtown daily by restricting some areas using traffic cameras, plate recognition to fine users still entering them, also those who don't match the maximum expected emissions[122]. Stockholm has decreased traffic by 20% combining different technologies like cameras, sensors, data on traffic flows, etc. [123] And these policies

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[120] Citibike https://www.citibikenyc.com/how-it-works retrieved by April 2019

[121] "The Anatomy of a SmartCity" *Orbismesh* https://www.orbismesh.com/the-anatomy-of-a-smart-city/ retrieved by April 2019

[122]YOUNG, J. "How will the new congestion charge affect London drivers & businesses in 2017?" *The London Economic*, publishes by Apr2017. https://www.thelondoneconomic.com/news/business/will-new-congestion-charge-affect-london-drivers-businesses-2017/19/04/ Retrieved by August 2018

[123] "IoE-Driven Congestion Charging System Enables Stockholm to Reduce Traffic and CO_2 Emissions," *Cisco*, 2014

are also increasing the use of public parking open spaces as source of funding. Barcelona is making more than 50 $m annually from parking solutions on streets, thru sensors and related apps.[124]

An example of strong controversy and citizen pushback because of just banning without offering alternatives before is Madrid Central policy.

Another consequence of this market shift towards electric cars is the need to build a powerful electrified infrastructure and provide chargers in each and every public and private parking, which means a huge opportunity for power companies.

Mid-term. Mobility as a service. (MaaS)

As changes and revolutions in transport systems are consolidated, a main need arises for integrated systems, multimodal services, point-to-point or end-to-end, where the user does not have to make complicated calculations to combine some systems with others: Mobility-as-a-Service. Users will pay for a mobility service, not for a vehicle ownership that just solves partially the problem, which entails many additional costs and that needs care, maintenance and space. The user needs to go from A to B by the cheapest, efficient and ecological way possible, combining the latest media and technologies, provided by specialized companies and provided or facilitated by the city.

- Car as a Service.

Being the proud owner of a car begins to be similar to the role of the nostalgic antique collector. Why spend so much money, time and space on a machine that we only use 4-5% of our time[125]. In addition, buying a car is ruinous from the point of view of taxes (especially in Singapore) and depreciation (nothing depreciates as much as 27% when just leaving the car dealer). And the remaining 95% of time is parked. Anyone who knows a little about the transport market can explain to us that

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https://www.cisco.com/c/dam/m/en_us/ioe/public_sector/pdfs/jurisdictions/Stockholm_Jurisdiction_Profile_051914_REV.pdf retrieved by March 2019

[124] "IoE-Driven Smart City Barcelona Initiative Cuts Water Bills, Boosts Parking Revenues, Creates Jobs & More", *Cisco*, 2014.https://www.cisco.com/assets/global/ZA/tomorrow-starts-here/pdf/barcelona_jurisdiction_profile_za.pdf retrieved by March 2018

[125] "The perilous politics of parking" *The Economist* published by Apr2017, https://www.economist.com/leaders/2017/04/06/the-perilous-politics-of-parking retrieved by March 2019

vehicles should be in use as long as possible. This also happens with airplanes, trains, buses, ... Thus, its use is maximized, and its inevitable depreciation is compensated. For this 95% of time that our car remains parked, it occupies a place (parking space) that is very expensive in the city center. I am always surprised to see couples living in minuscule apartments which size are almost comparable to the space occupied by their sports cars in the garage. Ok, ok, the car is also a social status indicator, not for long.

For these reasons, car sales are falling and the models of property-less car use such as renting, or leasing are increasing. Everybody talkes talk about the full model of Car-as-a-Service, to pay for a mobility service. Some manufacturers, car insurers and other automotive market players are making their business cases to launch Car-as-a-Service products on the market. In this model, you pay for the service or for the use of the car. It differs from using a taxi or an Uber because you are the driver and you choose the car. Imagine a car brand which for a fixed monthly price gives us a number of car use credits. Every time we need a car, we ask for it, choosing its characteristics and the expected time / distance. The car manufacturer offers us its entire fleet and is responsible not only to produce them, but to keep them in optimal conditions ready to be used. To go to work I need a small electric mono or two-seater. I find it near my house, ready, and I pay for using it one day one credit. At the weekend I need a van to go out with the family, then I will pay more credits. Or I go to a wedding with my partner and I want a sports car, then I will pay more accordingly. I don't care about car maintenance, tires pressure, filling the tank, insurances, and very important, I don't need a parking slot anymore…if I already have one, I can reuse it for storage… Soon we will see luxury brands that offer this, then the most common, then brokers that will offer a many model catalog from several manufacturers. The number of manufacturers and models will be reduced (today there are many models that share many pieces). If we continue thinking about the future and we add to this situation the autonomous car revolution, then we can conclude that we will not only not be the owners, but we will not drive them either. Will the authorities take the decision to forbid humans to drive with the intention to get more fluid traffic and the Zero fatalities vision? Definitely. Those who still want to drive must go to protected areas such as racing circuits or pay a plus for doing it off-road.

MaaS (Mobility-as-a-Service) is not a concept that emerged in the last few years and is not even exclusive to the automobile sector. The first formal regulation of MaaS dates from the mid-XVII century in London.

Long time before Uber and others were even imagined, and more than 200 years before the internal combustion engine was invented, the London citizens shared carriages. What has changed is that instead of raising a hand or handkerchief to a passing driver, we use a mobile application to request the service and make the payment electronically instead of using cash. With shared autonomous vehicles we could dream of a city where all transport is public, sometimes by drones, and citizens only pay for the service or trip. The city delivers again its mission to connect citizens by the best possible way.

- Fleet Management. Public Transportation Optimization.

To offer an efficient transport system at the lowest cost to the citizen and by the minimum environmental impact, cities need to renew their fleet of vehicles (buses, trams, waste collection trucks, inspection vehicles, police cars, etc) by other electric. In addition, they should optimize their maintenance, parts, materials, supplies, cleansing… For this, modern predictive systems based on IoT and AI are used. (Example Barcelona-TMB with more than 1100 buses[126]). It is also necessary to control and optimize routes, make them more efficient, with less energy consumption, adapt them to the circumstances and user needs. The GPS, IoT, AI, telemetry and its interaction with the city allow this (for example, optimization of bus routes in Helsinki)[127]

- Door-to-door commuting.

As we studied earlier, from the human point of view, the size of a city is determined by the efficiency in public transport: the city expands to the concept of metropolis or metropolitan area and public transport is the key enabler. This growth is an economic, social and political challenge because the metropolitan area is much larger than the basic political entity of the original city. It is a sum of entities that must work together in the development of the whole. When there are political

[126] "Case Study TMB." *Wonderware* https://www.wonderware.es/wp-content/uploads/2015/10/Transports_Metropolitans_Barcelona_historia_exito_Wonderware.pdf retrieved by April 2017

[127] "Using smart data to improve Helsinki's bus system" *CGI* https://www.cgi.com/en/case-study/using-smart-data-improve-helsinkis-bus-system retrieved by June 2018

differences between the small cities that make up the metropolitan area, inefficiencies, injustices and imbalances are constantly happening that citizens finally endure. To move around this extended area, citizens need a complete integrated mobility service (MaaS) that takes them door to door, using the most appropriate means in each case, on foot, by bicycle, train, metro, bus, etc. This coordination is not easy. It is necessary to know the status and situation of each element, its trajectory, capacity, external conditions like weather or seasonality, and cost and synchronize it with the others. To do this, the IoT world provides the necessary data from the sensorization. Previously, only the transport authorities' managers had this information. Now, all citizens have smartphone applications that, in real time, will take them through the extended city by the most optimal way (example like Waze, Moovit and others)

- Efficient systems. Area Smart Mobility Analytics

Obviously, with all that huge amount of data, AI / Analytics can generate the insight needed to improve the system in general. The combination of intelligent sensors, remote monitoring, pattern analysis, machine learning and the production of intelligent models based on neural networks allow us to think about the dream of having a transport network which could dynamically adapt itself to demand, in real time and according to the circumstances. The smart autonomous vehicles permanent interconnection with this infrastructure will strengthen this network, making it less unpredictable and more secure. As an example, the integral management of the Porto area (Portugal)[128], the advanced analysis in Rio de Janeiro by Waze reduced traffic congestion by 27% by the analysis of the area data[129], and it is helping the citizens to choose the most convenient car pool at any time and location and provide advice about 'dark areas' or those with highest crime ratios.

- MaaS Payment.

Another system that is being implanted gradually in our large metropolitan areas is the integral payment for transportation. It is about making it easier for the citizen to use all the transport elements at his disposal in an extended area. Through the use

[128] "Intelligent Transport Systems" *ARMIS* http://www.armis.pt/intelligent-transport-systems/ retrieved by October 2018
[129] "Waze Carpool in Rio de Janeiro, Brazil" *WAZE* https://www.waze.com/es/carpool/cities/BR/Rio%20De%20Janeiro?city=Rio%20De%20Janeiro retrieved by April 2019

of information technologies, a card, or an app is provided as in the case of Hong Kong Octopus Card[130], or London (TfL Oyster Card)[131], or the use of any credit card is permitted as in Milano (ATM). Once a month, and according to the trips made, it is paid according to the most advantageous rates based on the citizen profile (young student, retired, etc.). These systems are so popular that they are being accepted as micropayment cards, as they are verified by an official entity. In Hong Kong, Octopus is the most used card for this purpose. Another example is Turku (Finland) with a comprehensive regional transport system.

Long-term. Rebuild the city for humans.

Another main reason to transform the way we use transportation is the use of space. As less cars are needed, so the space dedicated for then. So, we can start thinking about regaining spaces for humans. We can very easily understand this by looking at figure 23, where each image shows different ways and spaces needed to move the same amount of people. This opportunity to transform the city shape by reusing lost spaces allows the full city new urban planning and design, creating spaces for humans where later there was just cars. Cities like Madrid (placing the inner ring or M-30 into 36 km tunnels), or Seoul (making all city center walkable and avoiding pedestrians to cross with traffic), or even NYC Broadway[132], where half of this famous street has been regained for human walk, terraces and places to meet, improving the city capability to foster humans to meet, share, trade, learn… a more human city, undoubtedly.

Jan Gehl, in his book "*Cities for people*" makes a masterful description of a new way of organizing the urban planning of a city, locating the appropriate distances and the ideal spaces to encourage citizens to be comfortably talking, sharing, working.[133] Cities are the catalyst for human activity (economic, social, artistic,

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[130] "Octopus - A Must Have Accessory in Hong Kong" *hongkong.net* https://www.hongkong.net/transportation/octopus-card retrieved by October 2018

[131] "Oyster cards" *Transport for London* https://oyster.tfl.gov.uk/oyster/entry.do retrieved by October 2018

[132] "BROADWAY BOULEVARD: TRANSFORMING MANHATTAN'S MOST FAMOUS STREET" *Project for Public Spaces*, https://www.pps.org/article/broadway-boulevard-transforming-manhattans-most-famous-street-to-improve-mobility-increase-safety-and-enhance-economic-vitality retrieved by May 2019

[133] GEHL, J. *Cities for People*. IslandPress. Washington. 2010

industrial and human development). But we all know that catalysts can be positive (accelerate) or negative (retard). In the past, all human activity happened on the street (markets, agoras, important events, even executions ...). In the twentieth century, the car has seized the street, invaded our cities, pushing humans out from the streets. As we need less cars and use more efficient means of public transport, we have the opportunity to reconquer our streets. In the urban development of the 20th century, low priority has been given to pedestrians or public space for people and high priority to traffic movement.

Figure 23. Source: We Ride Australia. [134] from The 2019 Deloitte City Mobility Index: Gauging global readiness for the future of mobility

More space for traffic means more cars ... and there is no more space available... can we try the other direction of this equation, less space, less cars? This has already been successfully tested in some areas of leading cities. The new urban planners have to hold several skills and disciplines such as architecture, sociology, data analysis technology, artificial intelligence, anthropology, ... They are no longer plan designers on a table. They face the challenge of rebuilding cities to encourage human development. It has been demonstrated that when certain streets of the center become pedestrian, the social and economic activity remarkably increases, price of properties rises, leisure and recreation areas arise, quality of life soars, group activities are encouraged ... aha, they are humanized. "*We shape cities, and they*

[134] DIXON D., IRSHAD H., PANKRATZ DEREK M, and BORNSTEIN, J. "The 2019 Deloitte City Mobility Index: Gauging global readiness for the future of mobility 2019." *Deloitte*, 2019 p.7

shape us" says Mr. Gehl in his book.[135] Man at the center of city's activities: that's the main theme. Man as city main attraction.[136] It is not just about making an attractive city from the aesthetic point of view (cities as an art gallery, colors, inspiring sensorial expressions) but from the economic point of view (creating meeting/trading places). Let's think about man. Man has a physical configuration and an attitude marked by his body. Our body has been made for walking: we have to make cities walkable, if not, we are fostering obesity and the many diseases that it entails. Our vision is frontal, and we badly see things above and below: we must position the city elements in that perspective. You have to think about the distances when designing the city: learn from the atrocities committed at Brasilia or LaDefense (Paris)[137] and handle distances[138] that allow human relationships (100m for watching movement in a stadium, 35m for plastic expression in a theater, 5m to hold a conversation, avoid noise, pollution, use urban furniture, ...). You have to assess the facades, avoid the disruptive angles, the cold and inhuman cities. It is good to make a beautiful city, but also a city where the 4th industrial revolution can be boosted. Density is better as we already explained, but the right kind of density[139], a combination of buildings where we always allow small spaces to share areas with large ones. Build places for people to meet: pedestrian areas, democracy expression meetings (agoras), playgrounds, energy/creativity development areas, areas for sports/gymnastics, festivals, parades, fireworks, demonstrations, or simply places to sit and talk, chairs, benches.[140] It's about setting priorities: first of all, why should I have to press a button at a traffic light to ask cars for permission to cross?[141], than bicycles, as the best tool for humans to move, Copenhagen already made that distinction. First humans, then spaces for humans, then spaces for buildings, not the other way around.[142] "*Look at the cats in your city: if they seem to be happy, so humans will*".[143]

Seven images / experiences in my life remind me of these concepts:

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[135] GEHL, Jan. *Cities for People*. IslandPress. Washington. 2010 p. Foreword IX
[136] Ibid p.25
[137] Ibid p.55
[138] Ibid p.33
[139] Ibid p.69
[140] Ibid p.154
[141] Ibid p.125
[142] Ibid p.193
[143] Ibid p.167

- Teruel, Spain, small city of the interior, not Madrid, not the coast, the 'deep Spain', summer 1980, 23h. Citizens had already finished their dinner and instead of watching television, they took their chairs out of their houses, on the street, right to talk to neighbors about life, the human and the divinity, watching people go by and the stars too.
- US, Atlanta (GE), downtown, summer 2010, 8pm. We arrived 2 days before a huge company event, nothing open, no cars, it looked like a ghost town with only skyscrapers and concrete. It seemed that something had happened that exterminated the humans. Two days later they opened the bars, restaurants, when 15,000 employees arrived.
- Copenhagen, winter 2015, 7ºC, 8pm, longest pedestrian street in Europe, terraces with gas burning stoves, people sitting with blankets at the terrace in the street, lively and interesting conversation, but it was freezing…
- Lisbon, today, new area of the Expo98, very nice pavement of little small cobblestones, impossible to walk, impossible to carry a wheel suitcase, ladies: forget about heels.
- Amsterdam, today, the red-light district, fewer and fewer red areas and more and more restaurants: Due to global warming (and after spending some summer times in Spain), the Dutch have discovered how wonderful it is to go out for dinner with friends. Say welcome to the 'Café Culture'. It was one of main factors for 'fin-de-siècle' Vienna, as explained.
- Oslo, today, the Opera house mixing with the environment, roof with floor, integrated, walking to the roof from the street. Building like an iceberg floating on one side, merged with the streets on the other, wonderful. See next figure 24.
- Los Angeles (US). Tourism with the family, summer 2009, 12h, my brother-in-law crosses a street running to get a good perspective to shoot a family photo in front of a museum, then a patrol car stops and asks him why he runs, why he walks down the street, do you need us to drive you anywhere, any help? Kind policemen, but cities should be made for walking ...
- Sao Paulo (Bra) 2008 at a luxury hotel lobby, 10 am, 'where can I buy an amethyst (semiprecious stone abundant in Brazil)? No problem, you can take our bulletproof van to go to a jewelry located in a popular square in the

city center. You can get out of the car right 1 m from the jewelry door and the driver will wait for you right there'.

Figure 24. Oslo opera House. Photo by: By Rafał Konieczny - Own work, CC BY-SA 4.0

There are great technologies specialized in visualizing the city (GIS), flat and in 3D, that help to redesign the city. There are technologies that based on high precision laser images (<2 cm accuracy) obtain 360º images of the city. Over these images, advanced AI algorithms 'visualize' the city and obtain the necessary information about distances and elements. On this information you can mount complete 'Digital Twins' city virtual models, positioning on top all the other information that we already have, but now georeferenced. We can add the layers of IoT information, the data we already have from citizens, their expressions on social networks, etc. In that way, we can redesign the city taking into account exactly what we have, what we can do with the available distances and spaces, and most importantly, who lives there and what we want to achieve in the future. We can think about the future of our cities, how we would like them to be, and more important, we all can contribute as co-creators. Think about the urban upgrade, the city of 2030.[144]

[144]BEEBE, A. and EINSNOR, D. "A tale of two cities, 2030 edition" *GreenBiz* Article. Published by May2019 https://www.greenbiz.com/article/tale-two-cities-2030-edition Retrieved by May 2019

1.5 Environmental Sustainability.

The re!magining Cities Foundation[145] points to three main components of Cities Sustainability, namely the 3 P's:

People – Social; Planet – Environmental; Profit or Prosperity - Economic.

Only when all three Sustainability's are achieved, then we can talk about a true sustainable SmartCity, actively working for improving citizens better quality of life. Some cities from the emerging world pay little attention to Environment just because they face social challenges and economical shortages which prevent them to dedicate resources. So, fixing those basics is clearly the first task to work out.

Cities use 75% of the planet's natural resources, consume 80% of energy, produce 75% of global CO_2 emissions, and consequently generate more than 80% of global greenhouse gas emissions. At the COP21 Conference (Paris, 2015), cities took a relevant twofold role: on one hand main megacities were pointed to as clear responsible for global warming, and on the other with cities declaring their responsibility and assumption for implementing the needed actions regardless the different position taken by their countries (NYC or San Francisco vs US President Trump)

There is a global alert on climate change and a collective conscience arises about the very serious impact that the abuse of the planet's resources will have on our lives and those of future generations. There is no longer talk about avoiding global warming, it is already accepted. Now, the efforts try to keep it at a level with non-fatal consequences for life on our planet and there are speculations on the maximum point of gases emissions that will not destroy it ... but there is no certainty in these calculations ... it is already too late? On the other hand, there are cities and countries that believe they have the right to continue polluting the common atmosphere "because they arrived late, and the most advanced countries cemented their development at the expense of contamination". We must break this direct relationship between development and ruining our planet, find ways to use renewable energy and development mechanisms that do not have negative consequences for our common environment. The mobilization of citizens over this

[145] Re!magining Cities foundation https://www.re-cities.org/about retrieved by Oct 2019

terrible threat has been increasing in recent years and the green parties (very radical with this issue) have been incorporated into the governments of most countries and cities in Europe. From the United Nations, and specifically from UN Habitat, global initiatives on this problem have been promoted, but there are still not enough global and solid agreements.

Cities face the challenge of establishing policies and forceful measures on environmental sustainability, but this is neither easy nor cheap, and it consumes resources that could be devoted to the economic development of the city. But citizens, and especially the most enlightened and talented, demand a clean and sustainable city. If cities want to retain or attract them, they should be attractive in this regard. The health problems associated with pollution and the environment also push to this position. Nobody wants to live in a not environment-friendly city. Using renewable energy and avoiding gas emissions is still more expensive than traditional systems based on fossil-pollutant energy, but the difference is shrinking and becoming acceptable and socially welcome. Our planet does not have an energy problem. We have a wonderful nearby star, the Sun, which originates diverse inexhaustible sources of renewable energies (solar, wind, hydro, sea tides, marine currents, etc). The problem is to store that energy for the time when it is needed. High-capacity, fast-charging battery technologies are evolving, although not as fast as others. It is estimated that by 2023, the cost of storing one unit of energy (kW.h) in a battery will be comparable to the one stored in an oil barrel. In that disruptive moment, oil producers will start to lower the price in order to compete. Those whose extraction price is high will have to stop producing, staying only those with an easy extraction. But the electrification of our cities, garages, cars seems inevitable. Decarbonization is underway. The question is whether it will arrive on time so that the caused damage on the planet by global warming is not irremediable or even fatal.

Becoming environmentally sustainable is a must-do for cities and companies. It is about attracting citizens or clients (aren't they the same person?).

Cities want to be sustainable for various reasons: ecological, political, public health, but above all, appealing to retain and attract talented citizens, citizens who can choose which city to develop their life and personal and professional potential. It is

also a question of prestige, but prestige is translated into a projected image, which also acts as a magnet for new generations of talents.

The companies launch internal social responsibility programs in which they invest to become carbon neutral or as sustainable as possible. They do it because they need to attract best professionals as employees (such as cities) and also as advertising for their products consumers. We all prefer products manufactured with renewable energy or with zero net carbon emission, unless the comparable price is very high, and, for the time being, it hasn't been found as a barrier. These tendencies together with the natural social green activity push in the good sense of decarbonification.

City decarbonification is not cheap neither easy, but also seems not optional if the city wants to compete in the world attractive cities premier league.

Resources Available

It's very remarkable the research work done by Global Footprint Network[146] analyzing the balance between natural consumed resources and Earth renewed resources. By 2016, we are collectively consuming 1,6 times more resources (fresh water, energy, food, materials, etc) than what Earth can renew in one year, so, we are using (or ruining) part of Earth reserves. (1,75 times by 2019). This situation can not last forever, since these reserves are finite, so if we don't stop the current consumption rate, we will reach a time when all available resources on Earth will have been spent. In figure 25, we can see this current consumption by country. In figure 26, we can watch our own biological capacity by country. In other words, starting by January 1st, which day, along the year, our country own reserves will last till if we consume them at current speed. Interesting to high external resources dependent countries like Qatar, UAE or USA, compared with other more self-sufficient like Vietnam, Jamaica or Colombia. Note that none is completely self-sufficient, meaning that Earth can't renew itself at our consumption speed, so natural reserves are declining every year.

[146] "Measure what you treasure" *Global Footprint Network* https://www.footprintnetwork.org/ retrieved by May, 2019

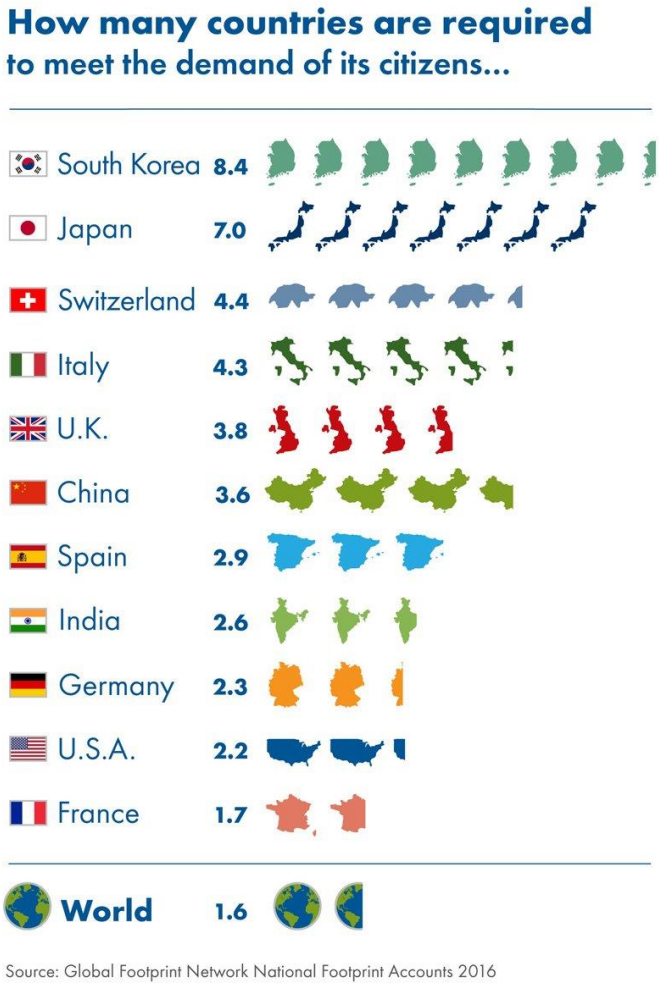

Figure 25. Global Footprint resources analysis.2016

Very clearly, a more efficient and intelligent use of existing resources is needed, especially water and land, to produce more food, etc, while reducing overall consumption, and wasting or ruining less scarce materials. In 2019, 29th of July set the day of full renewed resources consumption. "Earth Overshoot Day".

Climate Change. Decarbonizing. Carbon Neutral Cities

The current concentration of CO_2 in the atmosphere (2018) is the highest in the last 3 million years, with 415 ppm (particles per million)[147].

[147] NUGENT, C. "Carbon Dioxide Concentration in the Earth's Atmosphere Has Hit Levels Unseen for 3 Million Years" *TIME* http://time.com/5588794/carbon-dioxide-earth-climate-change/ published by May2019 retrieved by Jun2019

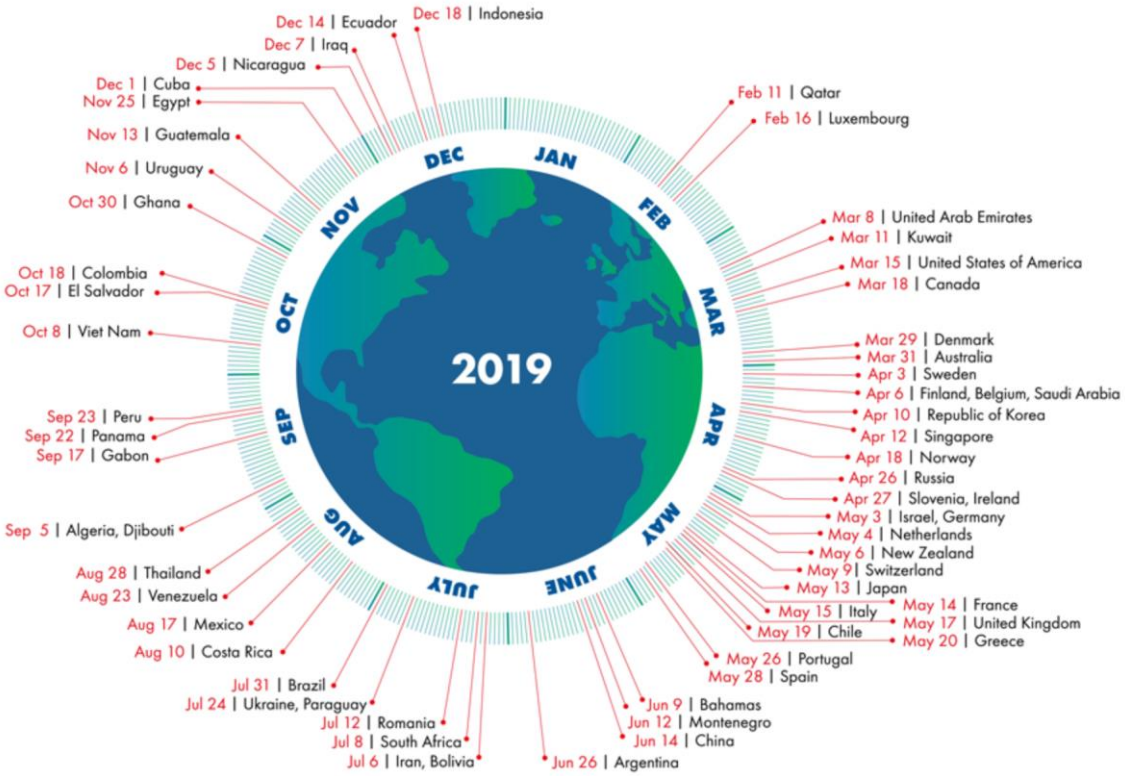

Figure 26. Global Footprint resources analysis. Country overshoot days 2019[148]

The Intergovernmental Panel on Climate Change[149] estimates that a concentration of 430 ppm would lead to a global 1,5ºC increase. Rising up to 450 would mean 2ºC and catastrophic consequences. 2016 was the hottest year recorded to date (2019): an increase of 1.78 degrees F (0.99 ºC) with respect to the 20th century average[150]. In Spain, if 2016 had the driest winter in 44 years and 2017 the wettest of the last 76, is anything happening on our planet?[151]

Poor people always take the worst share of this living situation[152]: 75% of the world's population lived in a low-lying coastal area in 2000, very vulnerable to rising sea levels and 11% are poor who must live there because of scarce resources.

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[148] "Country Overshoot Days" *Earth Overshoot Day* https://www.overshootday.org/newsroom/country-overshoot-days/ retrieved by Aug 2019

[149] Intergovernmental Panel on Climate Change (IPCC). United Nations https://www.ipcc.ch/ retrieved by Aug2019

[150] "NASA, NOAA data show 2016 warmest year on record globally" *NASA* https://climate.nasa.gov/news/2537/nasa-noaa-data-show-2016-warmest-year-on-record-globally/ retrieved by January 2019

[151] "El invierno 2016-2017, el más húmedo de los últimos 76 años" *EuropaPress* https://www.europapress.es/murcia/noticia-invierno-2016-2017-mas-humedo-ultimos-76-anos-20170321140121.html published Mar2017, retrieved by January 2019

[152] UN Sustainable Development goals https://www.un.org/sustainabledevelopment/blog/2016/10/report-inequalities-exacerbate-climate-impacts-on-poor/ retrieved by January 2019

There is a concentration of poor people in arid, semi-arid and dry areas that cover approximately 40% of the earth's surface. 29% of the world population lives in these areas and faces an additional challenge due to climate change.

The 2015 Paris Climate Change Agreement (COP21)[153] was signed by 195 countries, and includes limiting global warming, adapting to it and protecting nature. To pay for all these necessary changes, 0.1% of global GDP would suffice.[154]

27 major cities around the world signed C40 Declaration[155] "Fossil fuel free streets", with the objective of exclusively use zero-emission buses since 2025, and ensuring that an important area of their cities is zero emissions by 2030. A study in the United States, UK and France. and Germany showed that roads congestion costs the economy on average one percent of GDP in wasted time and productivity loss. This not only slows down our economies but also harms our health and the environment through the air quality worsening. Recent data show that polluted air produces almost 4.5 million premature deaths per year and impacts all other, especially children, with diseases such as asthma.

Extreme natural disasters will undoubtedly increase in the coming years, like hurricanes, tornados, tropical cyclones, heavy Monsoon or 'El Niño' conditions.

The climate impact during the next decade is already unstoppable and inevitable, but the future impact (which can be catastrophic) depends on the decarbonization action that we must do during the next two decades. Facing this challenge also involves new opportunities for development, growth, innovation and investment in resilience by cities.[156]

Man needs to implement gigantic changes to avoid catastrophic climate change in the coming decades. Staying below a 2°C increase in global warming requires drastic changes in the way we consume natural resources, energy and many

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[153] "Paris Agreement" *EU* https://ec.europa.eu/clima/policies/international/negotiations/paris_en retrieved by March 2019

[154] "CLIMATE CHANGE: 11 FACTS YOU NEED TO KNOW" *Conservation International* https://www.conservation.org/stories/Pages/11-climate-change-facts-you-need-to-know.aspx retrieved by January 2019

[155] "Fossil Fuel Free Streets Declaration" *C40 Cities* https://www.c40.org/other/fossil-fuel-free-streets-declaration retrieved by December 2018

[156] "Sustainability at a tipping point" *McKinsey* https://www.mckinsey.com/business-functions/sustainability/our-insights/Sustainability-at-a-tipping-point retrieved by January 2019

materials. This can only be possible if we deeply change the way we experience our mobility, our buildings and spaces, and the way we produce and consume food.[157]

A philosophical reflection. We live in a positivist scientist society. Technology solves all our problems. Climate change is not another problem, it is an "*Armageddon*" that must be stopped before it destroys us. And there is no fear of it. There is some concern but not a strong collective conscience to decarbonize on everything we do. We think that technology will solve it, like everything. It is true that, without technology, we would be died of cold and hunger fragile animals at the bottom of our cavern, at the mercy of elements inclemency and the vermin. I am optimist, and I think we live in the best moment of our human history, thanks to technology. The problem is that we have made it something like a God, assuming that it is capable of giving us everything and even answering our existential questions. Serious error. We hope that someone will invent a wonderful machine powered by the sun's energy, which extracts CO_2 from the atmosphere and turns it into nice coil rocks and clean, breathable oxygen. Problem solved, we can continue playing to be mini Gods, owners of the Earth. The error is human, and comes from attributing to technology a transcendent, almost divine dimension. Technology is human work, and we must never forget it. Nor must we demonize it, we must understand it and use it for the purpose it was developed, nothing more, and nothing less. That machine is chemically possible, but unfeasible. We do not sufficiently understand a process as complex as climate. The well-known phrase that a butterfly flutter can trigger a storm on the other side of the planet seems an aesthetically beautiful story. Scientists are not sure either that it is too late, nor that we can contain the rise in temperature to no more than 2ºC, nor that this will be enough. Hands on! What is clear is that we have to get down to work already, in a collective massive task. The great challenge is that all humanity, for the first time ever, must agree and decarbonize, in all our personal individual and collective actions, assuming that it can seriously impact those economies that still heavily depend on the fossil fuels energy generation. Technology will be a faithful and decisive ally.

[157] "Making an impact" *Climate-KIC* https://www.climate-kic.org/who-we-are/making-an-impact/ retrieved by January 2019

Evolution of CO_2 emissions from a city should set dates into this path:

NOW → NetZero (Carbon Neutral) → Net Negative → Zero Emissions Target

From positive net emissions, where the total amount of emitted CO_2 is not compensated by the amount of CO_2 that the city sequesters (basically by trees and plant matter, which are the fundamental tool for CO_2 fixing from air), we turn to an stage of NetZero or Carbon Neutral, where emissions are offset by green matter plus the so-called 'carbon offsets' or investments outside the city in activities that sequester the remaining CO_2 (plant a forest in Tanzania, improve crops, avoid emissions by compensations or alternatives, ...) regulated and certified by internationally recognized entities. But this is not enough to stop climate change. In order not to exceed the target of 2ºC increase, it is necessary to capture more than what is emitted (NetNegative)[158] or even reach zero emissions (scenario that will always be NetNegative because of the city forest mass).

First company to announce 'Net Negative' plans has been Microsoft. It's the first serious movement from a leader company understanding that achieving a carbon neutral is not enough for stopping the Global warming: we must consider capturing or sequestrating the already emitted CO_2 present at the atmosphere. The company starts investing 1b$ by 2020 to become Carbon negative by 2030 (more CO_2 capture than emissions, then remove all CO_2 the company has emitted since its foundation in 1975 by 2050.[159]

There are many voices that shout these facts, denouncing the facts and encouraging the conscience of city and country managers about the urgency to act. One of the most famous is the Swedish environmental activist Greta Thunberg, who at only 16 is able to make clear the consequences of inaction. In just six months, she has gained more attention than the entire global climate change movement so far.[160]

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[158] BURKE, J. "What does net zero mean?" *Greenbiz* https://www.greenbiz.com/article/what-does-net-zero-mean published by May2019, retrieved by Jun 2019

[159] BASS, D. "Microsoft to Invest $1 Billion in Carbon-Reduction Technology. Software maker commits to becoming 'carbon negative' by 2030*"* *Bloomberg* published by Jan 2020 https://www.bloomberg.com/news/articles/2020-01-16/microsoft-to-invest-1-billion-in-carbon-reduction-technology retrieved by Jan 2020

[160] BARCLAY, E. and BHALLA, J. "12 excuses for climate inaction and how to refute them" *VOX* https://www.vox.com/energy-and-environment/2019/5/17/18626825/alexandria-ocasio-cortez-greta-thunberg-climate-change published by Sep2019, retrieved by Oct2019

Cities are leading the way on implementing active climate actions that create jobs in a new and dynamic sector, grow economies and create new companies, and save lives by combating their effects on health. As an example, after the political decision to become Carbon Neutral by 2025, Copenhagen ruled in 2012 that all vehicles purchased by the city would be electric (cars[161] and buses[162]), and since then its growing fleet has been saving pollution and money.

The European Commission is leading the environmental sustainability movement, promoting a sustainability industry and looking for profitable ways for the European economy to remain competitive and at the same time climate respectful. The roadmap for a low-carbon economy is established at the European Conference on Climate and Energy and sets clear objectives for 2030 together with an objective to reduce greenhouse gases by 2050:

• By 2050, the EU should reduce greenhouse gas emissions to 80% below 1990 levels. This should be done only through own or domestic reductions (ie, not relying on international credits, or external 'carbon offsets').

• To achieve this, the main milestones are: 40% emission reduction by 2030 and 60% by 2040.

• All sectors of activity must contribute.

• A low carbon transition is feasible and affordable.

To achieve this goal, the EU must continue to move towards a decarbonization of society.

The road of Carbon Neutral.

To obtain the precious 'Carbon Neutral' certificate, companies and cities must follow a clear process:

1.- Evaluate the starting situation. What is my current carbon footprint? How many tons of CO_2 do I emit into the atmosphere as a result of my activity, operations, production? To do this it is necessary, basically, to measure. Measure, with sensors (IoT) the consumptions of fossil energy that I am using, because those consumptions generate CO_2.

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[161] ZACH. "Electric bicycles, buses and cars in Copenhagen" *EV Obsession*, published Aug2015. https://evobsession.com/electric-bikes-buses-cars-in-copenhagen-video/ retrieved by Mar2019

[162] VESTERGAARD ANDERSEN, A. "City of Copenhagen to replace diesel-powered buses with electric buses", *Green State*, published May2016. https://stateofgreen.com/en/partners/state-of-green/news/city-of-copenhagen-to-replace-buses-fuelled-by-diesel-with-electric-buses/ retrieved by March 2019

2.- Prioritize and implement decisions and processes that significantly reduce this carbon footprint. Contract renewable energy, replace fuel-engine vehicles by electric ones, adopt energy-saving computing solutions (automatic systems on and off, heating, buildings intelligent management, etc). This builds a roadmap of investments and achievements.

3.- The remaining non-avoidable emissions (or non-avoidable in the determined timeframe) must be compensated with actions that sequester the same amount of CO_2 down from atmosphere. For now, the only thing that absorbs and fixes CO_2 from the atmosphere is called tree (or plant mass). Ok, let's go counting trees ... In the case of companies, we may not find many in our garden, but in the case of cities, this concept is very significant (parks, gardens, forests, etc). There is an equivalence between live trees and their size and the amount of CO_2 they sequester per year.

4.- To finally achieve the goal of zero net emissions, we must compensate this final amount. It is about investing on activities that encourage the planting and use of plant material (use of compost or compostable materials from sustainable forests, planting forests in such a place, or reducing emissions elsewhere through these investments). These investments 'Carbon offsets' are valid anywhere in the world because, let's remember, our atmosphere is unique and common to all of us. There are organizations that issue a valid certificate on these tons of CO_2 that we must remove from air and fix on the ground and that our money has paid for.

In the case of cities, I observe two speeds or two different processes: the easy and the difficult one:

The easiest way is to achieve the status of 'Carbon Neutral' only in the city operations, that is, in the emissions produced by the city vehicles (cars, police cars, garbage trucks, fire machines, ambulances, etc) mayor and other officials working trips, lighting of the city and other uses of electricity that comes from fossil fuels, etc.

The complicated way (or extended) includes the energy used by all citizens (not companies). We must add each citizen carbon footprint and thus, the total city footprint is greatly increased.

Copenhagen (Denmark) is the first world capital with a serious clear target to become Carbon Neutral (in the extended version, including the citizens) by 2025[163], with a creative collective house heating system and the full citizens involvement[164]. This was a political decision taking more than 10 years and agreement from different politicians. To make this happen, Copenhageners have to use bicycle for 85% of their commuting. I really like this fact because it means a collective task, something all the citizens should contribute, all can feel proud of, reinforcing the sense of belonging, making their city the most attractive in the world from the Sustainability point of view.

Many other cities are following this leadership (see figure 27).

City	Country	Climate Action Plan
Boston	US	Reduce GHG emissions 25% by 2020 (compared to 2005 levels), carbon neutral by 2050
Copenhagen	Denmark	Carbon neutrality by 2025
London	UK	Reduce CO_2 emissions 60% by 2025 (compared to 1990 levels), zero carbon by 2050
Mexico City	Mexico	Reduce GHG emissions 30% by 2020 (compared to 2014 levels)
Munich	Germany	100% renewable energy powered by 2025
San Diego	US	100% renewable electricity by 2035
San Francisco	US	40% reduction in GHG by 2025, 80% reduction by 2050 (compared to 1990 levels)
Seoul	South Korea	25% reduction in CO_2 by 2020, 40% reduction by 2030 (compared to 2005 levels)
Stockholm	Sweden	Fossil-fuel free by 2040
Sydney	Australia	Reduce GHG emissions 70% by 2030 (compared to 2006 levels), 50% renewable energy
Vancouver	Canada	100% of city energy (including transport) from renewable sources by 2050

(Source: Navigant Research)

Figure 27. Climate action plans for selected cities.[165]

At the moment, I cannot imagine a city that wants to be attractive for talent and lead the 4th Industrial Revolution without a clear plan to become Carbon Neutral in the next coming years.

[163] "Carbon neutral capital" *Copenhagen* https://international.kk.dk/artikel/carbon-neutral-capital retrieved by January 2019

[164] MATHIESEN, B, AUKEN, I., SKIBSTED, J. "This is how Copenhagen plans to go carbon-neutral by 2025" *WEFORUM* https://www.weforum.org/agenda/2019/05/the-copenhagen-effect-how-europe-can-become-heat-efficient/ retrieved by June2019

[165] CITRON, R. and WOODS, E. *Utility opportunities in Smart Cities*. Navigant Research, Boulder, CO, USA, 2019, p.5

To solve one third of the problem, we can just allow nature to do its job. Natural solutions[166] are among the easiest and cheapest ways to decarbonize (seems obvious, more forests, plans, more CO_2 sequestered and fixed on the ground). It is estimated that 37% of the needed decarbonization to achieve the 2ºC target by 2030 may come from natural climate solutions like forest conservation, land management (wet, grass, agriculture). So, let's invest first on our green areas and allow photosynthesis to do its job, for free. Nature4Climate is a UN Initiative which tries to prioritize this.[167]

We have the collective mission to feed more than 9 billion people by 2050, while maintaining the planet sustainability and the people health. Latest Smart Agriculture technologies using drones, sensors to understand and adapt crops growth to weather conditions and maximize the growth are revolutionizing the land yield, preserving wide forestall areas, avoiding wild fires and helping nature to make our world greener.

The objective is to maximize wood production, but not for burning it. New construction techniques will use wood instead of cement (intensive carbon emissions needed to make it) to build large buildings (where all that carbon will keep fixed). Organizations like SilviaTerra are showing the way to take care of forests.[168]

Other tools that could be used to combat climate change are:

• Stop using coal / oil to produce energy. Use non-polluting, clean energies.

• End subsidies to fossil fuels. Do not use public money to maintain coal mining or similar.

• Reduce consumption: let citizens know the carbon footprint associated to meats, dairy products, gasoline / diesel cars, energy efficiency in buildings, etc.

• Continue using existing nuclear power plants. I know they are dangerous, but the danger is already there and in these moments of urgent reaction they produce a lot of clean energy. So, ok to dismantle then, but not so soon.

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[166] GRISCOM, B.W. et al "Natural climate solutions" *PNAS*, published Oct2017, corrected Feb2019 https://www.pnas.org/content/114/44/11645 retrieved by May 2019

[167] "NATURAL CLIMATE SOLUTIONS" *Nature4Climate* https://nature4climate.org/ retrieved by March 2019

[168] "Measuring and valuing every acre" *SILVIATERRA* https://silviaterra.com/bark/index.html retrieved by April 2019

• Capture carbon. They are inventing chemical processes that can help to sequester it in compounds such as gypsum, or as calcium carbonate or by burying it ...

In everything we do, in each product we buy and consume, we must think about whether or not it has required carbon emission and try to opt for the cleaner alternative. The leading companies in the world know that consumers are going to demand this type of clean products and their employees also want to work in clean environment respectful companies. For this reason, many companies detail in their annual reports the growing or complete use of renewable energies in their operations and in their products. Some detail a 'Company Ethics' code related to sustainability. Many incorporate these green investments in their Corporate Social Responsibility programs, and even encourage the development of initiatives in this sense with grants. As an example, Microsoft has a program to help develop applications based on Artificial Intelligence that improve sustainability. (AI for Earth)[169]

Artificial Intelligence technology alone can help reduce global greenhouse gases emissions by 4% in 2030, while growing world GDP by an impressive 4,4% and create 38 million new jobs in multiple sectors like water, energy, agriculture, and transport, according to a recent PWC report commissioned by Microsoft.[170]

Energy & Water Efficient use.

Energy transition: the boom in renewable energy. Let's go electric!

It is expected that global emissions related to energy production will reach their peak by 2024 and then decrease by 20% until 2050, mainly due to the decrease in the use of coal in the electricity power sector and despite the expected growth in electricity demand. However, this trajectory is still far from the path to not overpass the 2ºC limit increase.

Less carbon means more flexibility when it comes to producing electricity and recognizing the importance of alternative sources such as sun, wind, etc. The key

[169] "AI for Earth" *Microsoft* http://www.microsoft.com/en-us/ai/ai-for-earth retrieved by Feb2019
[170] "How AI can enable a sustainable future" *PWC* https://www.pwc.co.uk/services/sustainability-climate-change/insights/how-ai-future-can-enable-sustainable-future.html retrieved by May 2019

is, as we explained, the performance of storage systems, batteries. As soon as we have good ones (large capacity, minimal space, weight and require charging time), we can turn cars into electric and petrol stations into pit-stop battery replacing areas. Intensive of renewables is creating massive number of new jobs and promoting the economy. Forbes estimates on 150 $ trillion in climate change costs by 2050. In spite of this, we can still see barriers to solar power industry in US or plans to open a large coil mine in Australia, very much contested.[171] US is perceived as "*a hotbed of climate change denial*",[172] accusing China of being the problem root cause, hopefully the main US cities are acting the opposite way and taking action. On the other direction, we begin to see exciting news, like this one that points to UK without carbon-based generation by 2025, already tested in a week without burning coal for electricity, something that has not happened since 1888.[173]

One main power consumption area in the cities is Streets Lightening. There are about 320M light poles in our cities and only 1% are 'smart' (they allow some communication and remote control - IoT). Intelligent lighting is one of the basic issues for any smart city. It is the most visible aspect of intelligent technology, which often paves the way for other utilities such as water to follow the example. The lamp post is used to add many other sensors and often cameras. The benefits of intelligent lighting are indisputable: it improves public safety, reduces light pollution and saves electricity / money. The financing usually comes from saving energy (from bulbs or sodium vapor bulbs to LEDs). The Energy Savings Performance Contracts (ESPC) make these investments pay by themselves with the consumption savings. They are very popular and a no brainer decision in the early Smartcity plans. In figure 28, we can understand the process how SmartLighting is getting integrated into the overall Smartcity energy plan. First, the simple bulb replacement by LEDs is saving up to 50% on energy. If we add additional

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[171] ELLSMOOR, J. "Renewable Energy Could Save $160 Trillion In Climate Change Costs by 2050" *Forbes* https://www.forbes.com/sites/jamesellsmoor/2019/04/14/renewable-energy-could-save-160-trillion-in-climate-change-costs-by-2050 published by Apr2019, retrieved by May2019

[172] MILMAN, O. and HARVEY, F. "US is hotbed of climate change denial, major global survey finds" *The Guardian* published by May2019 http://www.theguardian.com/environment/2019/may/07/us-hotbed-climate-change-denial-international-poll retrieved by March 2019

[173] JOLLY, J. "Britain passes one week without coal power for first time since 1882" *The Guardian* published by May2019 http://www.theguardian.com/environment/2019/may/08/britain-passes-1-week-without-coal-power-for-first-time-since-1882 retrieved by May 2019

intelligence, so we can dim on and off the light according to specific conditions, then savings can reach 80%, and finally, additional benefits because of integration with the overall city IoT Platform.

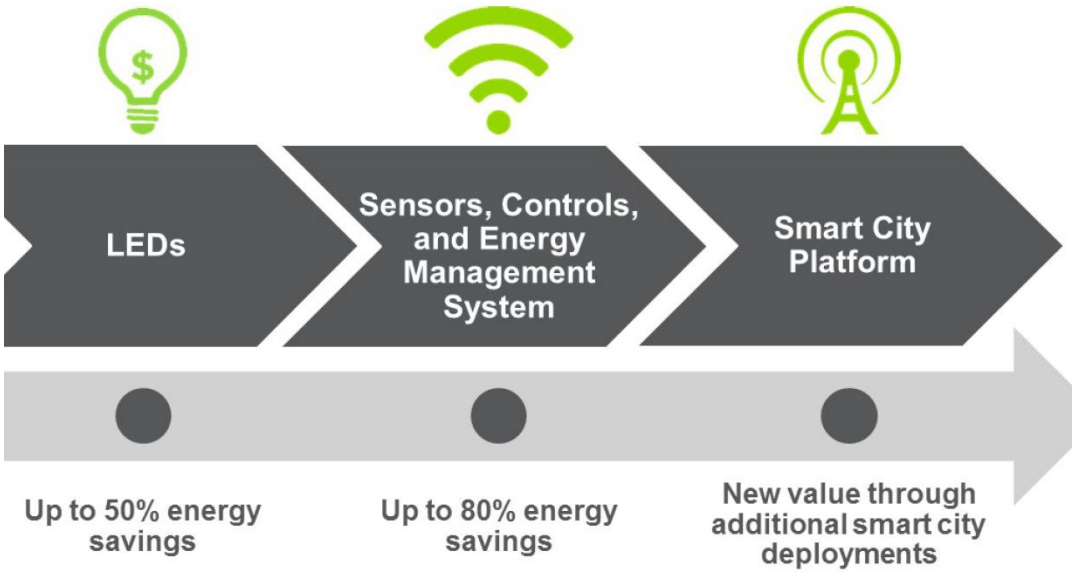

Figure 28. "Evolution of SmartStreet lighting in SmartCities: From LEDS to Networked controls and SmartCity Platforms"[174]

Although electricity generation accounts for 25% of all greenhouse gas emissions, being the largest contributor to climate change, its solution and replacement by renewables must also be a boost for the economy. With clean electricity, we can not only generate the energy we need for lighting, but help reduce the other 75% of activities that also emit these harmful to the greenhouse effect gases. Just think about transport, cooling and heating systems, factories, etc. It seems clear that we must improve production, with an expected half of energy generated by renewables by 2030, but also its storage, to have the energy available when we do not have the source (no sun, no wind, etc.)[175] With global warming, some cities that to date had paid scant attention to having an efficient water management system, simply because it was never needed due to its abundance, see how constant leaks and a too old pipes network are compromising the supply. Water gives us life, as a

[174] CITRON, R. and WOODS, E. *Smart Street Lighting for Smart Cities*. Navigant Research, Boulder, CO, USA, 2017, p.5

[175] GATES, B. "A critical step to reduce climate change" *GatesNotes* published by May2019, http://www.gatesnotes.com/Energy/A-critical-step-to-reduce-climate-change retrieved by May 2019

precondition for all forms of life and climate regulation, and becomes a vital resource that must be managed properly. Its quality, quantity, avoiding leaks, measuring its use by an integrated manner, are fundamental issues in a smart city. It is not only about the supply in homes and industries, but in the management of rivers, aquifers, wetlands and reservoirs/dams. Once again, the IoT sensors, permanent quality tests, early leak detection and consumption measurement are supported by the latest technologies. Even underground drones are available for the sewer's inspection with artificial vision. As an example of water crisis, we can mention India. Droughts, floods, a water pipe system too old or inexistent and an inefficient waste of water on agriculture has led a country with more water than needed to a crisis where 600 million inhabitants face critical problems on water supply, 70% of country water is contaminated and 200.000 deaths a year because of that.[176]

Circular Economy. Waste Management

Most current production systems operate in a linear fashion: extraction of raw materials, production of goods, disposal of waste. This is called the linear "take-make-dispose" traditional concept.

As we saw earlier when talking about the Earth resources, we cannot continue with the current rate of Earth exploitation. We must recycle.

If the rising demand and insufficient recycling of plastics continues its current trajectory, the global volume of plastic waste will increase from 260 million tons per year in 2016 to 460 m by 2030, and if we continue at that speed, by 2050, there will be more plastic than fish in the sea? WEFORUM[177] suggests three actions to tackle on this:

1. Rethink the use and design of packing systems to avoid that 30% of what we produce ends up in the land or in the oceans, and that the inevitable part that ends

[176]TEMPLE, J. "India's water crisis is already here. Climate change will compound it." *MIT Technology Review*, Apr2019 http://www.technologyreview.com/s/613344/indias-water-crisis-is-already-here-climate-change-will-compound-it/ retrieved by May 2019

[177]BRUCE-LOCKHART, A. "More plastic in the sea than fish? Not if we do these 3 things" *WEFORUM* published Jan2017 https://www.weforum.org/agenda/2017/01/more-plastic-in-sea-than-fish-3-strategies retrieved by April 2019

there is the least harmful and biodegrades as soon as possible. So, redesign to use less plastic.

2. Make at least another 20% of plastic waste be reusable.

3. Make that for the remaining 50% of plastic, recycling should be profitable.

In other words, apply the famous 3 R's (Reduce, Reuse, Recycle) to the plastic cycle.

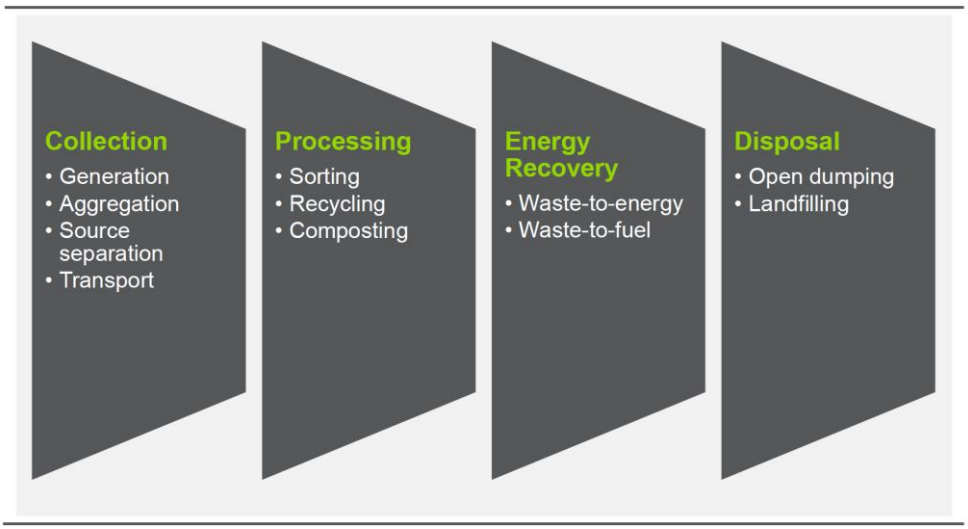

Figure 29: Municipal Solid Waste Management Value Chain[178]

Figure 29 shows the waste value chain in a city, and how waste is managed to maximize the recycling and energy generation.

The linear consumption model is reaching its limits. The traditional take-make-dispose approach no longer works, and resource constraints and sustainability make us firmly believe that the future of our cities has to be circular. A city with a circular economy is regenerative by design and is based on three principles: no waste, no materials obsolescence (recycling) and help Earth on natural systems regeneration. We are generating on average 1,42 kg of solid waste/capita/day. (2,2 kg in the OECD countries)[179]

[178] SOOKYOUNG JUNG, C. and WOODS, E. *Smart Waste Collection*. Navigant Research, Boulder, CO, USA, 2016, p.3

[179] KAZA, S. , YAO, L., BHADA-TATA, P. and VAN WOERDEN, F. *What a Waste 2.0 : A Global Snapshot of Solid Waste Management to 2050*. WORLD BANK, Washington, 2018 p.47

23 pioneer cities have signed the C40 Advancing Towards Zero Waste Declaration.[180] They commit to 1) reduce the city solid waste generation per capita by at least 15% by 2030 compared to 2015; 2) Reduce the amount of city solid waste disposed for landfill and incineration by at least 50% by 2030 compared to 2015.

The decrease in the waste generation, reuse and intelligent design are aimed at make the products life cycle circular, stopping the plastics proliferation and offering advantages both for the environment and for economic development. According to the European Parliament, the gradual transition to a circular economy model could save EU companies some 600 billion euros, reduce total greenhouse gases annual emissions by 2% to 4% and reach a 65% city waste recycling by 2035.

The circular economy is not just a new methodology to improve sustainability, it's a completely different way of business developing. Traditional and new companies that emerge taking advantage of this opportunity must innovate taking into account the scarcity of resources and climate change, developing new products within the circular paradigm responding to the demands of consumers who want to buy these types of products and sustainable proposals. The opportunity is huge. It is valued by Accenture at $ 4.5 trillion by 2030.[181]

This circular economy requires a company digital transformation, including its entire value chain, always maintaining the minimum consumption and maximum regeneration and reuse of materials objectives.

However, there is still a lack of awareness about the circular economy, its financing models and how companies and cities can take advantage of it. An important key is packaging. Some considerations:

• Replace the packages by others with a circular economy model. Work with suppliers to transition to these new packages and manage their impact on the business.

• Develop an impactful communication plan to consumers about this new packaging.

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[180] "Zero Waste Declaration" *C40* https://www.c40.org/other/zero-waste-declaration Retrieved by March 2019

[181] "The Circular Economy Could Unlock $4.5 trillion of Economic Growth" *Accenture*, published Sep2015, https://newsroom.accenture.com/news/the-circular-economy-could-unlock-4-5-trillion-of-economic-growth-finds-new-book-by-accenture.htm retrieved by March 2019

• Generate new marketing strategies based on the circular economy.

• Make a transition plan to a circular economy that does not compromise the brand. On the contrary, take advantage of it to strengthen it.

• Design a new materials, waste and polluting elements management.

It's very famous the example of entrepreneur Albina Ruiz who turned waste mountains into an opportunity to generate new jobs, environment care and quality of life improvement in Peru. (Ciudad Saludable)[182].

Very relevant in this concept is the Barcelona's initiative called FabCity[183]. FabCity points to a self-generation of everything the city consumes in 40 years. Started by 2014, the initiative has been endorsed by 34 cities in a manifesto[184], with the aim to reach a become a full circular economy by 2054. Then the question is about distances, but if we remember the concept of extended city, where a city, from the human perspective is everything reachable in less than 90' using public transportation, then there must be enough space to generate all the city needs. (see chapter 1.4 about Urban Mobility). Does this sound like the ancient Greece self-sufficient State-Cities?

Artificial Intelligence technology helps on waste recycling through advanced artificial vision based on infrared image (plastic, wood, metals, paper or cardboard, glass and organic material). The algorithm evaluates the type of material and informs the robot of its components to separate them, estimates the waste calorific value to be sent to the incinerator. Another solution observes through artificial vision the waste items that are deposited into a dumpster. For packages with barcodes, the type of material (bottle, plastic pack, etc.) is scanned and detected, then some 'green' points are assigned to the citizen who has recycled them according to the type of material. These points will be later exchanged by benefits or discounts due to public-private agreements.

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[182] "ALBINA RUIZ, UNA EMPRENDEDORA SOCIAL QUE ENCONTRÓ UNA OPORTUNIDAD EN LA BASURA" *Emprendesocial* published Nov2011, https://emprendesocial.com/2011/11/21/albina-ruiz-emprendedora-social-encontro-oportunidad-en-la-basura-la-basura/ retrieved by March 2019

[183] DOWNING, S. "Fab City, the global circular economy movement centered around local makers", *GREENBIZ*, Sep2019 https://www.greenbiz.com/article/fab-city-global-circular-economy-movement-centered-around-local-makers retrieved by Oct 2019

[184] FABCITY Manifesto, https://fab.city/uploads/Manifesto.pdf retrieved by Oct 2019

Buildings account for 39% of US CO_2 emissions and 70% of the electricity consumption.[185] In 2014, 31% of total global energy consumed and 33% of CO_2 emissions came from residential and commercial buildings.[186]

From the city total emissions, around 85% comes from buildings and cars.[187]

There is a significant confusion between Building Information Modelling and Building Information Management. While first is harnessing the future design of cities and urban planning (learn more from BIMForum[188]), the second is critical to obtain an efficient use of one of most relevant assets for any city: the public buildings where multiple services are delivered.

Building Information Management, otherwise known as a Building Automation System (BAS), is a computer-based control system installed in buildings that controls and monitors the building's mechanical and electrical equipment such as ventilation, lighting, power systems, fire systems, and security systems. It is often confused with the term 'Smart Buildings', which mainly applies to new advanced fully-sensorized and monitored buildings. You can learn more about this by reading about the World's Greenest Office Building (Deloitte offices in Amsterdam, The Edge). It is a flagship on IoT and Data Management applied to buildings.[189] But I don't want to talk about new excellent new buildings, but about existing huge amount of official buildings in cities: a great asset, but very expensive to maintain, and how technology could help on keeping it efficient.

What's the problem?

Based on some research that I made, **a modern city has an average of 1 official building per 1000 inh**. Surprised? I was surprised too after asking this question to

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[185] "Buildings & Built Infrastructure" *EESI* https://www.eesi.org/topics/built-infrastructure/description retrieved by March 2019

[186] ÜRGE-VORSATZ, D. *Energy End-Use: Buildings. Chapter10*, Fraunhofer Institute for Systems and Innovation Research, Germany, 2015, p.653 www.iiasa.ac.at/web/home/research/Flagship-Projects/Global-Energy-Assessment/GEA_CHapter10_buildings_lowres.pdf retrieved by April 2019

[187] "How a city paved the way to a new low-carbon economy" *McKinsey*, 2019, https://www.mckinsey.com/business-functions/sustainability/how-we-help-clients/impact-stories/how-a-city-paved-the-way-to-a-new-low-carbon-economy retrieved by April 2019

[188] BIMFORUM https://bimforum.org/ retrieved by April 2019

[189] RANDALL, T. "The Smartest Building in the World" *Bloomberg* Sep2015, https://www.bloomberg.com/features/2015-the-edge-the-worlds-greenest-building/ retrieved by May 2019

many cities. A city with just 100k inh is holding 100-130 buildings, while a 1m inh city has around 1k buildings. And this counts excluding services not provided by the city itself, like Schools, Universities, Hospitals, Ministries,…, only City Hall, districts, Libraries, local police offices, firemen, civic centers, social services, cultural centers, city theaters, city kindergartens,…). And I can observe some challenging facts that are increasing even more the need to control them, make them more efficient and keep their maintenance costs under control:

- Back to center. Past decade movements to place public services out of downtown are now under question. Long distances and time required to go are suggesting that reusing old buildings placed downtown could be a better way to serve the community. Easy to reach, well connected, these centric places also contribute to a more dynamic and vibrant city. So, cities are reconsidering the use of these available centrally placed buildings.
- Digitalization of Public Administration requires less office space, paperwork, so many traditional city buildings are today empty. An empty building is just a cost, useless for the community (apart from the touristic value if any). I estimate this 'free space' on 15% of total. Many civic associations are easily getting a space to meet because of this excess. This also creates another tougher problem: Squatting.
- Cultural Heritage Buildings. Especially relevant on countries with many centuries of history, cultural heritage buildings are a massive touristic asset, but also a burden on maintenance costs. And many of them are still in use for City services. Look at any of Europe's capital cities City Halls and you will find centuries old, big cold stone walls, low external sun lighting, wooden floors, high ceilings, old pipes, difficult facilities, low ventilation, almost impossible to refurbish (some are simply untouchable) buildings, just the opposite to efficient building management. Look at ICOMOS[190] (Inter*national Council on Monuments and Sites*) UNESCO department to know more about the dimensions of this human patrimony. Many European old cities simply can't afford the maintenance cost and must ask for special grants from central government.

[190] ICOMOS https://www.icomos.org/en/ retrieved by May, 2019

How technology can help? A low cost, easy to install, cloud-based solution to preserve and make an efficient use of these buildings is required. Access control, utilities efficiency (mainly Energy) are a must here. IoT sensors to capture info and generate dashboards provide the needed intelligence to make decisions on best strategies to achieve maximum efficiency. Most of these buildings are empty during off-duty hours, weekends and holidays, so some intelligence adds important savings. There are many examples where by monitoring only main 10% of existing buildings in a city, under an Energy Performance Contract (An energy specialist doing changes to improve performance and get paid based on savings), we can obtain a 25% to 31 % on savings on those priority buildings or 15% on savings in the total City energy consumption, in the first year!

The efficiencies from the Cloud computing on gathering the info from IoT sensors in real time, processing it with advanced analytics and providing accurate info to obtain savings plus the simplicity of the solution, not requiring special works or long time to be implemented into these existing buildings are making the difference. How many city buildings are waiting for energy efficiency solutions?

In other order, energy savings are the least cost savings one could obtain by applying a SmartBuildings strategy. For each 1 $ on energy savings, 10$ can be saved on Space needed, and 100$ on productivity.

1.6 Resilient City. Safety. Threats (Terrorism, Security)

What is city resilience? Urban resilience can be defined as "the capacity of individuals, communities, institutions, businesses and systems within a city to survive, adapt and thrive, no matter what kinds of chronic stresses and acute shocks they experience."[191]

The city resilience is the capacity to adapt to a new emergency situation, with exceptional conditions, to resist and quickly recover from public service interruptions that might have happened. Resilience to human violence such as terrorist attacks or street riots, pandemics and threats to public health, natural catastrophes and, finally, modern attacks and threats to cybersecurity, require a coordinated and programmatic preparation between the city and other national levels of government, businesses and citizens.

Human violence.

The nature and patterns of urban violence greatly vary according to the place and size of the city. All cities must address street crime as the fundamental basis of public safety, as well as organized crime, which includes extortion, drug trafficking and smuggling. These types of crime can sometimes be intertwined with homicides. In fact, the first objective in public security is to reduce homicides. A high homicide rate means a city with a corrupted social fabric, with no capacity for development or attractiveness for talent. Annual homicide rates of more than 10 per 100,000 residents are considered unacceptable and make the city unsafe for its inhabitants and visitors. In addition, these rates denote the triumph of evil and the weakness of the authorities to take over, which leads to a spiral of increased violence.

• Terrorism, which affects a wide variety of cities and specifically religious terrorism.

• Other forms of disorder, such as insurgency in urban spaces.

Operational resilience.

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[191] DAWSON, B. Chief Resilience Officer, City of Sydney, Australia, Rockefeller Foundation "The power of Three for smarter, more resilient cities". *EY*. 2016. p.6 https://www.ey.com/Publication/vwLUAssets/EY-the-power-of-three-for-smarter-more-resilient-cities/$FILE/EY-the-power-of-three-for-smarter-more-resilient-cities.pdf retrieved by May 2019

In the daily operations of the city government, from administrative work to activities where advanced technology is used, service is potentially vulnerable and could be stopped in the case of a specific circumstance, with the consequent physical or economic damage. The urban infrastructure vulnerability, including utility networks such as electricity, gas, drinking water distribution networks or Internet connectivity.

Cybernetic Resilience

Ensure that the government can prepare, mitigate, control and recover from attacks in cybersecurity, deliberate attacks in which attackers use digital technologies or taking advantage of technological failures, access to confidential citizens data and their properties, identity phishing in front of citizens.

Natural disasters Resilience

Natural catastrophes, such as earthquakes and their consequences such as tsunamis, floods, wildfires, or sea level rise.[192]

With the Rockefeller Foundation support, the "*100 Resilience Cities*" association has given a very important impulse to this issue. Thanks to their efforts, many cities have seriously raised the concept of resilience, hired a CRO (Chief Resilience Officer) and developed thousands of projects and initiatives.[193]

Technology plays a fundamental role in the immediate response, minimizing damage, managing the impact of natural disasters, improving quick communication and coordination, securing and protecting citizens' information, and also building a predictive system, a resilience plan and situation analysis and rapid recovery.

The security concept entails, once again, an ethical dilemma: how far new Artificial Intelligence based systems can reach and penetrate our privacy in order to preserve our security? We have already talked about our data security, but in terms of physical security, the concept of video surveillance and face recognition arises.

In a global terrorist threat context, it seems obvious that we must secure the most crowded spaces, such as airports, train stations, sports stadiums, shows / spectacles areas, busy pedestrian streets, public transport, etc. For those of us who travel a lot,

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[192] FELBAB-BROWN, V. "Safe in the City: Urban spaces are the new frontier for international security" *BROOKINGS*, Feb2016 https://www.brookings.edu/blog/order-from-chaos/2016/02/18/safe-in-the-city-urban-spaces-are-the-new-frontier-for-international-security/ retrieved by April 2019

[193] 100 Resilient Cities https://www.100resilientcities.org/ retrieved by Aug 2018

knowing that these places are video surveillance controlled is an important peace of mind, although we pay the price of time spent in passing thru the security check and to know that our face is been scanned and compared.

Facial recognition is commonly used in public spaces to identify criminals. There are thousands of cameras installed in Moscow, and also in Brussels[194] after the terrorist attacks. In the United Kingdom, the police permanently compare their photo databases with those taken by installed cameras. After the terrorist attacks, France deployed a complete face recognition system at the entrance of the UEFA Euro Football Cup 2016 stadiums. Zurich airport also uses cameras to identify faces. In Germany, the Hamburg police used facial recognition during riots in 2017 G20 Summit.

However, the Data Protection Commissioner of Hamburg and that of Germany considered 'video material biometric evaluation' illegal as there is still no legal basis for it. The problem lies in the use of this facial recognition for not security-related purposes. San Francisco and Somerville, (MA) in the US have recently banned the use of face recognition

The arguments for this decision assume that this facial recognition technology can generate discrimination and abuse against privacy and equality. It points to accuracy problems and errors when processing images of women's faces and people of color. In addition, we can find the indiscriminate use of personal information. A legal study conducted at Georgetown University revealed that most American adults are already in a police facial recognition database, even if they don't know it.[195]

Pros are clear: Safety Improvement, crime reduction, quickly resolve traffic accident disputes, avoid the human effect (or just tiredness) on decision making. The mentioned precision biases are questioned. It is explained by MIT that with adequate training, technology will have fewer errors than a human.

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[194]"Security Center is Brussels' latest move towards becoming a Smart City" *Genetec*, July2015, https://resources.genetec.com/security-center-unified-security-platform/security-center-is-brussels-latest-move-towards-becoming-a-smart-city retrieved by January 2018

[195] O'NEILL, P.H. "Face Recognition Surveillance Banned by Second American City". *GIZMODO* published June 2019 https://gizmodo.com/face-recognition-surveillance-banned-by-second-american-1835945552 retrieved by July 2019

But cons are strong:

Retail companies use artificial intelligence algorithms to analyze the dress preferences of those in front of the store window. That way, the retailer can deduct the 'next logical purchase' and make a quick 'special' offer. This reminds us the absolute identity control scenario based on face and eyes recognition from the movie "*Minority Report*"[196], set in 2054. The character played by Tom Cruise had an eye transplant to avoid being identified. Pre-criminals were arrested before they commit crimes…

Even the most accurate facial recognition software could be used to infringe civil liberties, as MIT Technology Review[197] describes. The controversy arises from the ethical problem when the good pursued causes an evil or discrimination.[198] Amazon tried to sell its facial recognition system to the US ICE service (Immigration and Customs Control Service) to track illegal immigrants in public places. Apart from looking like a 'witch hunt', the people detected could not receive any medical treatment in any public service, which would encourage clandestinity and foster human exploitation. According to this report, IBM used images from the NYC police department without informing citizens to improve their facial recognition ethnicity analysis technology.[199]

Cynthia Wong, representative of the human rights organization Human Rights Watch, indicates that if police surveillance is applied to public spaces, the freedom of assembly and expression is been violated, because citizens will avoid participating in demonstrations so as not to be captured and categorized, analyzed and monitorized depending on the demonstration aim. She points that latest algorithms will try to obtain conclusions (by comparison with existing patterns)

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[196] SPIELBERG, S. *Minority Report*, 2002

[197] HAO, K. "Making face recognition less biased doesn't make it less scary". *MIT*, published Jan 2019, https://www.technologyreview.com/s/612846/making-face-recognition-less-biased-doesnt-make-it-less-scary/ retrieved by June 2019

[198] KYBURZ, K. "Should we ban public face recognition?" *TECH GARAGE*, published by Feb 2019, https://techgarage.blog/en/should-we-ban-public-face-recognition/ retrieved by Aug 2019

[199] JOSEPH, G. and LIPP, K. "IBM used NYPD surveillance footage to develop technology that lets police search by skin color" *The Intercept*, published by Sep 2018, https://theintercept.com/2018/09/06/nypd-surveillance-camera-skin-tone-search/ retrieved by Aug 2019

about your identity, your beliefs, what you have done, and your potential future intentions (Minority Report again?).[200] The AI Now Institute[201] from New York University explains the impact of face recognition on race, gender, other personal information and affect recognition. This facial recognition subcategory could potentially analyze your personality, feelings, mental health status, or your likelihood to become an excellent worker. Imagine if this information is applied to insurance, employment, training or other. It is frequently talked about Chinese experiments in using artificial intelligence and facial recognition cameras in public spaces to predict whether an individual will adhere to the established rules or not, and also to look for political activists. Human Rights Watch[202] also reported last year that the Chinese use of software-assisted predictions based on data taken from surveillance cameras, as well as medical and bank records, has already led to suspect's arrests.

Security is a must-have, but if it needs face recognition, may be the privacy price and risk it still carries is too high.

What is really mandatory is regulation, clear rules about the use of these technologies and balancing the new technologies good progress with the human rights and dignity respect. A big problem for lawmakers and again, the need for global consensus is coming back on the table.[203]

Some companies like Microsoft are seriously developing an Ethics for AI principles[204], in a way to lead by example, and publicly committing on never place commercial advantages over Ethical principles.

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[200] WONG, C. "We underestimate the threat of facial recognition technology at our peril". *The Guardian*, published by Aug 2018, https://www.theguardian.com/commentisfree/2018/aug/17/we-underestimate-the-threat-of-facial-recognition-technology-at-our-peril retrieved by Aug 2019

[201] WHITTAKER, M. et al. "AI Now Report 2018". *AINOW*, published by December 2018, https://ainowinstitute.org/AI_Now_2018_Report.pdf retrieved by Aug 2019

[202] Human Rights Watch https://www.hrw.org/ retrieved by Aug 2019

[203] LECHER, C. "Congress faces 'hard questions' on facial recognition as activists push for ban" *THE VERGE*, published by July 2019, https://www.theverge.com/2019/7/10/20688932/congress-facial-recognition-hearing-ban retrieved by Aug 2019

[204] "Microsoft AI principles" *Microsoft* https://www.microsoft.com/en-us/AI/our-approach-to-ai retrieved by Aug 2019

1.7 Financing. Avoid Taxes Fraud. Cashless Cities

With a global public deficit around 4 $ trillion, governments need to find additional sources of financing. Rising taxes or increasing taxes burden is not the solution. Richest fortunes would leave the country while at the other end, poverty would impact more people, not mentioning the image/press impact and risk of losing voters. Clear solution is fighting fiscal fraud, improving tax transparency and extract the maximum from current system. Information technologies are key on this. After the 2011 bailout decision ($108 billion), Portugal had to stress all potential fraud combat initiatives to recover the economy and pay it back. With a regular (most products and services) tax of 23% (Value Added tax or VAT), they found no way to increase it. Only way was to make the most from it. First action was to get unpaid VAT from small transactions, bars, restaurants, and so, have all payments taxed, even the smallest. To make this happen, they invented a weekly raffle among all VAT invoices issued (you get a coupon per each 10€ on invoice including your TaxID).[205] So, from April 17 2014 'Lucky Receipts' lottery, following similar programs in Puerto Rico, Brazil and Slovakia, allows Portuguese tax payers to win an Audi A4 every week (an Audi A6 twice a year) just from the purchase of a cup of coffee.[206] Citizen become civilian 'tax inspectors', reduce black-market activity (estimated at some 25% of GDP), prevent tax evasion and unfair competition in a manner that pursues a more equitable tax system and swell the state's coffers.

Detractors argue a loss in productivity on registering the nine-digit tax number for every customer who buys a newspaper, the promotion of gambling and the use of luxury foreign cars as prizes (now changed by 35.000 € on Portuguese Treasure Bonds), but the benefits are clear:

- Fight tax evasion [reducing the 'tax gap']
- Increase tax revenues without increasing tax rates
- Reduce unfair competition between non-compliant and compliant taxpayers
- Reduce social costs through an increase in voluntary compliance
- Citizen involvement on fighting tax evasion

[205] "Improving VAT compliance". *European Union*, 2014, https://ec.europa.eu/taxation_customs/sites/taxation/files/resources/documents/taxation/gen_info/economic_analysis/tax_papers/taxation_paper_51.pdf retrieved by May 2019

[206] "e-Fatura" *AT-Portugal* https://faturas.portaldasfinancas.gov.pt/ retrieved by May 2019

Results? About 8.5 million Portuguese have invoices issued in their names and participate in the Lucky Invoice Draw every week. Increase of 800 m€/y on VAT. Only 9% VAT evasion. Consumption has increased 1,9%, VAT Taxes a 4,3%. It seems the Tax Agency has discovered the beneficial effects from compulsive gambling…

And this is just the first step. Second is setting the requirement for companies with computerized accounting to produce the SAF-T[207] audit file according to the OECD Model. This allows the Tax Agency to monitor the economy in real time, crossing invoice issuers with payers from the info contained into that XML file, avoiding tax fraud and errors from large companies and obtaining a predictive taxes model. Again, Information Technologies, and especially massive Analytics Cloud computing makes it possible.

But these are just the first steps. In my opinion the Tax Agency will use intensively Information Technologies to generate all needed invoices by itself. Simply get connected, provide the info and the Tax Agency will notify both parts, taking immediately its share of the business.

Ok, but how to remove that remaining 9-10% VAT evasion? Answer is simple: Eliminate cash.

Sponsored by some banks and credit companies like VISA, MasterCard, Citi, UBI, BancoPopolare,… some cities have launched the 'Cashless City' initiative. The Indian cities of Visakhapatnam[208] and Chandigarh[209] claim to be the first on this journey. Bergamo-Lombardy[210] (Italy) also made a wide initiative, rising 10 points the use of electronic transactions.

No cash means all transactions must be electronic, allowing the cities and governments to track all expenses and associated taxes, in full tax transparency.

Fighting untaxed 'black' economy and helping tackle corruption seem obvious and positive (experts also believe that this will even prevent a banking crisis), but

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[207]"SAF-T" *Wikipedia* https://en.wikipedia.org/wiki/SAF-T retrieved by May 2019

[208]"Visakhapatnam To Become The 'First Cashless City' In The World" *YO!VIZAG*, 2017 https://www.yovizag.com/cashless-city-visakhapatnam/ retrieved by May 2019

[209] DEEP, A. "Chandigarh All Set to Become India's First Cashless City & Here's How It Will Work" *ChandigarhMetro*, Feb2019 https://chandigarhmetro.com/cashless-city-chandigarh-india-first/ retrieved by May 2019

[210]GUERRINI, F. "Cashless payments: How one city has made electronic transactions pay off" *ZDNet*, Jan, 2016, https://www.zdnet.com/article/cashless-payments-how-one-city-has-made-electronic-transactions-pay-off/ retrieved by May 2019

smallest traders and poorest inhabitants will suffer. Transaction costs are fix, so small transactions are painful, and homeless don't have a bank account to receive your donations… Will we return to community work exchange and basic goods trading? Some cities see these social practices rising.

Large bank notes are questioned and could soon be removed from circulation. Payment for quantities larger that some few dollars must be done by credit card or transfer (as low as 70€ in Greece). Cash movements across countries is prosecuted, with little quantities allowed for tourists. So, governments are on their way to get rid of cash. But complete abolition of cash threatens our freedom and rights of citizens in so many areas.[211] Central banks could apply negative interests to our deposits (they are starting to set this), so our money could slightly be evaporated, like whiskey God's share… This was already demonstrated recently by the example of a Swiss pension funds, which withdrew their money from the bank in a big way and now store it in vaults in cash in order to escape the financial repression due to negative interest rates. Central Governments hunger for citizens money would be facilitated (remember Argentina's 'corralito').

Amsterdam could be the first main city to become completely Cashless by 2030[212] due mainly to Mobile Payment, while Sweden is predicted to be the first country due to the intensive use of Swish[213] (very popular payment App). Mobile Payment rocks in Kenya, with M-Pesa. Launched by Vodafone and Safaricom, with M-Pesa, mobile phone users can transfer money and pay for products and services by sending PIN-secured text messages (no bank account needed).

Other initiatives are linking the concept with Transportation cards. Transportation payment thru an official card/app gives the citizens the trust they need on micropayments, so these cards or mobile payments are widely used for many other

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[211]WashingtonPost, May2015, https://washingtonsblog.com/2015/05/why-the-powers-that-be-are-pushing-a-cashless-society.html retrieved by May, 2019

[212]WEINSWIG, D. "Europe Approaching Cashless Society, With High-Volume, Low-Value Transactions to Drive Mobile Payment Uptake, Says Fung Global Retail & Technology Report" *Deborah Weinswig*, Jul2016, https://www.deborahweinswig.com/news/press-releases/europe-approaching-cashless-society-with-high-volume-low-value-transactions-to-drive-mobile-payment-uptake-says-fung-global-retail-technology-report/ retrieved by March 2019

[213]ETIENNE, "Swish, the secret Swedish FinTech payment company created by Nordic banks and used by 50% of Swedes is challenging Swedish unicorns" *Medium*, Jan,2017 https://medium.com/@etiennebr/swish-the-secret-swedish-fintech-payment-company-created-by-nordic-banks-and-used-by-50-of-swedes-cfcf06f59d6f retrieved by April 2019

consumer purposes (Hong-Kong Octopus[214] or Transport for London (TfL) Oyster [215]Card)

New Projects Funding. Public-Private Partnerships (PPP) and new models for maximum investment.

Some creative new funding models:

- Public-private partnerships (PPPs) PPPs establish public-private agreements where the private sector invests in a public project. This investment may have a mere social interest, could try to connect to potential customers through the public project. Action. The city should not promote a brand through ads or marketing, but if the project is of great importance and privacy and access to citizens' information ethical checks are verified, it can be justified. In general, all help is welcome if it is philanthropic. Adding a logo or a 'sponsored by' does not bother and is a public acknowledgment to the company that has paid for or contributed to the project. The other extreme would be to 'sell' citizens' data in exchange for a private investment ... this is a crime and carries a heavy fine according to GDPR. Therefore, we must be open to these collaborations without compromising compliance or ethical standards.
- Energy savings performance contracts (ESPCs). These contracts allow cities to address street lighting improvement projects and others related to energy savings without having to dedicate up-front investments. These models are popular in the US. The new technology (basically LEDs) means a significant cost reduction or energy saving. Because of that, the agreement sets a same-as- today price for a period of time which compensates the investment. After this period, the net cost reduction starts to impact the city accounts. One day, these models will pay for electric vehicles as well.
- Investment recovery. These contracts assume that the investment has a ROI or return from investment in a given period of time. Cities work for citizens service improvement, not for ROI, but in some cases, the savings or cost

[214] HONGKONG https://www.hongkong.net/transportation retrieved by May 2019
[215] "Oyster cards" *Transport for London* https://oyster.tfl.gov.uk/oyster/entry.do retrieved by May 2019

reductions are patent and justify these investments. But the city doesn't have the capital needed upfront, so these contracts include an external player or financing company that is committed also in the ROI. That company is getting compensation every year from the ROI or savings, to finally recover all the up-front needed capital plus a margin compensating the risk.

- Social impact bonds (SIBs). Very popular in UK, the social impact bonds are investments which interest or success margin depends on the social impact made by the investment. It's not a bond in fact, as return of investment is contingent depending on the social outcome achievement. If the pursued social impact is not achieved, then neither the principal nor the interest is repaid. Most times, it is considered a social investment from private companies' Corporate Social responsibility program, and return is not expected, so these are considered nice programs but risky investments, as many times the social impact is not easy to quantify or measure. Anyway, these programs are very common and help companies to raise their image as social contributors and give back to community.
- EU Grants (Structural, H2020, and many other). EU wants to keep some leadership on the most advanced technology topics. There are some specific programs to invest on Cities as part of Horizon 2020 programs[216] and many more. Basically, the EU asks for multinational (3 or more), multiple cities applications for grants. The grants cover 70% or more of total project cost. Projects are driven by Universities, as some research is needed, but cities are endorsing and show some commitment to finally deploy the project is awarded. Topics vary depending on the main EU focus, but cover AI, Data Analytics, borders security, transportation, energy, etc. I strongly recommend all EU cities to hire a small team to proactively apply to these programs directly or by endorsing an existing consortium of Universities and other cities. Funding is large, chance to get it depends on the quality of the call, but may reach 20-50% if the application is well prepared, and as a result of it, cities enjoy a wonderful tailor-made project to help them base their Smartcities strategy.

[216] "What is Horizon 2020?" *EU* https://ec.europa.eu/programmes/horizon2020/en/what-horizon-2020 retrieved by May 2019

1.8 City Main Challenges. Conclusions

- Mankind faces the most complex challenges in his history. Some seem controllable, others have effects that are still unknown, such as global warming.
- To solve them, it will be necessary to work together all humans (and this has never happened before, on a planet divided into blocks and civilizations).
- The massive people movements are no longer forced by hardship, hunger or war, but by the attractiveness of living in the city that best helps develop each person potential. The world center of gravity moves incessantly towards East. The human future in terms of number of inhabitants will come from Africa.
- In a context of peace and macroeconomic stability, cities do not need their countries anymore as centralized policies management and thus become centers / hubs of international development.
- In a context where machines are going to do all kind of non-creative work, jobs must evolve and take advantage of the human creativity that we all have. This allows me to be optimistic and dream of a rebirth (new renaissance) of arts and humanities and a special appreciation for human creations.
- Ethics becomes the inseparable companion of technological development, once new technologies have a tremendous impact on people's lives and must, therefore, adapt to basic ethical criteria and respect for human dignity. The ethics to regulate Artificial Intelligence is already urgent and necessary and needs a worldwide consensus.
- We cannot stop our planet destruction by global warming if we do not all act in coordination. It will require the largest global coordination since WWII. It has already been assumed that there will be serious unavoidable damage. The objective to not exceed a 2ºC increase may not be enough to avoid fatal consequences.
- The city creates the conditions for human relations development, and therefore, economic and cultural prosperity.

2. SmartCities. Technology as enabler

2.0 Intro. Technology to cope with challenges.

Cities use technology to meet the previous challenges. But creating the best possible city it is not only a matter of technology. Urban planning and development (the 'brick & mortar' physical smartcity) and a humanistic conception of that development are also necessary, always keeping in mind the impact and benefit for the citizen.

I do not believe in extreme models that pose as Cyborg "*Zero-Human*" City vs "*Solo Human*" 100% Community City (as defined by Netexplo SmartCities research)[217]. First is a dystopia with full city automatic cybernetic control, second describes an all shared decision-making process like an Amazon tribe social conduct. I think it is about finding a perfect combination of the latest technology use on a humanistic ethical basis where everything is decided from the utmost respect for human dignity, but where the citizen constantly participates in decisions where he has a qualified opinion. I consider a mistake to ask the citizen about technical or urban decisions, because that is what the city has its technical staff for. Nor do political issues or strategy, because for that an election is held where representatives are elected based on a program describing all those strategies. All other issues (and there are many) can and should be asked or open to active participation, not forgetting spontaneous feedback, reporting or proposals.

Creating an ideal city from scratch is an ancient notion. The Greek philosophers were already playing with the idea, the ancient empires developed the concept for their main capitals. The XIX Century industrial capitalists tried it in Europe. Now, authoritarian governments such as China (Chengdu), Saudi Arabia (Neom), Morocco (Zenata), Singapore are investing in new cities as beacons of innovation. Some democracies have also invested in new ideal cities in their expansion plans such as Brazil for his capital, Brasilia, or South Korea with Songdo.

It is easier and faster to build that ideal from scratch in a new city, or in a neighborhood or expansion than to transform an existing old one.

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[217] CATHELAT, B. *SMARTCITIES SHAPING THE SOCIETY OF 2030,* UNESCO and NETEXPLO, Paris, 2019 p.106

Cities are handling a complex reality in which technology simultaneously offers solutions to our main challenges, but at the same time, uncovers and highlights deep problems by virtually allowing the entire population to have access to communicate, express their opinion, denounce an inequality, know the possibilities and demand them. That's because of XXI century technology access democratization: Citizen are becoming massively digital, so new technologies are inherent on whatever they do. City leaders desperately need help in two main areas: Knowledge and Financing.

World's major cities play an increasingly important role in the XXIst century global power distribution. City level government policy decisions impact major international problems, such as climate change, housing, transportation, security, social services and financial and commercial developments.

To be effective, a city's ecosystem cannot be limited to the political or physical city boundaries. Central/federal and state/regional governments must be key partners for these ecosystems. Two important reasons for this are:

- Central/federal and state/regional governments are increasingly awakening the importance of cities and the need to establish future city development plans. Significant amounts of state funds have been made available in Europe (through the European Union and national governments) and in many other countries around the world to support these plans: constant dialogue is key to be well positioned to take advantage of these financing opportunities.
- The future cities initiatives have regulatory implications that must be studied at national and international level (either the need to change existing regulations or create regulations for completely new ways of interacting with citizens or very clearly, to regulate the ethical use of new technologies such as video surveillance, virtual identity, autonomous systems and Artificial Intelligence).

Collaboration with other cities or regions is also key for several reasons:

- Be able to take advantage of lessons learned, knowledge and solutions in all cities, avoiding the 'reinvention of the wheel';

- Find the synergies to undertake large investments in technologies and solutions that, without the collaboration from a group of cities, would not have the size to be economically justifiable;
- Be able to compete for funding opportunities that require collaboration between multiple cities and partners (as is the case with European Union grants, Horizon 2020, and other);

While it is clear that city leaders recognize that smart technologies can help address the 21st century challenges and improve quality of life, economic opportunities and habitability of their cities, however, cities often have extreme difficulty on finding financing for smart city projects. Promoting solutions from just laboratory pilots or research projects to commercial deployments is especially difficult for many cities. To better illustrate the impact of technology on the city management and evolution, we have drafted the below chart in figure 30:

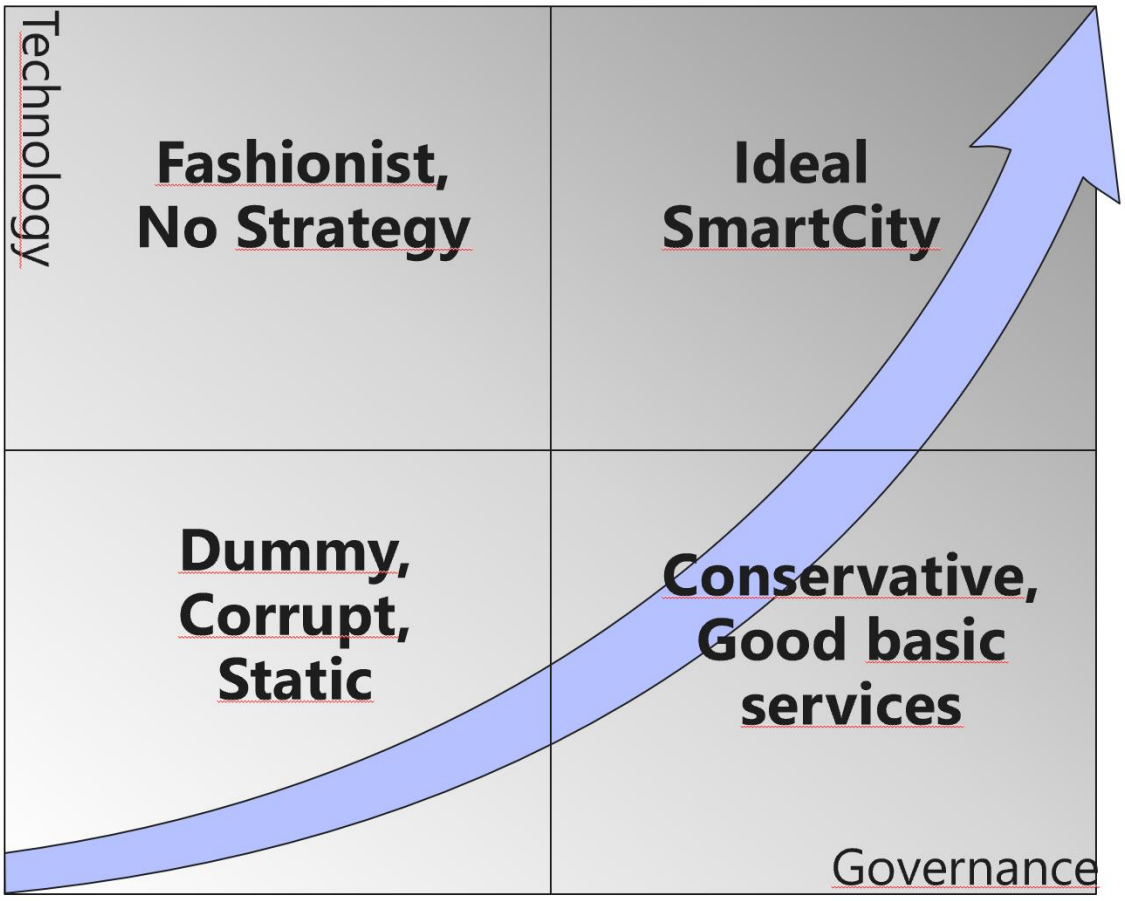

Figure 30: Governance vs Technology for SmartCities . Source:Author

Fix the basics: In the lower left corner we can find cities with poor governance and little or no use of technology. These cities barely know their citizens except to

collect taxes. City government does not respond to the basic needs in infrastructure and services, either due to corruption or extreme poverty. Urban development is randomly done as a dummy houses' agglomeration. City future is very much questioned, and citizens will basically try to find better opportunities far away as soon as they can.

Embrace Technology: In the lower right corner we can find cities with poor use of technology because of many reasons: lack of professionals, plan, strategy, Major's leadership, fear to new technologies challenges... Governance is right, things happen on time, budget and city works, basically. But citizens are way ahead of the city in terms of embracing technology, and they demand the same level of quality services they get from private sector (retail, banks,…) now from the public city services. Most cities have some development areas in this stage due to area managers immobilism, lack of funding or conformism / reluctance to change. Some cities are here because they don't perceive the need to invest on latest technologies because they are already very much talent attractive due to some specific country conditions (Swiss Cities).

Populist, Press-driven technologists: In the top left corner, we can find fashionists, strategy-less cities. When I study a SmartCity plan and I find dozens of little nice press-oriented actions without a main clear strategy or sort of priorities, then I understand that city is using the SmartCities motion to 'sell action', but real implementation is poor. Innovation is used in front of press for electoral purposes or to hide some chronic main internal issues, like populism propaganda. Again, all cities have some areas / projects around this concept. We need to understand the need to go to press to show small quick wins to justify a mid/long-term strategy, that's right, but if we can't find anything else but scattered low impact high visibility projects, then technology is just a shiny façade, not an impactful enabler.

And finally, the top right corner includes the balance between intensive latest technology use and the need to make better governance, better informed decisions, fully integrating the citizens opinions and contributions and creating an inclusive, resilience, sustainable, advanced city.

To provide an example from a city well positioned in this magic quadrant, let me mention Helsinki. "*Smart is not just about technology. Technology is only a tool to achieve more human goals, such as strengthening democracy, increasing resident*

participation, boosting mobility, increasing trust, being more inclusive and helping the environment." Anni Sinnemäki, Helsinki Deputy Major.

There are many smart solutions that do not necessarily involve the use of advanced information systems, such as special walking-with-mobiles lanes in Chongqing, Buenos Aires traffic lights on the ground, and countless urban elements such as urban furniture, ambient marketing (using public areas and transportation vehicles spaces to advertise services or public proposals), city beacons (high bandwidth connected totems to interact with citizens), projections on the bus stops ground, or simply illuminate a red line in the crossings so that heads-down teenagers smartphone users do not cross in red. See Figure 31.

Figure 31. City of Bodegraven, (The Netherlands) LED light strips on the sidewalk synchronized with traffic signals[218]

[218] BAGRI, N.T. "People won't stop staring at their phones, so a Dutch town put traffic lights on the ground", *QUARTZ*, published by March 25, 2017, https://qz.com/942104/people-wont-stop-staring-at-their-phones-so-this-dutch-town-put-traffic-lights-on-the-ground/ retrieved by Aug 2018.

For most cities, becoming a smart city is no longer an option, it is essential. Technology is taking a growing role in the cities' evolution and growth.

Apart from all the challenges described before, new technologies are catalyzing many other global trends, such as the sharing revolution. The increasing use of digital platforms and mobile applications are catalyzing the shared economy development, and peer-to-peer business models are becoming more common. Urban shared mobility (bicycle sharing, public bicycle sharing, car sharing, scooters sharing and smart parking) is an area that has undergone a major transformation because of them.

2.1 What's a SmartCity?

The 'Smart City' concept is a too much simple expression to describe a very complex environment, a multidimensional reality where technology, urban and human city development are combined. How can cities intelligently respond to the challenges posed in Chapter 1, such as achieving the city decarbonisation, eliminating pollution, violence or human and natural hazards, achieving a dynamic and efficient urban mobility system, offering services social demands from a very aged society while promote education, employability and welfare of its citizens?

Balancing Technology Innovation with Citizen Quality of life

How can we balance technological innovation with noble human aspirations in terms of quality of life? This concept is not only complex and multifaceted: it is an evolving system, which emphasizes different priorities as the city progresses. We will see later the different phases by which it develops.

In 2009, IBM was the first company to talk about 'Smarter cities', understanding the fast-growing importance of cities in the global context, the scarce or very limited use of technology they made (and therefore the great opportunity for modernization) and the citizens exponential demand for digital services. Its proposal was: "A comprehensive approach to help cities function more efficiently, save money and resources, and improve the quality of life of citizens."[219] Under a strong decline in its consulting business, IBM had a legion of 'crossed arms' consultants that it could use to 'donate' projects to certain selected cities to achieve a strong position and experience in this new and huge market.

The rest of the large technology consultant companies like KPMG, PWC, Deloitte, EY, CapGemini,…applauded and endorsed this bet and the 'SmartCities' concept was popularized especially in Europe. Only one important accelerator was needed: financing. Soon, the European Union understood that this line of innovation fit perfectly in its investment in innovation to maintain some leadership ahead of the

[219] "Icons of Progress." *IBM 100.*
https://www.ibm.com/ibm/history/ibm100/us/en/icons/smarterplanet/ retrieved by Aug 2018

USA and China and then assigned an important part of its EU FP7 research grants and structural programs and subsequently Horizon2020[220] to this concept. Then, we began to see very innovative large projects led by major European cities such as Amsterdam, Barcelona, Helsinki, Manchester, ...

From that moment on, every relevant city wanted to address the issue and position itself as an innovative city: the competition to attract talent was intensifying with the evolution of information technologies. Thus, groups of cities, associations such as Eurocities[221], Major Cities of Europe[222] and others were organized to jointly access European funding. In addition, each country developed its events and meetings to discuss the issue and share experiences. The world's largest SmartCities event, the SmartCity Expo & WW Congress[223] held in Barcelona every November, started in 2011, as a show about the latest state of the art in technology applied to cities. It is very remarkable that it is an atypical event, where demand and supply are together in the same expo. Thus, technology companies showcase their latest innovations in front of city stands that also show their latest projects, in their eagerness to demonstrate their leadership in innovation and their attractiveness.

The SmartCity concept receives different definitions depending on who proposes them.

Professor Albino[224] and Gil-García[225] mention no less than 20 definitions from different authors in their research.

The most technological entities rely more on the technology role, while politicians and civic organizations highlight the improvement in the citizens quality of life.

As examples of definitions loaded towards the technology side, we mention:

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[220] EU Horizon2020 https://ec.europa.eu/programmes/horizon2020/en retrieved by Aug 2018

[221] Eurocities Association http://www.eurocities.eu/ retrieved by Aug 2018

[222] Major Cities of Europe Association. https://www.majorcities.eu/ retrieved by Aug 2018

[223] SmartCity Expo http://www.smartcityexpo.com/en/home retrieved by Aug 2018

[224] ALBINO, V., BERARDI, U. & DANGELICO, R.M. "Smart Cities: Definitions, Dimensions, Performance, and Initiatives." *Journal of Urban Technology*, 2015, vol. 22. No.1 Routledge. Taylor&Francis Group, pp.4-8 https://doi.org/10.1080/10630732.2014.942092

[225] GIL-GARCÍA, J.R., PARDO, T. & TAEWOO, N. "What makes a city smart? Identifying core components and proposing an integrative and comprehensive conceptualization Information" *Information Polity*, vol 20, no1. 2015. IOS Press, p.64

Borrowing from the Smart Cities Council[226] (a group of leading companies advised by top universities, research laboratories and standardization bodies aiming to help or sell consultancy services to cities) definition of the term, "*a smart city uses information and communications technology to enhance a city's livability, workability, and sustainability*". "*A city in which digital technologies are integrated into all the functions of the city*". "*We envision a world where digital technology and intelligent design have been harnessed to create smart, sustainable cities with high-quality living and high-quality jobs.*" "*A Smart City can be defined as multiple, integrated information and communication technology, as well as the Internet of Things, (IoT) solutions to manage the assets and operations of a city. The IoT is challenging the way people live and work, and how government and businesses interact. This new ecosystem forms the foundation of Smart Cities*.". Even Wikipedia definition[227] is very technology driven: "*A Smart city is an urban area that uses different types of electronic Internet of things (IoT) sensors to collect data and then use these data to manage assets and resources efficiently. This includes data collected from citizens, devices, and assets that is processed and analyzed to monitor and manage traffic and transportation systems, power plants, water supply networks, waste management, crime detection, information systems, schools, libraries, hospitals, and other community services*."

What constitutes a SmartCity is not well defined. In the broadest sense, a Smart City is one that uses electronic means to provide services to its residents. The value of the data that comes mainly from the IoT world and that allows us to control the city from the physical point of view is emphasized. In these definitions, human issues and the citizen's role are presupposed, but not specified. With the arrival of Artificial Intelligence, you have the opportunity to turn all that huge mountain of data into knowledge and bring technology closer to the citizen (which is very well equipped with a smartphone). But there is also the friction[228] of super-automating

[226] SmartCities Council https://smartcitiescouncil.com/ retrieved by Oct 2018

[227]"SmartCity" *Wikipedia* https://en.wikipedia.org/wiki/Smart_city retrieved by July 2019

[228] ROSENBAUM, D. "All hail the AI overlord: Smart cities and the AI Internet of Things" *ARSTECHNICA* published by Dec2018 https://arstechnica.com/information-technology/2018/12/unite-day3-1/ retrieved by Jan 2019

or dehumanizing the city management, regulating the artificial intelligence ethical limits and establishing the trust boundaries between what a city official should continue to do and what an automated system can do instead.

On the opposite side, criticisms have arisen around the exaggerated value given to the SmartCity concept, used by many cities as part of the its image and brand and the fascination for new technologies, forgetting about citizens. This article[229] is very critical and even talks about 'stupid' SmartCities. It is explained that a truly intelligent city must leave room for spontaneity, participation and grassroots citizen initiatives. Instead of so much control, it should collect diversity and offer transparency by default in all activities. The city must be only a reflection of its citizens and their collective desires.

From the most human point of view, highlighting the quality of life improvement as the main objective with technology as a means, we can find some definitions from politicians:

"A smart city involves relevant use of new technologies to serve the daily needs of city residents, equitably shared technological progress, accepted by residents who perceive an answer to their needs, after being informed, made aware and encouraged to express their needs and participate."

Miguel Gamiño (former CIO of San Francisco and CTO of New York City)[230]

"*When I think of technology and investing in a SmartCity, it's how a city adapts what it does using data to get on the front end of a problem, rather than on the back end. Technology is a means, not an end, to help the public."*[231]

Rahm Emanuel, Mayor of Chicago.

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[229] KEETON, R. "When Smart Cities are Stupid" *International New Town Institute*, published by Jan 2019 http://www.newtowninstitute.org/spip.php?article1078 retrieved by Feb 2019

[230] ALPHONSE, L. "New York City CTO Miguel Gamino Aims to 'Make Sure Technology Is Working for People'" *USNEWS* published March 2018, https://www.usnews.com/news/best-states/articles/2018-03-16/new-york-city-cto-miguel-gamino-aims-to-make-sure-technology-is-working-for-people retrieved by Aug 2019

[231] WALKER, B. "Big mayors talk big plans at Smart Cities New York 2018" *HERE360*, published by May 2018. https://360.here.com/big-mayors-talk-big-plans-at-smart-cities-new-york-2018 retrieved by May 2019

"*The objective is to promote cities that will provide their citizens with essential infrastructure and decent quality of life, in a context of sustainable development and by applying smart solutions. This development must be inclusive*".
Ministry of Urban Development of the Government of India.[232]

Obviously, the most commonly accepted definition is a balanced midpoint between latest state-of-art technology use for the benefit of fully engaged and participative citizens.

Today, however, we are starting to see the turn from the very focused on sensors and data first SmartCities to some new approaches that, taking advantage of technology, involve not only the city government, but also citizens, visitors and companies in a smart and connected ecosystem.

It is about improving the citizen experience by operating at the intersection of 3D: Data, Digital and human-centered Design[233]. Data is key and is the information base that inhabits the rest. As Barcelona Mayor Xavier Trías once said "*To rule the city I just need data, not opinions, rumors or partial surveys. Give me data and we will make decisions*" (SmartCityExpo, 2014). The objective is to allow a better decision-making process through the use of data by all interested parties: government, companies and citizens.

The focus of any smart city should be its people, providing benefits such as:

• A better quality of life for citizens and visitors.

• Security and physical and virtual resilience.

• Economic competitiveness to attract industry and talent.

• Environmental sustainability.

Another balanced definition comes from the United Cities and Local Governments Association (UCLG)[234]: "*A city can be defined as a SmartCity when it shows good performance in these three fields (Entrepreneurship and generation of economic activity, Knowledge and Talent, Digital Society and Economy), and when it has*

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[232] "SmartCities Mission". *Government of India*, https://www.india.gov.in/spotlight/smart-cities-mission-step-towards-smart-india retrieved by Aug 2019

[233] EGGERS, W.D. and SKOWRON, J. "Forces of change: Smart cities" *Deloitte Insights*. Published by March 2018 https://www2.deloitte.com/insights/us/en/focus/smart-city/overview.html retrieved by July 2019

[234] UCLG - United Cities and Local Governments https://www.uclg.org/en retrieved by July 2019

been built based on a Smart combination of elements (communications, infrastructure, economic development) and on purposeful and independent citizen activities (participation, education) that make sound management of the available resources through open governance"[235]

Aligned with this citizens quality of life by means of technology solutions, we can find the next definition by Intel and its research body, Juniper:

"*A Smart City is an urban ecosystem that places emphasis on the use of digital technology, shared knowledge and cohesive processes to underpin citizen benefits in vectors such as mobility, public safety, health and productivity."*[236]

Same approach from Japan: "*A smart community is a community where various next-generation technologies and advanced social systems are effectively integrated and utilized, including the efficient use of energy, utilization of heat and unused energy sources, improvement of local transportation systems and transformation of the everyday lives of citizens*."[237]

Since 2005, the European Union (EU) has dedicated increasing investments to design a smart urban growth strategy for its metropolitan city-regions. The EU has developed a series of programs under the 'Europe Digital Agenda'[238]. According to this digital agenda, the EU aims to achieve: "*A smart city is a place where traditional networks and services become more efficient with the use of digital and telecommunications technologies, for the benefit of its inhabitants and businesses. With this vision in mind, the European Union is investing in research and innovation in ICT and developing policies to improve the quality of life of citizens*

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[235] "SmartCities Study 2017", *UCLG Committee Digital and Knowledge-Based Cities*, Bilbao, 2017, p.13

[236] "SMART CITIES – WHAT'S IN IT FOR CITIZENS?" *Juniper Research / Intel* https://newsroom.intel.com/wp-content/uploads/sites/11/2018/03/smart-cities-whats-in-it-for-citizens.pdf retrieved by Jan 2019

[237] Japan Smart Community Alliance, Kawasaki https://www.smart-japan.org/english/ retrieved by Jan 2019

[238] "Digital Single Market. Policy. Smart Cities" *European Union* https://ec.europa.eu/digital-single-market/en/smart-cities retrieved by July 2019

and make cities more sustainable in view of Europe's 20-20-20 goals." (By 2020, all EU cities should achieve:[239]

- 20% reduction in greenhouse gas emissions (since 1990 levels)
- 20% of the energy consumed from renewable energy.
- 20% improvement in energy efficiency (reduction in consumption per unit -person, household, public transport route)

In addition to this balance between quality of life and use of latest technologies, we can't forget the permanent urban development (the physical evolution of the city), which is transforming the city shape and identity in the mid-long term.

A Smart city is defined as an integrated system that interacts with human and social capital using Information technologies solutions. Its objective is to efficiently achieve city sustainable development goals and quality of life, based on the cooperation between different social agents like Citizens, City Managers, Urbanists, Technologists, Universities and entrepreneurs. In this context, smart cities are becoming the solution for achieving a more sustainable urban development while increasing the citizens quality of life through the use of new technologies.[240]

A good integration of these three components come from this BSI Group definition: "*A city is smart when it displays effective integration of physical, digital and human systems in the built environment to deliver a sustainable, prosperous and inclusive future for its citizens*."[241]

Other definitions:

- "*A smart city is a developed urban area that creates sustainable economic development and high quality of life by excelling in multiple key areas; economy, mobility, environment, people, living, and government. Excelling*

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[239]"Climate Action" *European Union* https://ec.europa.eu/clima/policies/strategies/2020_en retrieved by July 2019.

[240] NEIROTTI, P. et al. "Current trends in Smart City initiatives: Some stylized facts." *CITIES*, vol 38, ELSEVIER, Torino, 2014. p.25 http://dx.doi.org/10.1016/j.cities.2013.12.010

[241] "Making Cities smarter. Guide for city leaders: Summary of PD8100*".* *BSI group for UK Department for Business, Innovation & Skills*. London, p.2 https://www.bsigroup.com/LocalFiles/en-GB/smart-cities/resources/BSI-Making-cities-smarter-Guide-for-city-leaders-UK-EN.pdf retrieved by Jan 2019

in these key areas can be done so through strong human capital, social capital, and/or ICT infrastructure."[242] (Business Dictionary) I very much like this conceptualization of the three components (people, city urbanism and technology)

- "*A smart city is a municipality that uses information and communication technologies to increase operational efficiency, share information with the public and improve both the quality of government services and citizen welfare*." (IoT World)[243] This definition is more focused on technology serving humans.

Finally, let's go to check the standards bodies' definition. The current working definition from the ISO Board Smart City Advisory Group is …

"*A '**Smart City**' is one that…*

… dramatically increases the pace at which it improves its social economic and environmental (sustainability) outcomes, responding to challenges such as climate change, rapid population growth, and political and economic instability …

… by fundamentally improving how it engages society, how it applies collaborative leadership methods, how it works across disciplines and city systems, and how it uses data information and modern technologies…

…in order to provide better services and quality of life to those in and involved with the city (residents, businesses, visitors), now and for the foreseeable future, without unfair disadvantage of others or degradation of the natural environment."[244]

The Swiss definition from ETH Zürich University is aligned with previous, but puts special emphasis on sustainability, energy efficiency and decarbonization:

"*Smart City characterizes a city that:*

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[242] Business Dictionary http://www.businessdictionary.com/definition/smart-city.html retrieved by Aug 2019

[243] "IoT Agenda." *TechTarget.* https://internetofthingsagenda.techtarget.com/definition/smart-city retrieved by Aug 2019

[244] WELCH, D. and DADAGLIO, F. ISO Member "ISO Smart Cities Key Performance Indicators and Monitoring Mechanism" *ISO*, ITU Forum on Smart Sustainable Cities, 2015, Abu Dhabi, p.17 https://www.itu.int/en/ITU-D/Regional-Presence/ArabStates/Documents/events/2015/SSC/S6-MrDWelsh_MrFDadaglio.pdf retrieved by March 2019

.- systematically applies information and communication technology as well as technology conserving resources on its way to post-fossil society

.- intends to become independent of fossil energy carriers on the long run

.- connects new technologies for infrastructure, buildings, mobility etc.

.- uses resources such as energy or water as efficiently as possible.

.- anticipates and realizes future sustainable forms of mobility and the necessary infrastructure.

.- forces integrated (city) planning processes, e.g., for energy planning

.- creates the spaces for innovation and the testing of new ideas (cleantech)

.- installs management systems ('Good Governance') to enable optimized leadership in the different areas and - through a holistic controlling - for developments to be reported in a measurable and verifiable manner.

.- provides the appropriate personal and financial resources

The integration and interconnection of these areas is the characteristic of a smart city with the aim of realizing the potential for ecologic and social improvements."[245]

In summary:

The SmartCity concept is very wide and no one can say with sharp precision what it refers to or not. But everybody in the cities' arena is talking about it from many different angles. Although there is no standard definition and even the ISO Board approach is very ample in areas and topics to consolidate and integrate, let me try to find a common template. The SmartCities umbrella includes any kind of technology applied to cities to provide value in many different areas, always placing the citizen at the center as user, beneficiary, passive or active contributor, and always under the inspiration from the UN SDG (Sustainable Development Goals) 2030 Agenda. Obviously, SmartCities trend is here to stay, it's works in progress and every city has to set priorities according to its needs. So, the main first tough decision is where to start from, how to set priorities and assign the scarce available resources to make the greatest advance and improvement.

What our SmartCity may be is based on our hopes and our dreams, and relies on our execution capacity, leadership and available resources.

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[245] SCHMITT, G. "SmartCities*"* Spring Semester 2017, *ETH Zürich* p.10 http://www.ia.arch.ethz.ch/wp-content/uploads/2017/02/L01-Intro-Smart-Cities-FS-2017-170220.pdf retrieved by Aug 2019

OK, but what are those areas to consider so we can make a first assessment on where we are, what achievements we want to accomplish and assign resources?

Again, there are abundant proposals from most technological providers, and thousands of available solutions to impact. Most are grouping those areas in some few 6 to 10 mains, integrated or correlated between them.

There are dozens, but let me show just four examples:

One of most famous is Boyd Cohen's Smart City wheel, where this urban and climate strategist describes 6 main areas and 18 subareas for action around SmartCities. See figure 32

In figure 33, we can see the approach from IoT World. Very technological driven, citizen is placed just into one area as 'Smart/Digital Citizens', mixing city areas in parallel with specific technologies like OpenData or Wi-Fi.

KPMG, in its 53-cities Benchmarking City Services[246] Analysis simplifies on these 12 basic functions to assess city services quality: Road access, Transit, Small and medium enterprise development, Building permit and enforcement, Park access, Recreation facility access, Drinking water supply, Wastewater removal, Storm water drainage, Fire rescue, Garbage collection, Waste diversion and recycled waste collection.

In figure 34, Deloitte proposes six main areas surrounded by general objectives, necessary infrastructure and associated strategy. From the inner core focus on the three fundamental objectives (Economic Competitiveness, Sustainability and Quality of Life), the information and communications technology infrastructures together with the analysis and security tools allow us to address the six development areas under the strategies of Collaboration, Transparency, Inclusion and Engagement. Very complete, it does not contemplate the physical urban infrastructure transformation.

In figure 35, The Boston Consulting Group focuses on technology for six fundamental areas, placing the citizen in one of them 'Smart social'.

It seems clear that the SmartCity concept is multidimensional, trying to describe the 'what to do' and the 'how to achieve it' by using latest technologies.

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[246] BEATTY, S. & MITCHELL, A. *Benchmarking city services*. 2017. KPMG International, Canada p.7 https://assets.kpmg/content/dam/kpmg/xx/pdf/2017/10/benchmarking-city-services.pdf retrieved by Aug 2019

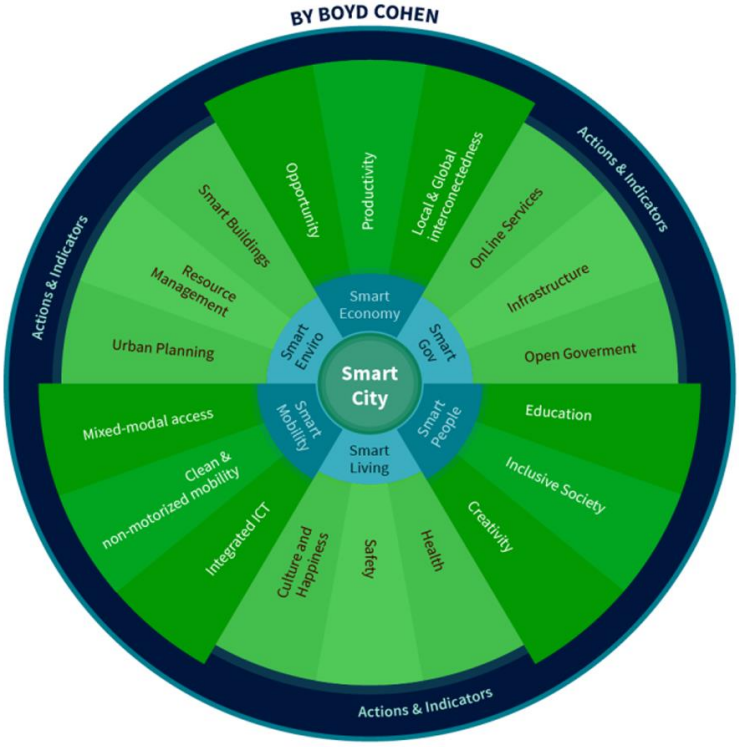

Figure 32. Boyd Cohen's SmartCity wheel[247]

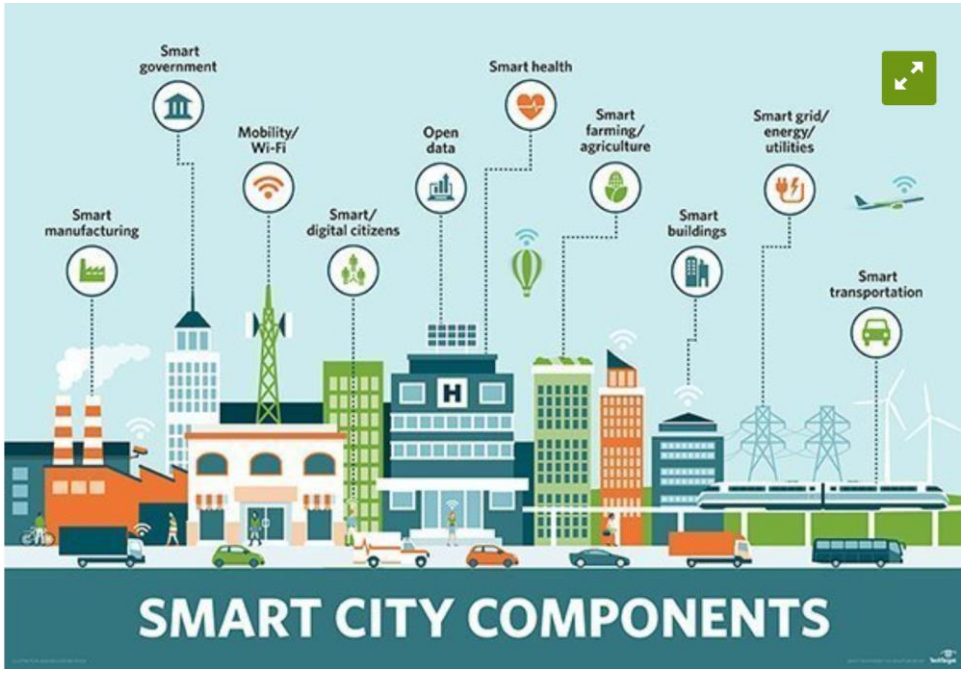

Figure 33. IoT World SmartCities Components.[248]

[247] COHEN, B. "SmartCities Wheel" https://www.smart-circle.org/smartcity/blog/boyd-cohen-the-smart-city-wheel/ retrieved by Aug 2019

[248] "IoT World SmartCities Components. IoT Agenda." *TechTarget.* https://internetofthingsagenda.techtarget.com/definition/smart-city retrieved by Aug 2019

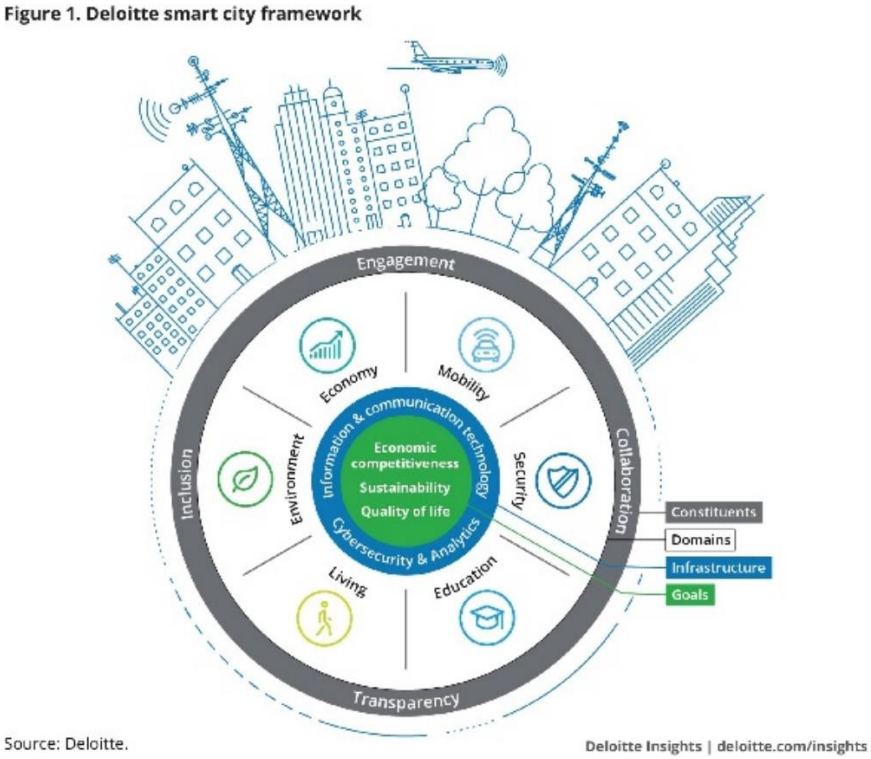

Figure 34. Deloitte SmartCity framework[249]

Figure 35. SmartCities Platform by The Boston Consulting Group[250]

[249] EGGERS, W.D. and SKOWRON, J. "Forces of change: Smart cities" *Deloitte Insights*. Published by March 2018 https://www2.deloitte.com/insights/us/en/focus/smart-city/overview.html retrieved by July 2019

[250] RUBEL, H. "Smart Cities – how to master the world's biggest growth challenge" *Boston Consulting Group*, 2014. Slide 14

From Objectives POV

Deloitte described the three fundamental SmartCity objectives as Economic Competitiveness, Sustainability and Quality of Life. This leads us to think about three main City models depending on the weight each city puts on each of them. That way, we can talk about Business/Competitive City, Eco/Sustainable City and Human/Citizens/Liveable City. These different weights are associated to political orientations and electoral promises. Typically, conservative/right wing are more focused on Business/Competitive while socialist/left wing are talking more about Eco/Sustainable. Human/Citizens/Liveable City is in the program from everybody, even from those Populists, but from different interpretations. Anyway, this varies from city to city, and sometimes is too much linked to the Major's willingness and leadership.

Business/Competitive City

With the incessant globalization, cities face the challenge of continuously maintain and improve their competitiveness. From this point of view, everything should be prioritized in the SmartCity plan to make the city more powerful and solid to develop the local economy and attract external investors. All other components will come later as a consequence. Therefore, the collective enrichment of the city / region, the development of growth factors and the ability to attract investment, are now the most important objectives for large urban agglomerations, competing for the international status / recognition of Smart city. A good example of this objective as the core one is taken by UK Innovation research agency Future City Catapult[251]: "*The digital technologies deployed (at Smart City Demonstrators) help address environmental, economic and financial challenges. A successful outcome is market creation and investment for businesses and SMEs and the creation of an exciting and healthy environment for citizens to live, work and play*."

There are here two main motions in this Business focus objective:

External focus (inbound)

[251] "SMART CITY DEMONSTRATORS. A global review of challenges and lessons learned." *UK Innovation research agency Future City Catapult* https://futurecities.catapult.org.uk/wp-content/uploads/2018/03/Hyperconnected_smart-city-demonstrators_v3.pdf p.3

The main objective is to attract multinationals and their investments in manufacturing, retail or operations plants and research. Especially relevant are technology companies (digital giants) and financial companies. We are seeing how Amsterdam, Dublin, Paris and mainly Frankfurt are currently competing (2019) to attract financial companies that are divesting in London due to the impending Brexit. It is necessary to adapt local universities to generate the requested talent. The priority objective of this SmartCity strategy is external, it is external marketing, 'selling' the city attractiveness to attract investments.

Local economic development objective (outbound)

This other direction of economic development is linked to the previous one. The idea here is to encourage the creation and development of local service companies to complement the installed multinationals and in parallel, innovative new companies that are going to be projected internationally.

Therefore, all 'smart' actions that offer the best quality of life for international companies' expatriate executives and retain young local talents by stimulating the generation of new innovation companies from university clusters, should be prioritized.

Eco/Sustainable City

The term sustainability is often reduced to ecology, although with the global warming threat strong initiatives have been developed such as the Paris agreement and the C40 manifesto and many others that point to cities decarbonization and increasing investments in electrification, energy efficiency and circular economy. The new generations remarkably appreciate the concept of 'GreenCity', so cities are increasingly committed to this goal and dedicating significant investments.

"*At Helsinki, the Sustainable Development Goals turn from the agenda into action especially at the city level*".[252] Jan Vapaavuori, Mayor of Helsinki

Human/Citizens/Liveable City.

[252] "From Agenda to Action The Implementation of the UN Sustainable Development Goals in Helsinki 2019". *City of Helsinki*, 2019, p.2 https://www.hel.fi/static/helsinki/julkaisut/SDG-VLR-Helsinki-2019-en.pdf retrieved by Aug 2019.

In this third approach, which is still a minority in the world, the citizen quality of life and social interaction are the main priority. For all other kind of projects, citizen are passive actors like in a guinea-pig approach, in which city managers only want to analyze their reactions to the developed innovations. Business City obviously tries to promote citizen's wealth and Sustainable/Eco projects make city more liveable, more ecologically pleasant. In this model, Citizen impact is not a consequence, but the main action point, then sustainable and business goals are achieved. Cities like Sao Paulo and Medellín are convinced that if they focus on the citizen then the business objective will come.

"*If I look only for business, I miss out on the potential of the city. I miss out on the inclusive city and the sustainable city, connected, even in safety. The least important factor is the business aspect. The focus is on the citizen. When the goal is the citizen, the business environment gets built as a consequence*."[253] João Octaviano de Machado Neto, Mobility & Transportation Secretary, Sao Paulo.

Medellín (Colombia) has evolved from being one of the most dangerous cities in the world under the social disaster caused by Escobar's drug cartel, to become one of the most innovative SmartCities in Latin America, with a priority focus on integration and equity in the access to social assistance by all population segments. It is based on building a strong identity around progress and innovation led by trusted leaders. Although these advances need technology, the technicians who implement them smile and get surprised at their high humanistic content. Over dreaming of the enrichment of the city, being technologically attractive and purely ecological, Medellín has based its transformation on social cohesion and the rebirth after the past social chaos.

Citizen-Centric functions.

Helsinki 2017-2021 City Strategy[254] aims to make Helsinki "*the most functional city in the world*". Citizen-centric seems to be a secondary objective behind the Eco/Sustainable City (carbon neutral target). But this concept of functionalism improves the quality of life from all its angles. All city administrative processes

[253] CATHELAT, B. *SMARTCITIES SHAPING THE SOCIETY OF 2030*, UNESCO and NETEXPLO, Paris, 2019 p.99

[254] City of Helsinki https://www.hel.fi/helsinki/en/administration/strategy/strategy retrieved by Aug 2019

simplification and acceleration, digitalization projects, free Wi-Fi access in public spaces, advanced citizen services in a safe and clean city are contributing to economic growth and improving governance transparency. It is clear here that the Citizen City is not reluctant to endorse new technologies, just the opposite as citizens are more and more digital and technology is not an external tool anymore, but something familiar they daily use. Generation Z are digital natives, so using the latest technologies is natural for them.

Finally, technology allows citizen to take a more active role in the city management and future development. They can become active actors on improving their quality of life. After some failed attempts to involve citizens in large-scale decisions, such as urban planning or heavy investments (citizens do not know in general about urban planning and for that, the city has its own qualified technicians), it seems obvious that citizen involvement should start from the neighborhood or district, so an environment they live closer and know better, and based on providing ideas and opinions about things they quite well know or suffer from or enjoy every day.

Citizens feel more empowered and listened, and while taking responsibility for producing cooperation and collective knowledge, they also gain more self-respect as a community. In addition, the proud-of-belonging feeling is growing and the links with the city are reinforced. This is very relevant for those talented citizens who will feel themselves more comfortable here, so the chance to explore other attractive cities will decrease. There are many initiatives aimed to generate this collective shared participation. City Apps, participatory budgets, feedback and reporting tools, chatbots are very common in the most advanced cities. The concept of small testing, then massive deployment is widely used thru the concept of 'citylabs', also promoting the local innovation and new companies' creation. Helsinki is continuously testing this thru the Forum Virium[255] in the district of Kalasatama in wellbeing services, Jätkäsaari in Mobility, and many other projects. Citizens active participation is also promoted with incentives to recycle, use bicycle (Rotterdam) or reduce use of car, civic behaviors (like the project we mentioned from City of Cascais (Portugal)). This collaboration is even materialized in real brick & mortar actions like co-building social houses in Chile. Pritzker prize

[255] "Helsinki's citylab". *Forum Virium.* https://forumvirium.fi/en/ retrieved by Aug 2019.

awarded architect Alejandro Aravena developed a project in Iquique[256] to build social houses, or better to say, build half-a-house, allowing the citizens to complete it by themselves. This is reducing the cost, allows to place the houses in a better-connected space (not very far from center), creates the I-did-it-myself sentiment and helped transform a slum into an integrated neighborhood. Project tries to overcome our cities the circle of poverty and inequity, while promoting self-development, not just another basic social expense. See figure 36.

Figure 36. Quinta Monroy Aravena's half-a-house social housing concept

So, a SmartCity model is a balance between these three non-divergent, overlapping objectives: A Business/Competitive City, Eco/Sustainable City and Human/Citizens/Liveable City[257]. We can say that it should be a lineal combination of them where the associated weights to each one are set by politics, starting and final destination, funding and external cooperation (Public-Private-Partnership or similar). On the other hand, a good SmartCity plan can't forget any of them. Technology is omnipresent, as a great overall enabler.

[256] Quinta Monroy Housing. Iquique (Chile) https://www.architectmagazine.com/project-gallery/quinta-monroy-housing_o retrieved by July 2019

[257] CATHELAT, B. *SMARTCITIES SHAPING THE SOCIETY OF 2030*, UNESCO and NETEXPLO, Paris, 2019 p.103

2.2 Why SmartCities?

The motivations to invest in the SmartCity concept respond to a global trend and to each city specific needs. In parallel, there are some internal motivations aimed at offering the best service to citizens and other external, within a global competition, positioning the city as an attractive place for talented citizens and investors. We have already studied the growing urbanization trend and the increasingly important role of cities in world development. This positioning makes cities accelerate the use of all available technologies to improve their internal services and their external projection. Being more relevant in the international context, mayors also have greater responsibility and awareness. In many countries, the mayor of the country capital seems to be only one step away from being a future prime minister.

Citizens increasingly see the central government as a group of politicians who only talk about macroeconomic issues, direct taxes and international issues, which are perceived as very distant from everyday reality. On the other hand, the city is perceived as closer and local political actions have a clearer and more concrete effect on the citizens lives. In a context of military peace and economic stability, issues related to defense or macroeconomics are of little concern if they are compared to daily local conditions. In parallel, citizens are increasingly digital, and the penetration of Smartphones exceeds 100% of the population, which requires a local electronic administration that offers comparable quality services to those from the private sector. In addition, technological evolution allows the provision of electronic services, massive data capture from sensors (IoT world) and the use of advanced Artificial Intelligence systems at very cost-effective way. These costs mean a fraction of the associated cost of offering them face-to-face or by telephone, so that technological innovation enjoys all the advantages: improvement in current service and quality of life at lower costs and provision of new advanced services at acceptable and justifiable costs. We cannot talk about ROI (Return of Investment) as it is said in the private sector, but we can quantify the return on service improvements, time savings for civil servants and citizens and return on institutional objectives improvements or achievements.

From an internal point of view, making the city a more comfortable, safe, sustainable, connected and vibrant economy place is all city politicians and

managers mission. And for that, technology is no longer a plus, but a must-have. It is unimaginable to enjoy the services and quality of life we already have today without the right technology fundamentals. Just as it is unthinkable to look to the future (AI, 5G, autonomous cars, ..) without placing technology, and therefore, the concept of SmartCity as the indispensable means.

From the external point of view, within the unstoppable globalization process, our cities compete in a global context for becoming a reference in innovation, relevant in the international decision making and a beacon in attracting talent.

The competition for talent

As we have already studied, cities are globally competing to retain and attract talent. Talent is the key to the city economic development. Without talent or sufficient talent, the city is not innovative, it does not generate enough wealth or employment, it is not a powerful new initiatives leader. And even worse, the talent attraction has a positive acceleration feedback: talent calls talent but also the opposite, the lack of attractiveness makes talent migrate so chances of being attractive are getting reduced. It is therefore a fierce competition to achieve this resource: talented citizens.

We talked in chapter 1 about the 3T's as a recipe for the city prosperity (Technology, Talent and Tolerance), as the magic equation to boost economic growth. Cities must rule with sufficient tolerance to allow immigrants to get access to the city to work and develop new ideas and business opportunities, attracting talented citizens and investors and using technology as an enabler for this transformation. Technology is the key component of this trilogy. Other authors assume that a modern city is tolerant enough by default and they exchange this T (Tolerance) by Trade, giving importance to international commerce relations or to the city credibility in the business area. (Technology + Talent + Trade). Other authors add the term ‘climate change’ as a fundamental factor to attract new talent generations: so, they get Talent + Technology + Climate change as key axes of the future city.

For all this, it seems clear that there is a kind of cold war or hidden competition for talent among the most important cities in the world.

There are many more things that I admire than I detest from the American way of life. One of those that I like best is its pragmaticism and lack of hypocrisy in matters that

could be controversial, but that everyone previously knows and assumes. And this is one of them. We can find direct offers to talented citizens to move to a certain US city. They offer them all kinds of grants, even paying for their pending studies loans if they commit to live and settle up new companies in that city/state for a period of time. It seems reasonable to me to offer grants or scholarships to study in your own city / state, but it surprises me that rural or not as attractive as main cities areas literally go to 'catch / fish talents' where they are been nurtured (in cities with the best universities). Some examples:

Kansas offering to pay off student loan debt if they move there and stay. Other cities also offering grants for house building.[258] Another 5 US Cities with different grants if you move there.[259] If you plan to move and start a business of a company, then these 37 US States offer you different grants and incentives. See full guide.[260]

This ask for talent is happening globally. In Portugal, they are calling back with tax incentives all talented emigrants who decided to leave. They offer tax breaks, help with relocation and more.[261] A Finnish friend living in Spain is receiving a call every 6 months literally saying: 'We need you back. Your country needs you. How can we help you make that decision?' Ireland has as well active policies on this.

We also talked about the 4th Industrial Revolution and the role of talent. This era of change is definitely marked by Artificial Intelligence and Robotics. Many decades ago, scientists already designed algorithms and systems based on Artificial Intelligence (AI). They were never released because of the lack of good and massive data to build and debug the model and computing capacity to obtain results in a reasonable time, tending to real time. It is today when the massive data acquisition

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[258] BERGER, S. "These towns will help pay off your student loan debt if you move there." *CNBC Make it.* Published by Jan 2018 https://www.cnbc.com/2018/01/03/us-towns-that-offer-financial-incentives-to-live-there.html Retrieved by Aug 2019.

[259] WHITE, M. "5 U.S. Cities That Will Actually Pay You to Move There" *Moving.com* published by June 2017 https://www.moving.com/tips/5-us-cities-that-will-actually-pay-you-to-move-there/ retrieved by Aug 2018.

[260] Business Facilities. https://businessfacilities.com/state-by-state-incentives-guide/ retrieved by Aug 2019.

[261] ELLIOT, D. "Portugal wants its emigrants back – so it's paying them to return" *World Economic Forum* published by Aug 2019 https://www.weforum.org/agenda/2019/08/portugal-emigration-incentives-population/ retrieved by Aug 2019

environments (IoT and other BigData) and the huge data processing power from Cloud DataCenters allow Artificial Intelligence to impact on all human spheres, not just the very technological ones as a manufacturing plant or retail business, but also those that connect with people, such as the services offered by a city. This makes people with skills to work in Artificial Intelligence highly demanded.

That way, companies look for roles with the 3 D's: Developers, Designers, Data scientists. It is the human part of Artificial Intelligence. And even beyond, HR departments must seek disruptive roles in this new digital world, such as cognitive data managers, privacy auditors, product incubation managers, blockchain specialists, behavioral scientists, geospatial engineers, ethics advisors and emerging technology specialists.[262]

For ATKearny, as reported into his famous "*Global Cities Index*", talent or human capital is the key differentiator for competitive cities. And the talent is growing from inside, but also coming from outside in a global competition.[263]

This competition for talent is also affecting the negotiations of the treaty between the USA and China. President Trump does not want young Chinese talents to be trained and obtain the know-how from American universities. [264]We are clearly in a global war for talent. In other words, talent is considered a fundamental strategic asset in the trade agreement. It is the element that can make a country lead the world future or be relegated to a secondary basic service provider role.

Another factor that increases the value of talent is the decline in birth rates in the most advanced countries. This lack of young talent makes the HR departments pay make special efforts to retain this profile of workers. A profile of young people from Millennial Generation and Generation Z, which as we studied in the previous chapter are not easy to retain and motivate. New strategies are been developed in

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[262] SNYDER, S. "Talent, not technology, is the key to success in a digital future", *World Economic Forum* published by Jan 2019, https://www.weforum.org/agenda/2019/01/talent-not-technology-is-the-key-to-success-in-a-digital-future/ retrieved by Aug 2019

[263] MENDOZA, A. and DESSIBOURG-FREER, N. "Talent makes the city", *THE HILL*, published Jun 2019, https://thehill.com/opinion/finance/448371-talent-makes-the-city retrieved by Aug 2019.

[264]"Trump's Next Trade War Target: Chinese Students at Elite Schools" *Bloomberg* published by June 2019 https://www.bloomberg.com/news/articles/2019-06-03/trump-s-next-trade-war-target-chinese-students-at-elite-schools Retrieved by Aug 2019

this task.[265] At the city level, the game is not only to attract companies and innovative businesses, but to create a vibrant attractive city which will motivate this target to move there.

In this situation of talent search, countries want to filter among potential citizens who apply for residence or a work permit or VISA to favor those who will generate wealth and development due to their skills and work compared to those who simply look for a better place to live. and enjoy the social achievements and benefits. This filter is a complex problem with ethical connotations. Finland and Australia have seriously considered to set an exam that could determine the question of talent. In general, the companies HR departments are the best filter. If a company is willing to hire a foreigner for a highly qualified position and has already found him, we should give that person all the necessary facilities. It is clear that the company specialists have made the filter and are willing to bet on that person. Another criterion is to own a company that is already making some significant revenues in the country. It is assumed that if you have achieved that it is because you have enough talent.

And keep an eye on your locals! Given the fierce competition for talent across cities, dissatisfied citizens will be tempted to leave for more attractive environments.

Look at my TED Talk session: Attractive SmartCities: Contest for Talent[266]

An increasingly connected world

With the constant improvements in efficiency in the means of transportation and the globalization effects, the movement of the so-called 'digital nomads' has been created. We can find workers from virtual services companies that are located in very remote locations scattered throughout the world. They are people with the talent, skills and needed languages to be able to develop their work in any place that

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[265] ALLAS, T. et al "Confronting overconfidence in talent strategy, management, and development" *McKinsey* published by June 2019, https://www.mckinsey.com/featured-insights/talent-management retrieved by Aug 2019

[266] AUTHOR. "Attractive SmartCities: Contest for Talent" *TED Talk*. Feb 2019 https://www.ted.com/talks/jose_antonio_ondiviela_attractive_smartcities_contest_for_talent (SPANISH) or https://www.youtube.com/watch?v=DAABkQRIcM8 (ENGLISH)

offers a good enough connection to Internet. As Carlo Ratti[267], one of the most prestigious city designers, explains, digital nomads do not live in a fixed place, but instead experience different cities where they quickly integrate. Thus, they take advantage of the best from these cities at all times and when working or weather conditions change, or simply when they get bored, they move to another city. "*They meet other people at coworking or co-living spaces*", said the MIT Senseable City Lab Director.

Cities are adapting to attract these digital nomads. While some cities were already cosmopolitan and well prepared to host the expatriate, others are actively developing policies and infrastructure (co-working or smartworking / co-living spaces) to attract foreign talents.

And we must remember that we are social animals. The most demanded destinations are the large metropolis, where the density causes creativity to multiply and development to stimulate.

To verify this, just take a look at the below figure 37. Most cosmopolitan cities are receiving people from abroad. This movement was not promoted in the past, but now, there is an ask for foreigners (talented). Vienna should have been included here as well. Our Europe's East gate population has this profile: 50% with a migration background, (they were born abroad or have at least one parent who was), 29 % are non-Austrians and 35% were born abroad.[268]

And if we look at net native-born people living abroad, we can check the below figure 38 from STATISTA. 2008 Economic Crisis made a clear impact, but the trend is growing, and that crisis ended by 2012. As we have seen before, many countries are trying to recover all those locals lost. So definitely, people are in the move.

[267] Carlo Ratti's website https://carloratti.com/ retrieved by Aug 2019

[268] Vienna facts https://www.wien.gv.at/english/social/integration/facts-figures/population-migration.html retrieved by Aug 2019

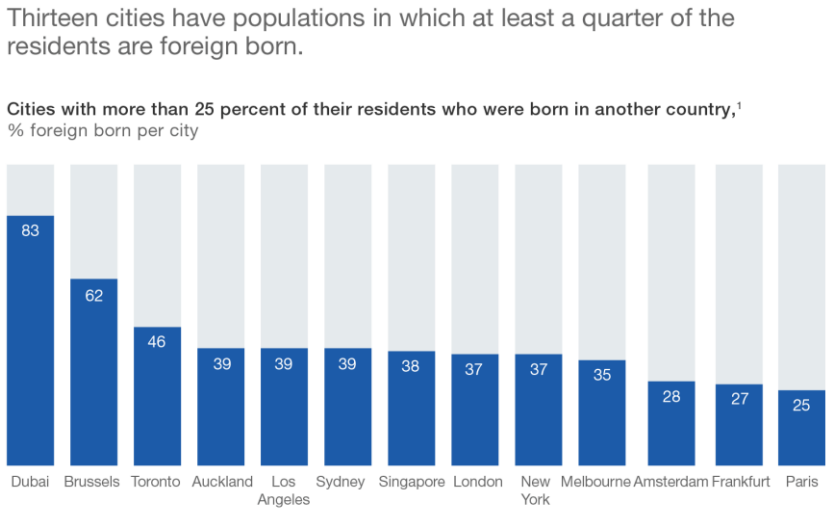

Figure 37. McKinsey Analysis of main Cities with largest foreign-born population[269]

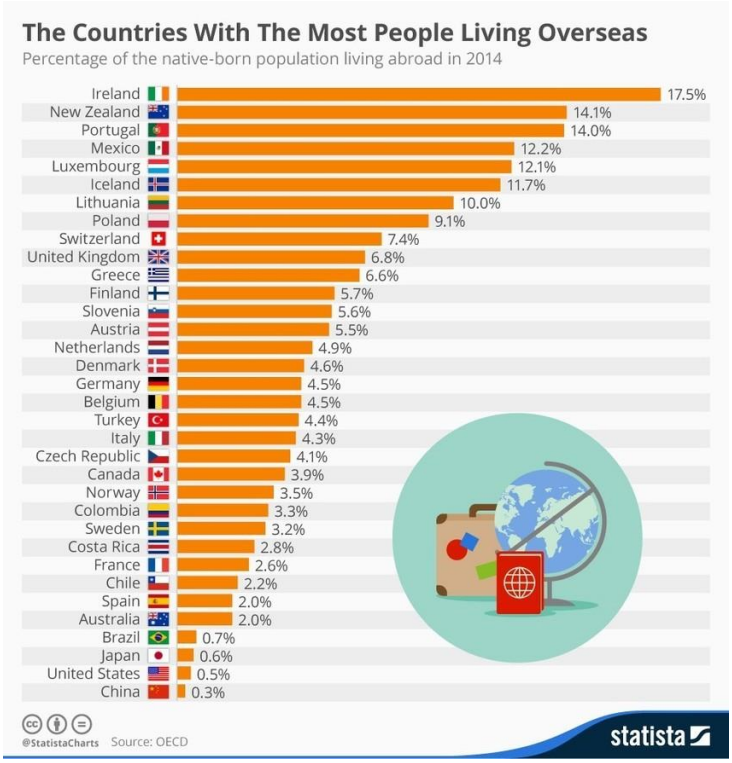

Figure 38. STATISTA Analysis of % people born in a given country but living in another [270]

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[269] FREM, J. et al "Thriving amid turbulence: Imagining the cities of the future" *McKinsey* published by Oct 2018 https://www.mckinsey.com/industries/public-sector/our-insights/thriving-amid-turbulence-imagining-the-cities-of-the-future Retrieved by Aug 2019

[270] McCARTHY, N. "The Countries With The Most People Living Overseas" *STATISTA* published by Jan 2016 https://www.statista.com/chart/4237/the-countries-with-the-most-people-living-overseas/ Retrieved by Aug 2019

Migrations are no longer driven by unqualified pioneers with nothing to lose, but by well skilled workers who want to earn what they believe they deserve. People who are very demanding with their salary and evaluate the attractiveness conditions of the possible cities where they plan to develop their lives.

There is a new variable that is conditioning this mobility between cities: the housing price and the loans cost that it entails compared to wages. This means that many professionals are trapped in a city because of the high outstanding debt of their mortgage loan (pre-crisis) against the real value of their home (decreasing) with a stagnant (or non-competitive) salary. In parallel, the most attractive cities raise their housing prices because salaries are higher because they attract the best talents, making them more unattainable. This generates a vicious gentrification cycle where two societies and two speeds are created by a Darwinian process. One in unattractive cities, with low wages but still high cost of living and housing. And another in attractive cities, with high salaries and high living costs, but almost exclusively reserved for talent elites. To very much simplify: poorer are trapped, talent-elites win it all. This process is described as economic and social urban 'sclerosis' that isolates the most disadvantaged areas, where no one leaves because they are trapped and where no one wants to move because they are not attractive enough. This process is well analyzed for US by the International Monetary Forum[271], but is happening in comparable ways in other geos. If the plus in salary because of living in a large attractive city doesn't compensate the plus in cost of living then the model doesn't work, and the potential emigrants have to consider the overall set of conditions, not just work and housing. This is a great opportunity for moderated cost of living from mid-sized cities very well connected to expensive large metropolis. Again, urban mobility is the most important component and the reason why this is seriously impacting US and so much Europe where distances are shorter and urban mobility is excellent: you can live in an affordable house located 100 km from your job downtown if urban mobility takes you there in reasonable time and cost.

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[271] BAYOUMI, T., BARKEMA, J. "Stranded! How Rising Inequality Suppressed US Migration and Hurt Those Left Behind", *IMF WORKING PAPERS*, published by June 2019 https://www.imf.org/en/Publications/WP/Issues/2019/06/03/Stranded-How-Rising-Inequality-Suppressed-US-Migration-and-Hurt-Those-Left-Behind-46824 retrieved by Aug 2019

The Four SmartCities Evolution Stages

Since its conception in 2010, the term SmartCity has evolved, or better to say, it has been humanized. Some authors talk about a shift from a SmartCity 1.0 focused on technology to a SmartCity 2.0 focused on citizens. Other experts like Boyd Cohen talk about 3 generations of SmartCities. 1.0: Technology leadership. 2.0 Technology-based City leadership. 3.0 Citizen leadership.[272]

My vision broadens this classification and considers technology (as well as urbanism) as a transversal component, never a destination, but an ever-present mean.

SmartCities 1.0:

Mr. Cohen explains SmartCities 1.0 as a generation of projects led by large technology multinationals such as IBM and Cisco, with the noble interest of selling their technology and services. In my model I propose that SmartCities 1.0 use technology to solve cities main internal problems. With the intensive use of the Internet and the immense computing capabilities available by 2010 in comparison with previous decades, cities understood that computers were no longer just a means of writing letters or collecting taxes. New technologies are going to be the way to transform city services. In this generation, technology is used for the city directors service, to solve their fundamental internal problems of management, and financial control. They also begin to consider technology as a possible solver for some physical problems such as traffic management and city elements geolocation. It is clear that technology multinationals are here to sell projects, but they also play a fundamental role as catalysts for urban development, providing technology, procedures and methodologies that do not exist within the city's staff. Here is his enormous value contribution. Before SmartCities 1.0 our cities just used technology for the old concept of ‘mechanization’, moving administrative procedures from paper to computers.

[272] COHEN, B. “The 3 Generations of Smart Cities” *FASTCOMPANY*, published by Oct 2015, https://www.fastcompany.com/3047795/the-3-generations-of-smart-cities retrieved by May 2018

From the urban point of view, until 2010, urbanism was considered only a bricks & mortar concept, with heavy equipment making hard physical things like buildings, railways, roads, parking, airports, harbors, power plants and energy distribution networks, water reservoirs and pipes,...). The term 'Smart Network City 2010' starts to sound and technology makes all this world more manageable, able to be planned in advance, and efficient.

SmartCities 2.0:

Mr. Cohen explains SmartCities 2.0 as a generation of City-led technology intensive projects. So, city proposes, technology delivers. We can observe the raise of a massive SmartCities solutions industry and an awesome fascination for technology. Other voices talk about the concept of 'Computing City' made of a 'Network City' that is gathering data from myriads of sensors combined with a 'Software City' that is processing that data in a 'Cyborg City' which controls it all. If we add Artificial Intelligence, then we evolve this to the 'Conscious City' idea which makes the city work as a self-sufficient self-conscious live body.

Honestly, I dislike this way of futuristic thinking which quickly moves from describing latest technology innovations to alert about potential scary sci-fi dystopian worlds. This doesn't help with the ever-complex digital transformation processes, because is only adding doubts and reducing trust. Technology is an ally, an enabler for human capabilities full expression, and it just does what humans program it to do. We must trust on technology by default, then ensuring it is managed by ethical principles on skilled hands.

When I talk about SmartCities 2.0, I mainly refer to the new king of knowledge economy: DATA. Cities are sensorized. Traditional SCADA (Supervisory Control and Data Acquisition) industrial information management is adopted by cities to control the physical environment, creating large data farms, big data.

Available data from IoT (Internet of Things) is massively growing, but it's just a fraction of human-produced data in social networks. Cities are much better controlled and managed, drastically improving their resilience. Most decisions are based on data, or in other words, all decisions take data into account, because Data is the city's truth, for the good or bad. And knowing the truth makes us/them free to choose right. Due to all that data transformed into insight and knowledge,

governance accuracy is very much improved. Data comes from different sources: structured (sensors, IoT, existing citizen information, taxes, properties, health records,..) and unstructured (social networks, posts, twits, other). To obtain knowledge from all that data you need analytic tools like Social, Sentiment, Predictive Analytics, BigData or DataLakes. All of them considered vital tools to manage the city (Water, Energy, Transportation, Safety & Resiliency, Education, HealthCare, Tourism, Urban Planning,…). Accordingly, Cities are developing 'smart' plans to build an integrated view of the various city components and creating connections between them. This points to the concept of Urban Operating System or UrbanOS as an integrated platform to gather all available data and create new solutions and services. This was first proposed by the CityOS model born in Barcelona, but there are many commercial proposals from main technology providers. This article describes most of them and the potential model evolution. [273] Cities are also sharing all public non-private or PII (Personal Identifiable Information – remember the strict GDPR data protection regulation law) externally, in the concept of OpenData. So, they are collecting data on the city in real time, enriching these and then making them available at the right place and the right time to businesses, governments and citizens (see City Data Exchange[274] massive OpenData platform from Copenhagen). The aim is to foster the development of new applications and services, improve city management transparency and provide more information to potential investors.

But technology is only an enabler, Cities are based on People. Ummm, where are the citizens? SmartCity 2.0 uses the latest technologies to provide the best services to citizens, but without citizens. We have forgotten about citizens. They are humans walking the streets there, outside our projects office…and ok, once every four years we try to connect to them to gain their trust in the form of a vote. This stage is decided and programmed top-down, focusing on the city's ecosystem functional procedures rather than citizens real needs, who are treated as passive elements. It is

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[273] MARVIN, S. and LUQUE-AYALA, A. "Urban Operating Systems: Diagramming the City" *IJURR (International Journal of Urban and Regional Research)*, published June 2017 https://onlinelibrary.wiley.com/doi/full/10.1111/1468-2427.12479 retrieved by July 2019

[274] LARSEN, P.B. "Open Data Exchange", *Copenhagen. Hitachi* http://live.industrienshus.dk/files/12915716/5b960afa2b3062d.pdf retrieved by June 2019

a modern and technological version of XVIII century enlightened despotism: 'Everything for the citizen, but without the citizen'. We must change this and place the citizen at the center of all our actions. If we do not connect to the citizen, we run the risk of simply nulling him, reducing his city government influence down to zero, moving towards the 'zero human' paradigm: Zero human connection to real world, as all this is can perfectly managed by IoT, Zero human decisions as intelligent assistants will better make them all flawlessly based on Artificial Intelligence machine-learning algorithms, replacing humans from most tasks, providing maximum comfort and efficiency.

The most extreme example of the use of technology to offer better services to citizens could be the Google Sidewalk Quayside Toronto project[275]. Google promises a completely built-from-scratch Smartcity from the Internet up. The proposal is based on the idea that real-time data flows can be used to optimize the city 'central nervous system', making great improvements in transportation, public services, environmental care and the land use. This seems very much aligned with the concept of CityOS that we have just seen. But when citizens have asked more about the use of their personal data, movements, customs and when they have noticed that this real-time monitoring also includes them, protests and strong counter reactions have arisen. We meet, once again, with the ethical issue of Privacy, Personal Information vs. Protection / Knowledge to provide better service or quality of life.

SmartCities 2.0 are then implementing the model of 'Datapolis', the city of data, with the plan to evolve into a 'Participolis' where citizens take an active role in city life.[276]

SmartCities 3.0:

All the most advanced SmartCities are in this chapter. Once we have all the date we need (data is a must-have because without data you don't know your city and you

[275] THORNHILL, J. "Smart cities still need a human touch". *Financial Times*, published Aug 2019 p.1 https://www.ft.com/content/67c52480-b51f-11e9-8cb2-799a3a8cf37b retrieved by Aug 2019.

[276] PISANI, F. "A Journey through smart cities: between datapolis and participolis" *Netexplo Observatory*, 2015 UNESCO. https://unesdoc.unesco.org/ark:/48223/pf0000234422 retrieved by June 2019

have little to propose or ask your citizens, basically because, again, you don't know them) we can start engaging, connecting and making the citizens owners and cocreators of their city. It's a big mistake to consider this a non-technological approach. It's not about technology or citizens, it's about technology for citizens (SmartCity 2.0), and technology with citizens (SmartCity 3.0). the plan is to make a Copernican shift and place the citizens at the city center for all activities. We swap from a Data-centered city to a Citizen-centered city, but remember, we need data (or enough data) first.

We already described the challenge and the main tools we can use to tackle it in chapter 1.2 Connecting/Listening to citizens. City Co-Creation.

There are many alternatives to connect/engage with citizens: Apps for smartphones, Citizen Relationship Management tools, Social Listening, Sentiment Analytics, chatbots as 'virtual civil servants' you can interact with, eDemocracy tools to provide opinions, feedback or even eVoting in some specific questions. Some cities allow the option for participatory budgets, 'ask the Mayor' or propose all the cultural agenda and demanded services. But there is a long way to walk till the moment where citizens will feel proud of their city, fully engaged and feeling the 'belonging' sentiment. There are some main issues and blockers to make this SmartCity 3.0 paradigm a reality:

.- Do we know who our citizens are?. Ok, we have tons of info about them (taxes, properties, cars, water-energy consumption, also healthcare records, dependencies,..), but most times all that data is isolated in silos and because of some technical (and sometimes legal) restrictions, we can't integrate it all creating a single model, a datalake where we can filter and find the different segments of population with specific conditions that we want to improve. This is the concept of social marketing or citizen segmentation.

.- Do we know how to connect to them? If they don't have a virtual identity, a way to uniquely identify each, providing the demanded services with security, authentication, reliability, privacy and obvious compliance with laws. There are some cities with successful 'citizen cards' projects. People identify themselves and get a card. That card can be used in multiple city services. Ok, but this is a physical card, not an electronic way to identify yourself and get access to your city services

from your smartphone. Advanced eID Services like those implemented in Estonia and Ireland are needed at the city level.

.- Citizens are very much reluctant to allow more apps into their smartphones unless they provide advanced services in a way they can trust. Banks are already doing that…as a suggestion.

.- Even for basic Government services, there is a long room for improvement both in the quality of service provided and the real use of those services. It's not just a question of publishing or making a new service available, you need to make the citizens know it, use it and obtain the expected benefit, otherwise you are wasting your resources. And again, citizens should trust on those new services and clearly experience the value, otherwise they simply won't use them. Europe is the most advanced in eGovernment, and even here there are significant differences between countries. See figure 39. If we land this down to the city level, then the gaps are even wider. We can see how the different EU countries are performing in terms of digitalizing the most common services vs the use of those services' penetration in the population. This is improving the (chapter 1.2 explained) 2015 situation where only 27% of public services were mobile-friendly (available at the mobile, and using the mobile capabilities), only 41% of websites were transparent about the requested process duration, response times, making many citizens to drop before competition, only 35% were informing citizens about their chance to participate and provide ideas or feedback about the involved policies, services were not personalized in general (different personas -student, professional, elder,…- have different needs), not taking into account the available information about the citizen, only 45% forms are prefilled with citizen data and finally, only 4% of services were proactively offered and delivered to citizen.[277]

[277] "EU eGovernment Report 2015 shows that online public services in Europe are smart but could be smarter" *EU DIGIBYTE* 2015, https://ec.europa.eu/digital-single-market/en/news/eu-egovernment-report-2015-shows-online-public-services-europe-are-smart-could-be-smarter retrieved by Aug 2018

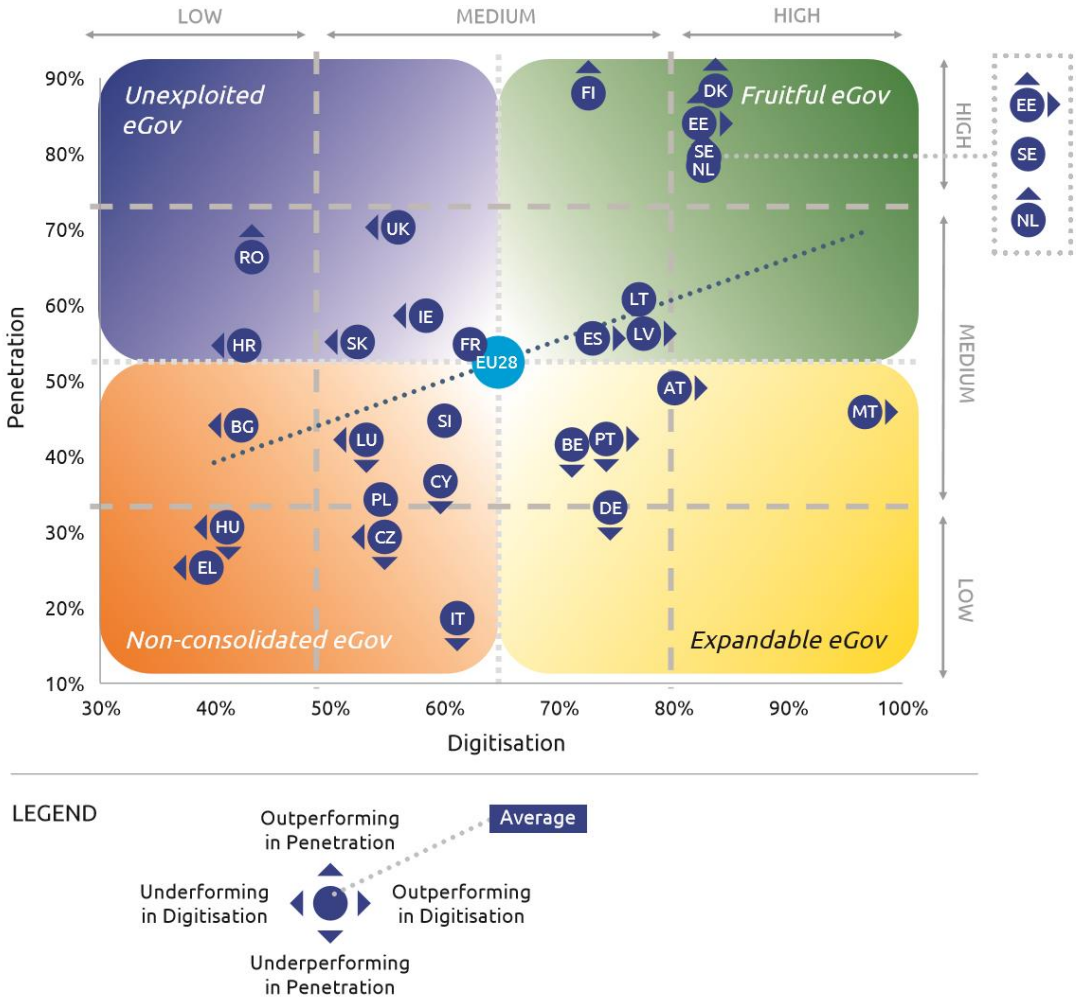

Figure 39. eGovernment Benchmark 2017 EU [278]

.- eVoting? Electronic voting systems are starting to be used in controlled, reduced environments and where privacy and voting independence can be guaranteed. If we think of an elderly lady voting on a computer screen, advised (or directed) by her granddaughter, we may rise doubts about who is really selecting one option or another. George Washington University is seriously studying the applicability of eVoting to mass elections. Massively criticized, eVoting has failed to improve citizen engagement in politics despite all the investments made to generate public trust in the system, but due to the complexity and questionable elections transparency in some cities and the overwhelming penetration of Internet and

[278] "eGovernment Benchmark 2017" *EU* p.130 published by 2017 https://www.capgemini.com/wp-content/uploads/2017/11/2017-egovernment-benchmark_background_v7.pdf Retrieved by Aug 2019

secured smartphones, eVoting is gaining space and will gradually be adopted everywhere.[279] Another issue is the nature of the question. To what extent can we ask citizens about advanced urban development topics, for which most of them do not have basic skills and whose opinion can simply be guided by aesthetic criteria (everyone has the ability to appreciate the beauty and tell whether something looks pretty or ugly), not considering all the relevant criteria? Sometimes we love the pendulum movement, from not asking anything to ask even the most difficult decisions. Is it an excuse to avoid responsibilities? You (citizen) chose it, so don't complain now.

There is a huge set of digital tools to facilitate citizen participation.[280] On the one hand we can find communication and dialogue tools such as citizen forums, online discussion, chats with the mayor, groups of interest, etc. On the other hand, requests in various formats, reporting tools, direct, grouped, supported by photographs, requests for signatures, etc. Volunteer management tools, recruitment for civic social services. Participatory financing, collaboration and crowdsourcing, also crowdfunding. Massive collaboration tools for popular initiatives. And finally, as we explained, all Opendata tools that share all kinds of city information, both static, historical data to real-time info from sensors, always without personally identifying any citizen due to obvious data protection reasons.

Therefore, we must connect and consult citizens in all that we technically and pragmatically can, with specific focus on questions of opinion, desire or tendency, questions about nearby or familiar topics and where we ensure that there is minimal knowledge and formed criteria, openly explain the pros and cons and seek very high participation, to prevent cyber-ready citizens have more voice than cyber-unready.

A very well-known project on SmartCities 3.0 is Barcelona's "*Decidim*" or 'we decide', an online platform that allows citizens to propose and participate on city decision making. Around 40,000 people use this "*civic alternative to Facebook*",

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[279] HAPSARA, M. et al "E-Voting in Developing Countries Current Landscape and Future Research Agenda" *University of New South Wales, Canberra, Australia* published by Jan 2017 https://www.researchgate.net/publication/312923714_E-Voting_in_Developing_Countries retrieved by July 2019

[280] CREIGHTON, J.L. *La participación ciudadana en la era digital*, CIVICITI, OpenSeneca, Barcelona, 2017 pp.44-45

which is obviously relevant, although only means 2,5% of 1.620.000 2018 Barcelona's inhabitants. Anyway, this is a clear way to promote and connect with citizens, but creating other more viral, cool, must-have tools is still a pending subject. Some initiatives where we ask the citizens for direct participation on specific strategic projects like energy in Vienna, sustainability in Vancouver or the impressive Medellin 'sharing' initiatives to help the most vulnerable suburbs with technology innovations are leading this SmartCities 3.0 motion.

Apart from technological tools to enable consultations, and Citizens participation in formal decision-making, these new collaborative projects open the scope for more ambitious goals like social inclusion, entrepreneurship creation and building social capital. Technology remains as a vital component for the SmartCities conversation, but cities that design technology projects around their citizens will be more prepared for the future and more attractive internal and externally.

"*Companies don't disrupt, cities don't disrupt, people disrupt. And as you [the government] think about building and evolving smart cities, you have to have citizens at the center*."[281]

Although we begin to hear about Citizen-Centric Cities, the reality is that most of the projects and plans are still Top-Down implementations made for 'silent citizens', who are not asked anything except, rarely, their feedback about the service provided.

Modern SmartCities 3.0 environments confer an active role not only to citizen associations, volunteers and city managers, but also to citizens, in a Bottom-Up process where they can express their opinions, needs, tastes, preferences and suggestions. Several questions arise when implementing these systems:

.- Do the solutions developers take into account the citizens lifestyle and customs? Are they are asked, proposed, do they test solutions before launching?

.- Are citizens willing to participate, to get involved, are they ready to help those developers if asked?

I believe that except in a few cities with a strong sense of belonging, citizens are not aware of their responsibility as recipients of services and as collaborators in the

[281] AFSHAR, V. Salesforce Chief Digital Evangelist at Smart Cities Connect Conference, 2017 AUSTIN, Texas, US.

city creation. They simply live there and take the opportunity to leave in a hurry as soon as the weekend arrives.

SmartCities 4.0:

Although only an eutopia, a happy destination to aim for, I wanted to add this phase, SmartCities 4.0, as the maximum paradigm of collaboration and co-creation. You can start with neighborhoods or small groups and organize permanent collective active participation projects. It is like a beehive where citizens are almost constantly contributing to the common goal. It is the role of the smartivist, defined by the BeeSmartCity[282] association: "*an individual who steps forward to actively support the process of creating a better place on a voluntary basis*". It is an incipient movement, but it is gaining activists as citizens observe that they are heard, and their opinion and contributions really count to improve their city.

Taken this to the future limit we could think of a collective consciousness, something like the neural connection of all the tribe members to 'mother tree' in "*Avatar*"[283].

The nearest real example to this concept could have been Bletchley Park (UK), where a team of people lived as an intelligent community. Led by Alan Turing, all were working focused on collaborating to solve a problem (decoding the Nazi Enigma cypher).

SmartCities: Perfect Solution for Urbanists, Politicians and Technologists

The SmartCities model is the solution to the main motivations from the three main actors: urbanists, technologists and politicians.

- Urbanists faced the model of unlivable megacities, denounced by active leaders such as Jane Jacobs, Rem Koolhaas, Jan Gehl, ... and have found in the SmartCities paradigm a way to evolve those megacities from a 'Generic'

[282] "Redefining the SmartCity: A new definition" *BEE SMART CITY*, published Aug 2017 *https://hub.beesmart.city/strategy/en/towards-a-new-smart-city-definition* retrieved by Aug 2018

[283] CAMERON, J. *AVATAR*, 2009

City model to a sustainable and liveable city; a city for citizens, to enable them to express their creativity and develop their potential.

- Technologists like me are delighted to contribute to the cities development, to inspire our Cities transformation to cope with XXI Century Challenges competing in a global context to retain and attract talent to lead the 4th Industrial Revolution, with Data as new fuel and Artificial Intelligence as new economy engine. We want to deliver the enabling technologies to make Cities more Sustainable, Inclusive, Efficient and Safer, delivering the most advanced services thru a Citizen-Centric model.
- And finally, to politicians, who needed new references for human development: nothing better than promising liveable cities, catalysts of human creativity and competitiveness (economic, artistic, scientific and human rights breakthroughs)

Megacities are mostly described by experts and experienced by residents as disastrous and unhuman agglomerations when it comes to all progress criteria:

- Disordered or random urban planning that generates as senseless collage of slums, wastelands, racial ghettos in combination to modern districts, financial downtown, green University areas, and of course, a big airport as an isolated cosmopolitan island… in a chaotic complexity

- Public infrastructure, utilities and services with a chronic inability to respond to rising demographic rhythm, to the point where they become inaccessible;

- Social segments inequalities that generate violence, riots and crime, social tensions and lack of inclusiveness;

- Abandoned citizens with undesired loneliness in an anonymous crowd of indifferent numb individuals;

- Natural ecosystem destruction, pollution, inefficient energy generation;

- Wasted time on traffic jams, hectic and stressful lifestyle, work burnout, disease - depression.

It is the 'Generic' city as described by Rem Koolhaas[284]. An empty city, without history, superficial, sedated, like drugged and numb. A city where the street has

[284] KOOLHAAS, R. *Acerca de la ciudad,* GG, Barcelona, 2014 from "The Generic City" Domus, núm. 791, Milano, 1997 pp.8-12

died because it is not used and life happens vertically or in a shack, with marked disruption edges (vertical – horizontal), leaving no opportunity for the meeting, for creative density. A city that repeats itself in a fractal way, where everything is the same, where everything that is not strictly useful or functional has no place in. A formally directed architecture design in the city center, where there the wealth is and a diffuse wide stain of poor suburbs outside, emphasizing inequality.

To oppose this negative image, the Smart Cities model is presented as the solution, the new paradigm, a feasible utopia.

The SmartCity is then a convergent ideal that combines the size and density of a modern attractive city, with the manageability, efficiency and liveability for its citizens, provided by technology.

2.3 How to develop a comprehensive and impactful SmartCity Strategy?

Depending on the different priorities and circumstances, cities define different strategies too. Thus, the strategies of Singapore (SmartNation) or the latest initiatives of Amsterdam or Copenhagen looking for creative alternatives to increase and make bicycle parking more efficient, are very different.

In any case, a SmartCity Plan implies a city huge digital transformation: its citizens, its internal management, its control, and even its organization and its future.

Every digital transformation implies an organization change management process.

"*A very big issue in the concept of a 'Smart City' is culture. The technology is easy compared to the necessary culture change. We need to be more agile and have autonomous teams who can get things done."* Mikko Rusama, Chief Digital Officer of Helsinki

Every change process responds to the famous Dannemiller's[285] change formula in order to be successful:

I would change or update Vision by two main areas: Expectations and Leadership, then resulting on this modified formula:

D x E x L x F > R

Therefore, we have four factors that push change and that are all strictly mandatory. If any factor is limited or scarce, then the final product will also be small and may not be enough to overcome the natural human R resistance to any change or leaving our comfort zone. These four factors are:

D: Dissatisfaction with the current situation. This leads us to first take a picture of our current starting situation, analyzing our assets, our advantages to take advantage of what we are strong in or have an advantage and then setting our priorities, with special focus on those areas where we are not competitive.

E: Improvement expectations. It is clear that technology dazzles us, but here it is about looking at what other cities have already achieved and what technology can

[285] DANNEMILLER, K. D. and JACOBS, R. W. "Changing the way organizations change: A revolution of common sense". *The Journal of Applied Behavioral Science*, 1992, pp.480–498

do for us. Set achievable expectations in gradual, realistic, approachable steps with our budget and our execution capacity.

L: Leadership. The Mayor's role is fundamental. Also, the CTO or SmartCity Strategy Director. They must push without fainting avoiding the many internal and external obstacles that they will surely face.

"*The factor that contributes to smart city success is the willingness of local leadership*."[286]

F: First steps. It is essential to achieve quick wins. They will show all stakeholders that the way to walk leads to an attainable goal and that these first results are promising. This will achieve additional endorsements and strengthen the strategy execution.

Major's Leadership. Role of CTO

A city is not only its mayor, but some mayors vision and leadership have been instrumental in addressing its city transformation. Some examples such as Mayor Azkuna in Bilbao, Mon-soon Park in Seoul, Trias in Barcelona, have led profound transformations in their cities. There is even a World Mayor Prize[287] that recognizes every two years the most transformative mayor and the one who has contributed most to all his city citizens, highlighting the inclusion facet.

It seems clear that a SmartCity requires a Smart Major[288]. A mayor who leads, who take risks, who bets and who wins, but also a mayor who listens, who always puts his citizens ahead of any other interest, who is able to travel around the world to promote his city, to make it relevant and attractive.

An excellent mayor who develops an excellent SmartCity should manage the city based on a solid and efficient governance. The transparent, effective, reliable and

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[286] COLLIER, C, "The One Factor That Determines If Your City Will Be A Smart City" *SmartCitiesConnect*, published by Aug 2019, http://smartcitiesconnect.org/the-one-factor-that-determines-if-your-city-will-be-a-smart-city/ retrieved by Aug 2019.

[287] "Honouring Outstanding mayors since 2004" *World Major*. http://worldmayor.com/ retrieved by Aug 2019

[288] "Smart city? Smart mayor!" *Smart City Hub*, published by May 2019 http://smartcityhub.com/governance-economy/smart-city-smart-mayor/ retrieved by Aug 2019

predictable government basic elements are the fundamental pillars of any strategy. On these pillars, you must develop a clear vision of the city, considering and integrating all stakeholders, always with citizens at the center of any initiative. You must have the courage to take risks and try experiments, especially those suggested by citizens. He must be open to public-private partnerships (PPP) with technology companies, use all those technologies that demonstrate value and profitability and lead those that have the greatest impact on his city main challenges. He must combine technology-based strategies with non-fundamentally technological ones, such as urban planning from a physical point of view and social services from a human point of view. And finally, he must be very pragmatic, quickly implementing what has been shown to add value and really works and immediately stopping what is not, without wasting time or hesitating.

But the mayor cannot devote the necessary time to this plan. Even those very technological mayors can't be leading this transformation. They need a Smartcity plan director. He must be an innovator and a great change manager. We can find them as CDO (Chief Digital Officer or Chief Data Officer), or CIO (Chief Innovation or Information Officer) or Smart City Manager. It is recommended that he is different from the CIO because the CIO is very much dedicated to technology as an internal tool that manages the city. Here we talk about going beyond that. A solid IT base is needed in the city and the infrastructure managed by the CIO will have to be integrated and exploited, but the SmartCity plan implies a city life transformation by the use of technology. Thus, the CDO or the SmartCity Manager must be a creator, an innovator, planner, strategist, a leader in change management, a city of the future visionary for each case. He needs an innovative mayor to bet and provide him with the needed budget, but above all, he needs from his major all trust and leadership. And the other way around, a transforming mayor needs this firm executing arm so that the impact is real, and they make the difference.

Any successful SmartCity plan should achieve excellence on four main areas[289]:

- Creating a smart city ecosystem

[289] "Smart cities and the promise of innovative public services". *BeeSmartCity*, published by Apr 2019, https://hub.beesmart.city/strategy/en/smart-government/smart-cities-and-the-promise-of-innovative-public-services retrieved by July 2019

- Planning, Priority Assessment
- Implementing a digital transformation based on those priorities and additional testing tools.
- Delivering measurable Quality-of-Life improvements

Creating a Smart City Ecosystem

For the United Cities and Local Governments association, the main actors working in a comprehensive SmartCity Plan are described in Figure 40.

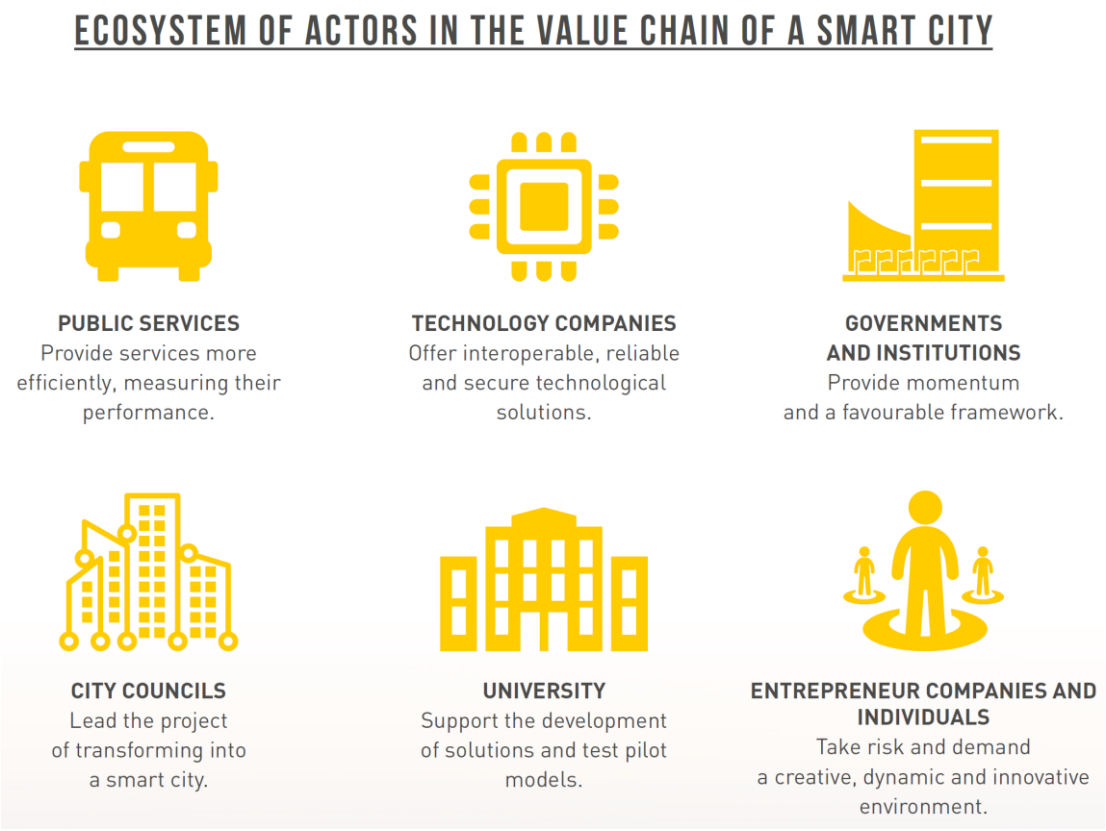

Figure 40. Factors that define a SmartCity by UCLG[290]

From the city hall at the center, Public services companies (especially those providing urban mobility) and other government institutions, especially those over the city like the county, region, metropolitan area or country are fundamental,

[290] "Factors that define a SmartCity" *UCLG* http://www.uclg-digitalcities.org/en/factors-that-define-a-smart-city/ retrieved by July 2019

mainly from the political support, economic stability and international context relationship. Universities, research institutes and local companies create the innovation approach by local people, nurturing local talent and fostering the quality employment creation. Large technology companies are crucial to provide the needed technology and enable the transformation. I would add some other main stakeholders. First, the citizens. Citizens as co-creators of SmartCity, providing inputs, ideas, desires, feedback and using the new projects to obtain the expected outcomes. Other actors to consider are Utilities companies (water, energy, waste management and recycling…). They are fundamental to achieve the sustainability objectives. Also, very relevant and gaining importance, I can find the construction companies and the urbanism revolution implementers. As we have studied, there is a brick&mortar transformation as well, and technology has a decisive role on that as well. And additionally, Telcos, with the incoming 5G play a significant role in the needed communication infrastructure.

Smart cities are not strictly public sector projects. To reach maximum impact, smart cities must be inclusive by the private sector. Same people are consumers or customers for the private sector and citizens for the public sector. With the same objective and respecting due transparency and independence, both forces ensure maximum use and impact of projects. At its richest moment in projects and initiatives, Barcelona obtained an additional 1.7 EUR from external financing (private sector, external institutions like European Union projects) for every 1 EUR invested by the city.

In figure 41 we can find the main technological solutions and initiatives providers in SmartCities. There are many more suppliers, but we can understand the variety of proposals from different sectors and areas that contribute to a comprehensive SmartCities plan.

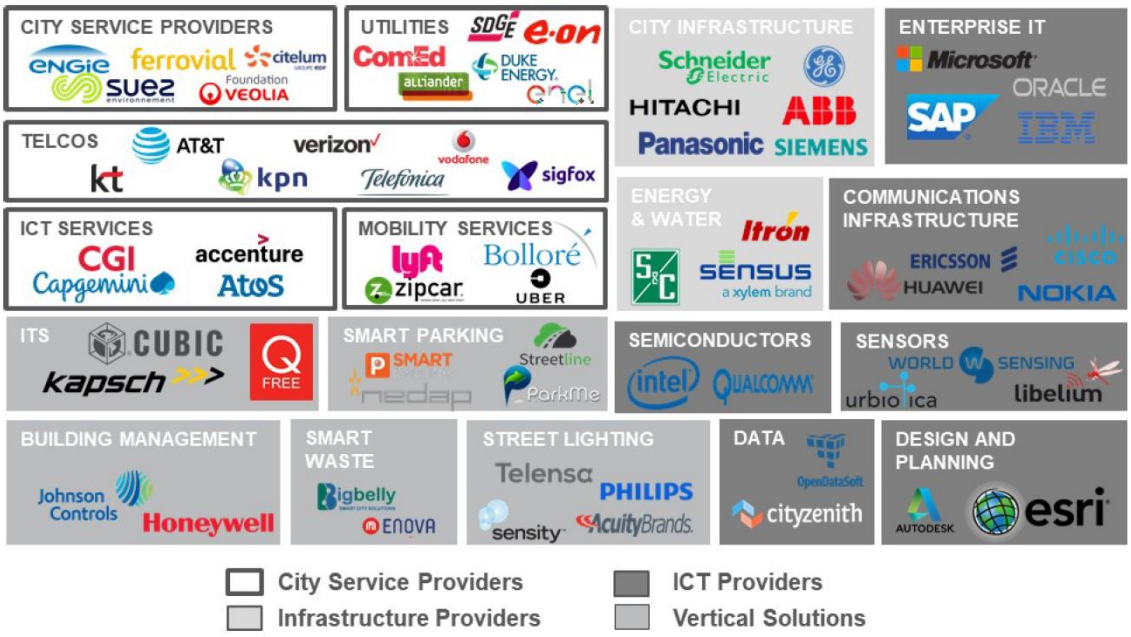

Figure 41. Smart City Supplier Ecosystem by Navigant[291]

To develop a SmartCity strategy it is not simply necessary to decide on a specific technology or a number of innovative projects in various areas. Many cities make this mistake and finally get a collage of disconnected and isolated systems that add little value. It is necessary to have an integrated data platform where all the used technologies are interconnected to simplify the use of all data sources, regardless the environment they come from and make all components work coordinately. From the point of view of actors and entities, this collaboration is also necessary to achieve maximum performance in a system as complex as a city. There are many entities that own relevant information about citizens. Apart from the city hall, other governments, utilities, telcos, health system, financial and banking systems, and many others have information that can be interesting to better know and understand the citizen and offer a more personalized and advanced service.

From the main technology providers perspective, the main American digital giants like Microsoft, Google, Amazon, IBM, Cisco are the most active players. Looking at mid-long term strategy, all American known as GAFAM (Google, Amazon, Facebook, Apple, Microsoft) plus the rising NATU (Netflix, AirBnB, Tesla and

[291] WOODS, E. & LAWRENCE, M. *Smart City Platforms* Navigant Research, Boulder, CO, US, 2018 p.14

Uber) are showing interest. We can't forget their Chinese counterparts (BATX: Baidu, Alibaba, Tencent, Xiaomi) and Huawei all massively investing on artificial intelligence and advanced technologies and clearly wanting to go beyond their Chinese/Asian market, to Europe and Africa. All should be considered as very active players in any wide Smartcity plan. Obviously, top consultant companies are paying attention as well. Main in this area are KPMG, EY, PWC, Accenture, Deloitte, CapGemini. A typical Plan has an Strategic Consultant as designer, a Technical Office to ensure all data and solutions integration, and a number of specialized best-in-class solutions for the different areas, all under the CDO / SmartCity Manager supervision. An extended plan includes other roles as Marketing, and a Program Manager for other actors integration, including all city suppliers and providers of physical infrastructure like buildings, roads, streets, bridges, public and private transportation, energy, water and environmental services, and communications (telcos).

Creating the technological ecosystem requires the development of partnerships with high-tech specialized startups, established large companies, universities and research institutes which offer the SmartCity projects needed skills and knowledge. This plan can also serve to nurture local technology entrepreneurship[292] – Universities clusters, which will create high quality employment. A good example of this ecosystem complexity can be found at the BeeSmartCity Solutions Database, which includes hundreds of services and solutions provided by public and private entities. [293]

So, we clearly have three groups of stakeholders in a comprehensive SmartCity Plan: City Leaders and other Government authorities, Private Entities and Citizens. Deloitte[294] proposes some orientations on main tasks and guidance for them to cope with the increasing complexity a massive SmartCity plan may englobe.

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[292] "Building and planning the citizen-centric SmartCity-part1", *Bee SmartCity*, published Jun 2018, https://hub.beesmart.city/strategy/building-planning-citizen-centric-smart-city-part-1 retrieved by Aug 2019

[293] Bee SmartCity https://www.beesmart.city/ retrieved by July 2019

[294] EGGERS, W.D. and SKOWRON, J. "Forces of change: SmartCities". *Deloitte Insights*, published March 2018, https://www2.deloitte.com/insights/us/en/focus/smart-city/overview.html retrieved by June 2019

City Leaders should prepare a Plan with a clear strategy, one which citizens can easily understand. In my opinion, this strategy must be linked to taking advantage of each city existing advantages and fit its citizens mind. These should buy-in that idea and make it their own. We can use as much technology as we need and be as ambitious as our capacity and budget reach, but we cannot ask citizens to lend their support to something they do not believe or with which they do not feel identified. Instead of an all-or-nothing plan as a monolithic project, create a set of smaller projects, but always over a unified integration basis so that everyone takes advantage of the rest and the sum is always bigger than the isolated parts. As we indicated in the change management process, 'quick wins' are essential to demonstrate that the chosen path is the right one and get endorsements. It's fundamental to establish a constant, progressive and convincing communication. This communication means transparency, commitment and leadership and must be on the political agenda and specially oriented to communicate progress and results. The private sector, companies, NGOs and nonprofits must seriously consider this revolution in the future of cities within their commercial actions, corporate social responsibility and other activities. The most open and innovative cities are seriously using PPP (Public Private Partnerships) agreements. In addition to the noble purpose of selling solutions and services, large companies have the capacity to invest in certain corporate social responsibility programs, where very relevant issues for cities such as sustainability, carbon neutral, equality, ethics in AI, etc. can align investments with cities. On the other hand, by observing the required ethical and GDPR standards, cities can accept certain concessions to commercial companies in exchange of technology investments. It is about a responsible balancing between commercial and public objectives.

Citizens must assume a proactive role as city, its initiatives and future strategies as a smart city co-creators.

They must be aware of the change that is taking place and they must be vocal, ask and be heard. They should use the new technologies with trust, but also with responsibility and with some basic training, to preserve their security and identity / privacy. They must know that central role they are going to take and they must think about what the city does for them and what they can do for their city, in a non-explicit collaboration agreement. In the plan development they should be asked for

suggestions and ideas, but above all, what's crucial for the plan success is their participation and use of the new tools that are going to be designed for them.

Planning. Priorities Assessment.

There are several SmartCity planning models. We will describe the most common for new cities, or cities built from scratch as an example and symbol of modernity for their countries. For those that are not new, but are trying to improve existing cities, then the model is more complex, slow and restrictive, but at the same time, it has the greatest impact on the cities where citizens live now…On the other hand, one of main problems from cities built from scratch is how to fill them with people, avoiding the 'Ghost City' fatal destiny.

We will also see what main topics to consider when planning a SmartCity and how to discover what our priorities should be.

The new innovative and futuristic Smartcities built from scratch respond to a top-down voluntarism model. Fundamentally, country leaders have decided to build these cities for several reasons: project an external modernity image, retain talent, develop and export experience in Smartcities technology, develop or improve a depressed area, etc.

There are two sub-models according to who is finally investing, whether the state with public money or the private sector. In the totalitarian political regimes, we can find this Dirigiste model where a criterion is set and projected down in a pyramidal way. Its advantage is the innovation implementation speed, and as a disadvantage, the lack of flexibility and reflection of social needs, which in many cases gives rise to a modern 'ghost town' that has failed to be attractive even to same country citizens. There are variants of this model depending on how much prescriptive they are. There are many examples in Asia, the Middle East and some in Africa. China is the typical example of large-scale authoritarian voluntarism, with numerous cities developed as well, along with the support of local companies like Alibaba, Baidu and Huawei.

The Neom project in Saudi Arabia is also a leader and voluntarism, with an estimated investment of $500b in 30 years. The ambition is to compete with Dubai, which owns the technological leadership in the Gulf, although it must have its sights

set on not repeating the mistakes of failed Masdar (Abu Dhabi). The new project management (by mostly 2010's Barcelona former successful directors) is combining investment directed from the Saudi Kingdom with the investment from technology companies, providing additional flexibility and attractiveness. Morocco is also an example of Royal voluntarism with the Tangiers and Zenata projects. Here, apart from projecting the image of a modern country, the intention is to create poles of attraction for the enormous population development that Africa will experience in the coming years, doubling the urban population until 2030. In this same line, African projects are framed from Diamniadio (Senegal), Yabacon Valley - Lagos (Nigeria), to Benin, e-Madina - Casablanca (Morocco), and Konza (Kenya)-Nairobi's twin.

The intermediate example between top-down planed city, but which did not start from scratch is Singapore, with its successful 'Smart Nation' model. The Indian approach is different. Although there is a leading country intention to plan 100 new SmartCities, each state has its financial autonomy and have been looking for various private funding models. An example of the Indian model is Amaravati (new capital of Andhra Pradesh state), designed from scratch in both its location and urban planning.

The second non-authoritarian voluntarism model is based on private financing. In this case, certain companies want to invest in a new SmartCity as an experiment, laboratory and commercial reference / showcase. It is a fully supported-by-the-authorities commercial strategy, radical examples of PPP (Public-Private-Partnership). There are many examples of such cities. To highlight the most spectacular, we can mention Songdo in South Korea, with a total investment of about $ 40b from several real estate investment companies. Songdo has everything, but inhabitants[295], becoming the most expensive 'Ghost town' in the world. The authorities are integrating it into the Seoul metropolitan area with incentives as a free economy zone to make it more attractive. Google is investing on his own flagship SmartCity project at Quayside smart district in Toronto (Canada), Panasonic leads the CityNOW project in the Denver (US) area as an extension of

[295] LOBO, R. "Could Songdo be the world's smartest city?" *World Finance*, published by Jan 2014, https://www.worldfinance.com/inward-investment/could-songdo-be-the-worlds-smartest-city retrieved by June 2019

its successful project in Fujisawa (near Tokyo in Japan), Yarrabend, a suburb of Melbourne (Australia) is Tesla's testing ground.

For most existing cities that adopt the concept of SmartCity and where the state-directed planning model does not apply, or at least it is very restricted because laws and regulations apply, or there is opposition and political control and the voice of citizens individually or organized in associations is heard, we speak of a regulated democratic model. The investment in SmartCity must observe the limitations imposed by democratic audits, transparency and control. Innovation adoption is slower, more gradual and has a much greater weight placed on the social, educational and citizen integration areas. This is the model of modernization that works in the western world, where in addition, it must take into account the history, old urban centers with obsolete infrastructures, in contrast to a population that especially appreciates their culture and their lifestyle. These audits and investment control are slowing the speed of SmartCity projects deployment. In Paul McAuliffe's (Dublin's Lord Major) words at Barcelona's SmartCityExpo, Nov, 2019, "*Procurement is killing SmartCity*", explaining how much painful it is to run thru all needed audits, open tenders, investment justifications and transparency, stalling the necessary innovation process.

For a good SmartCity strategy planning, it is necessary not only the mayor's leadership and the vision from a CTO. We must have information, make a good situation, risk analysis, and assess our execution capabilities. We cannot venture to announce such an important plan without having all the information and stakeholders aligned. Nor should we reach paralysis because of analysis. Without hurry, but without pause, we must get going. The rest of the cities in the world compete to attract our talents. Let's look at the main issues to consider.

Opportunities and Alternatives Assessment

Most of the times our cities face the '3D' blocked state. They feel disoriented, distrustful, and disconcerted. Disconcerted by the huge amount of available possibilities, solutions and alternatives. The offer is huge, and it is difficult to choose the best for each SmartCity area. Distrustful because they receive many promises and have seen many deployment failures in cities with a lot of disintegrated scattered solutions that do not deliver the expected value and generate

more maintenance costs than expected. There are large suppliers with strong proposals, but also demanding strong medium-long term commitment or 'lockdown'. There are small, agile and innovative suppliers, but with little muscle in tackling large projects. It is clear that none can deliver everything by itself. It's also clear that every solution needs to work in sync on an integrated platform. Disoriented by the large number of inputs they receive and the difficulty of aligning them with the real city priorities, the CTO vision and the political agenda.

The CTO must combine its vision with the potential solutions identification and selection. There are multiple sources of ideas and opportunities to explore:

- Citizens, Surveys, feedback, crowd proposals, civic technology trials.
- From Technology. Companies. Events. Hackathons. Entrepreneurs, innovation labs, University research.
- Regulations to be complied with: GDPR (Data Protection Regulation in EU) and other similar, Policies, Privacy, Security.
- Prize contests. External (like EU Horizon2020) grants for certain SmartCity areas. You can apply, but you must use the funding for what's defined in the call, so better to choose those that fit your strategy, or the other way, adapt your strategy to what the EU Commission is prioritizing.
- Ideas Exchange with other cities. Don't hesitate to look and copy, replicate and mainly, learn from others. But be careful, as everybody shows what shines not what hurts…
- Urgent threats impacting quality of life: Human or Natural potential disasters. Public health, safety, environmental emergencies…
- Disruptive external forces and challenges described in Chapter 1.

<u>Understanding who are your Citizens. Social Marketing.</u>

You need to provide high quality services to all your citizens. But not all your citizens are equal or demand same services. Some cities are just digitizing existing generic services in a one-size-fits-all strategy. While this could be a first step, it neglects the unique needs from your very different citizens segments. On the other extreme, you should be careful to develop very specific advanced services that only few 'hyper-smart' citizens can consume. Watch as example what the private sector is offering, specially the most advanced on customer service: retailers and banks.

Citizens expect the same high-quality digital services they enjoy from those private companies. So, you should design advanced services for all, respecting all their diversity and differences. If you had to pay some special attention to one particular segment, then I would propose two: elder and millennials. Elder people because their special needs and massive future use of digital services (as explained in chapter 1) and millennials, because they include a large share of talented citizens you want to retain and attract.[296]

But I can find very good news here. You already own massive data about your citizens, so, please, use them, and transform them into insights and knowledge. Social Analytics tools can help you on that process. You should be the best on knowing your citizens and this is a clear advantage. Even more, it's expected that you can use that data to identify and proactively offer the services they need. '*Knowing what we know about you, we proactively offer this service because we firmly believe this could be your next logical demanded service'* – imagine you could say that, same way as retail sector leaders do with our data as consumers. Every citizen needs public services according to his current life fact. So, if we know you have just had a baby, or want to get married, or have just moved to town, or are looking for a job, or have just reached the age of 18...then we can proactively offer you all services you need because of that particular life fact, or better, all links to all those services regardless which entity (local, regional/state, national, international) must provide them to you, in other words, putting ourselves on citizen's shoes.[297] And more, you can seed, nurture, grow and enrich that knowledge (data mining) by using the right tools (apart from data Analytics) like social networks, civic engagement and all other participation ways like surveys, feedback or opinion tools, market research, panels, etc. That way you will use all available data (structured or traditional and unstructured or from posted text on all kind of social tools).

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[296] BOBMAN, M.C. "Effects of Smart City Infrastructure on Millennials" *Arizona State University Digital Repository,* Published May 2015. https://repository.asu.edu/items/28740 retrieved by Aug 2018

[297] MEURIS, F and NOELS, B. *Customer Insight Profiling and Service Design Guide. SmartCities*. EU. The Interreg IVB North Sea Region Programme published by Edinburgh Napier University 2013, Edinburgh, UK p.17

Dynamic and Agile Smart City Planning

The SmartCity strategic plan must be live, dynamic and agile. It must be able to establish the fundamental elements to build trust: Discuss how the projects and services that it includes will improve the quality of life, city sustainability and governance; how the city will guarantee the needed resources to carry it out; estimate benefits, costs and risks and identify contingency measures in case of disruptions or unexpected problems. It must set specific deadlines, but it must be constantly evolving to the citizens constantly changing needs, and above all, to the emergence of new disruptive technologies, which will have an exponential / viral adoption. It must be a combination of solid strategies with clear paths, but with the ability to self-adapt and manage the ambiguity derived from the speed with which society and technology are changing.

Innovation Capacity and Skills

Cities need human capital: capacity and culture of innovation and knowledge to develop the plan. [298]

They must ensure that they have the necessary innovation capacity, both from a technical point of view (either to implement by themselves or to know how to manage and assess market proposals), as well as from a political and from an internal management point of view, to be able to carry out the desired project overcoming internal and external barriers, always under strict compliance with established regulations. Many projects fail due to the lack of minimum technical skills (many cities are hiring Data Scientists), lack of leadership and political management, or lack of internal agility to make the projects start and develop without stops or blockages (a 'champion' is necessary to move through the administration complicated corridors, and a good communicator that marks the external milestones).

Officials dedicated to this plan must have an innovative culture, exploring alternatives, experimenting, constantly learning and creating new services, with

[298] GREENBERG, S. "Using Innovation and Technology to Improve City Services", University of Texas at Austin, US, 2015. *IBM Center for The Business of Government*. pp.30-36. Also as http://www.businessofgovernment.org/sites/default/files/Using%20Innovation%20and%20Technology%20to%20Improve%20City%20Services.pdf retrieved by Oct 2019

enthusiasm, always from their knowledge of the local culture, needs and possibilities.

Partnering and Collaborating with others

According to the World Economic Forum[299], cities must maximize collaboration with various entities and the co-creation of public services through:

• Stimulate citizen participation in all areas of the city, both from the citizen as an activist and from the city, proactively proposing activities and services.

• Partner with universities, research institutes and non-profit organizations, provided they help and collaborate in improving the city, the employability of citizens and innovation.

• Encourage companies and local entrepreneurs to invest in the improvement of urban services. Encourage PPP (Public-Private Partnership) agreements, always from transparency, equality and fair competition principles.

• Share adequate information (OpenData) and other physical assets such as spaces, etc. with local companies and entrepreneurs whenever this means attracting investment and talent to the city.

• Actively participate in regional, national and international smart city programs. These programs (such as EU H2020) require collaboration between cities from different countries, to ensure that the achieved objectives are replicable across the EU.

Cities can share goods, spaces, buildings, services, data and even residents, all with the purpose to improve the city quality of live and wealth and under a noble global competition for talent.

If citizens are sharing a long list of things and creating multiple new business models because of that sharing, cities should follow the example.

See in figure 42 the many ways people share things in the modern global online 'sharing economy'. [300]

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[299] "Collaboration in Cities: From Sharing to 'Sharing Economy' *", World Economic Forum*, published Dec 2017, p.12. Also http://www3.weforum.org/docs/White_Paper_Collaboration_in_Cities_report_2017.pdf retrieved by Oct2019

[300] Ibid. p.11

Figure 42. Some of the key sectors of the sharing economy. Source – Adapted from Ricart & Berrone (2017) with icons sourced from 'The Noun Project' and logos from respective company websites. WEF. Collaboration in Cities: From Sharing to 'Sharing Economy'

The smart city strategy focuses on the citizen, and over this basis it offers a neutral collaborative range where citizens, other governments, industries, investors, entrepreneurs, universities, and NGOs participate.

Implementing a Digital Transformation

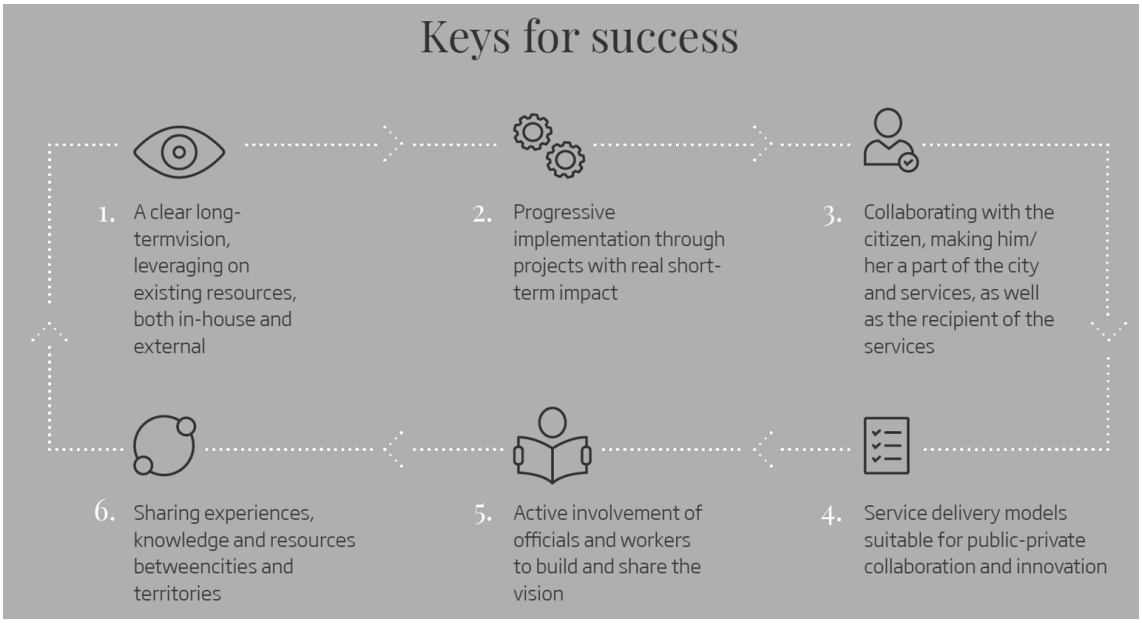

Figure 43. Minsait/Indra's keys for a successful SmartCity Digital Transformation.

Minsait/Indra[301] describes the SmartCity implementation process as a full digital transformation, from planning to execution involving all stakeholders and finally, sharing the experiences, learning and applying the feedback again to improve the process, so a virtuous continuous cycle.

A successful innovation project in SmartCity services is basically a process of digital transformation. It is a long, iterative, complex process. Some researchers point to about a 70% failure.[302] I find it too pessimistic, although I agree that expectations always exceed the achieved facts. On the other hand, minor or partial objectives are always achieved and the basic question is: it is a non-optional

[301] GONZALEZ SAN ROMAN, M.A., SARMIENTO, D. "The Digital City at the Service of the 21st Century Citizen*"*. *Minsait/Indra* 2019, p.61 https://www.minsait.com/en/news/insights/digital-city-service-21st-century-citizen retrieved by Jan2020

[302] BENDOR-SAMUEL, P. "Where Most Companies Go Wrong In Digital Transformation" *FORBES*, 2018 https://www.forbes.com/sites/peterbendorsamuel/2018/07/18/where-most-companies-go-wrong-in-digital-transformation/#7bf1817d6884 , retrieved by Sep 2019

process, immobility is a guarantee of failure and ruin for the city. BCG states that cities "*must face digital transformation as a business, review the digital route of public services from start to finish and eliminate all mandatory paper forms, phone calls and non-digital interactions*"[303]. It is about copying from the most advanced sectors such as retail, applying social marketing concepts and taking full advantage of technology possibilities. All this by translating the concept of customer into citizen, which means: forget about the ROI and focus on the quality of the service, its real use and associated cost; and obsessively apply respect for the identity, security and privacy of the citizens data.

An innovative project in SmartCity does not imply that it is necessary to take risks, apply a radical renovation or design of high-risk services. The reasonable approach is to find proven solutions[304] to try, experiment with models and pilot projects, all with the understanding that our city is unique and so are our needs, although surely applying the best from other cities implementations will very well match what we want. Run away from 'custom' projects. It is a last century concept, it simply does not scale, it is expensive and has an unattainable maintenance. There are many examples of solution catalogs. To name one, the German organization BeeSmartCity[305] is the global leader and includes hundreds of them to cover all areas. ESI-ThoughtLAB describes the SmartCities investment roadmap as a decisive investment with solid steps, planning from citizens needs, leveraging the best assess we hold: our citizens and city data, working always under the strict compliance and security rules, leveraging and adopting the innovation as soon as it is commercially available, affordable and proven, preparing our infrastructure (fiber-wiring the city, 5G,…), partner with Industry and significantly invest. See figure 44. A SmartCities process begins with planning, political leadership and coordination of all the actors that will contribute to it. It is necessary to assess

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[303] MOURTADA, R. et al "How to Supercharge Your National Digital Transformation" *Boston Consulting Group,* 2018, https://www.bcg.com/publications/2018/how-supercharge-your-national-digital-transformation.aspx?linkId=55243049&redir=true , retrieved by Sep2019

[304] EAVES, D. and MCGUIRE, B. "The Fast-Follower Strategy for Technology in Government", *GOVERNING*, 2018, http://www.governing.com/blogs/bfc/col-fast-follower-strategy-technology-government.html, retrieved by Sep2019

[305] BEESMARTCITY https://www.beesmart.city/ retrieved by July 2019

existing resources (both human and technical), available budgets and manage expectations.

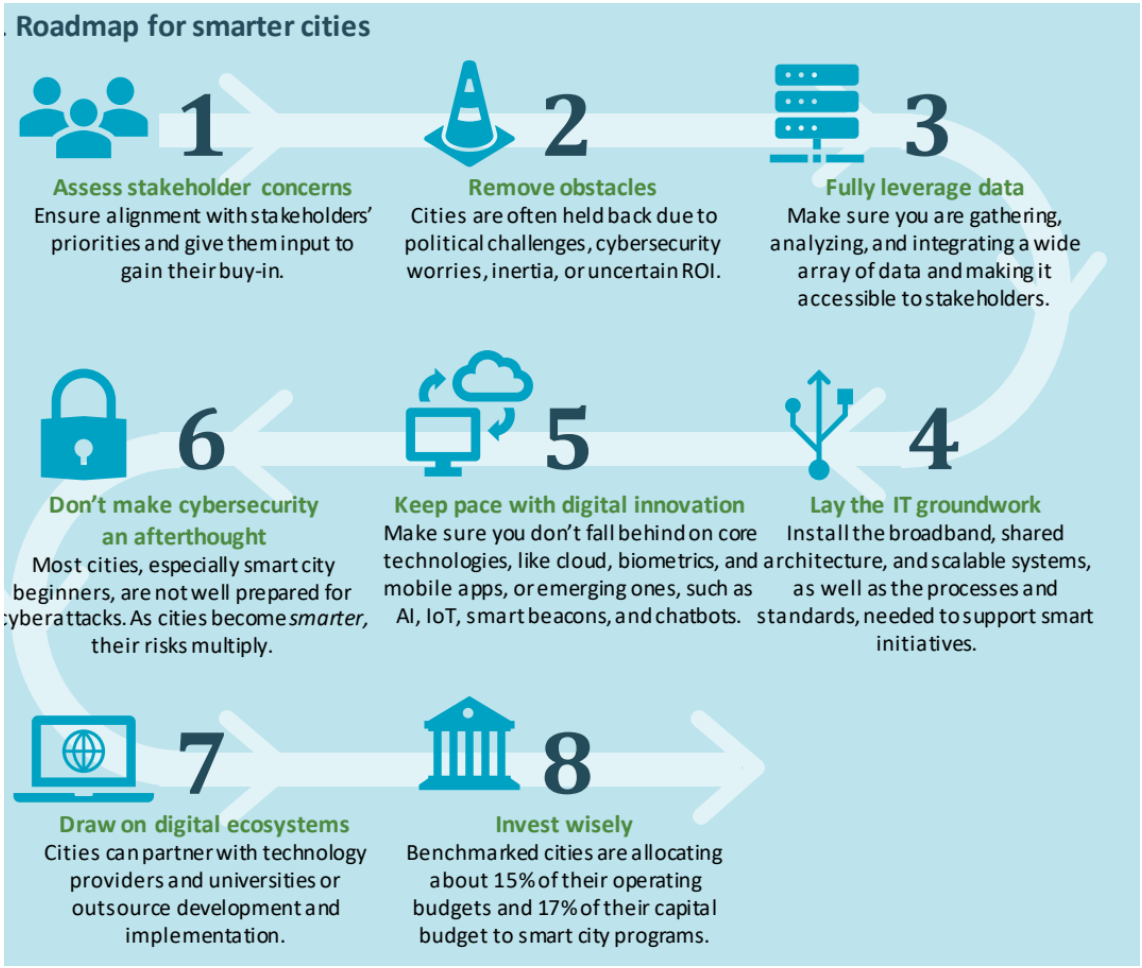

Figure 44. Roadmap for Smarter Cities. ESI-ThoughtLAB [306]

The starting situation, the objective or target, the indicators that will validate the progress achieved must be defined. Then you have to look at the market, the previous experience from other cities, the expectations of external grants and begin to test, assess and evaluate alternatives. Always better to buy existing and proven technologies than to develop ad-hoc solutions. A city is not a software / hardware development laboratory, but it needs software and hardware to achieve its SmartCity goals. The implementation must be constant, agile and adaptive, taking into account the parallel development and evolution of the necessary technologies,

[306] "Smarter Cities 2025 Building a sustainable business and financing plan". *ESI-ThoughtLAB*, 2018, p.8, also https://econsultsolutions.com/wp-content/uploads/2018/11/ESI-ThoughtLab_Cities_2025_Whitepaper_FINAL.pdf.pdf retrieved by Oct 2019

incorporating them when possible. It is about taking advantage of everything already done that is commercially available and affordable, without reinventing the wheel or taking on costly developments. We are unique and different, but not so much…, surely, we'll find elements that give us much more than we need. The process must begin as a pilot, and as soon as its benefits are appreciated, spread it throughout the city, and prepare to continue evolving. There is no use installing 18,000 sensors if half are unusable in a year and there is no continuity, improvement and maintenance plan. Important is to pay for what is needed. We need data, not sensors; results, not computers; availability of information, not storage disks; Intelligence, not algorithms. Decide your investments towards Pay-as-you-use solutions, or what is the same, pay for what you use. Here, SaaS, PaaS and Cloud solutions in general demonstrate a tremendous advantage. A typical SmartCity project (in terms of sensors, or IoT devices along with the rest of the city information) starts with the collection of data from the sensors, adding the information we already have from citizens (taxes, properties, utilities, health, identity, ...), and summing up the citizen sentiment reflected in social networks in real time. With this massive amount of information, we feed a complete, predictive, real-time and historical analysis system, determining alerts and behaviors or patterns, providing knowledge about the current state of the city and applying artificial intelligence algorithms that generate a city model, which allows us to understand our city, how it behaves now and how it will behave in the future or facing certain unexpected situations. With this knowledge, directors can make informed decisions and with a solid intelligence base. These decisions should be communicated and shared with the population, to justify investments and improve citizen benefits. It must be proposed, communicate the benefits, seek the collaboration of the citizen, making them part of the solution, co-creators of it, not only passive receivers. We must provoke the solutions propagation virality. Based on the actual use of the proposed solutions and the feedback obtained, model improvements and evolutions are proposed. Public-private collaboration is not only welcome but necessary, as it provides financing and reality to the investment, fitting in with the real citizens needs and taking advantage of the natural connection mechanisms established by the companies. We must communicate externally, share with the rest of the world and learn from the leading cities in each area, all in a fairy

competition for talent. The international strengthening and awareness of our city will position it as an attractive and innovative place for the rest of the world.

Citylab Model: Try, test, experiment

In the strategy implementation, a wide range of possible alternatives are available. All Smartcities need to test new solutions, and solution providers need to test their solutions. We can identify three models of 'CityLabs'. The most widely available, easy and useful is the 'DataCityLab', where we are testing different proposals and solutions with the City Data. Second is reaching further and extend the testing from just data to a real solution (or full strategy plans) implementation in physical real spaces or neighborhoods 'LivingLab'. Third approach is reaching the extreme where a new full city is developed 'from scratch' to serve different purposes, but mainly to validate a strategy 'NewCityLab'.

Cities need to test different solutions from the market, run what-if scenarios, test the internal applications development and encourage the creation of a local ecosystem of start-ups working with Universities to settle up new businesses, create jobs and nurture talent, all developing new SmartCity solutions. And they all need real data to test and tune those apps. So, the city is offering a dataset (a snapshot photo of city data) to test those solutions. Ideal way to make this happen is to use a Cloud environment and protect it with a kind of gatekeeper professional that guarantees the correct use of resources, data, security, privacy and reliability. This is the concept of 'DataCityLab'. Linked to it, most cities are exposing aggregated and non-personal-identifiable data to all external stakeholders (OpenData environments).

And many cities have gone beyond that point, not only experimenting with data, but with real city areas, neighborhoods, districts testing the applicability of newest technologies, assessing their impact, measuring the benefits before deploying them massively to the whole city. As one can imagine, many technology providers have found this approach very attractive to test a brilliant solution and obtain a remarkable reference (the city) as example or case study to justify the expected benefits to the rest of potential customers. But at the very beginning, this real 'LivingLab' testing started from the academic sector. The growing number of SmartCity LivingLabs is causing turmoil in the urban modernization market. Initially, these test environments were led by laboratories or university and

scientific research units that develop technological solutions to test them in real-life situations; but now, more and more, new projects are observed in districts, or small satellite cities within a large urban area, financed through private initiatives or as public-private partnerships (with the private sector as the main investor).

Those who promote this concept present them as laboratories in real-life conditions; but they are also, above all, showcases, cities similar to the pilot floors produced by real estate developers, models that verify that the strategies and solutions are correct and that seek replicability (to be sold and reproduced). In the years 2000-2010 several innovative cities such as Barcelona came to have more than 100 live projects in the city testing various technologies. The condition was: 'test what you want, but leave it installed. If you prove its value, we will evaluate using it for the entire city.' The city reached a ratio of external investment of 1:1,7 or making 1,7 additional external from every internal euro.

In the European Union, the European Network of Living Labs (ENoLL)[307] was created in 2006, with the objective of promoting collaborative developments between cities, research laboratories and the co-creation with private companies and citizens. Living Labs try to serve the citizen and place him at the center of every innovation, and promote the use of all the capacities offered by new technologies to match the specific needs and aspirations from local environments and cultures, and leverage the different creativity patterns and potentials. ENoLL has identified 5 core components that should be present in any Living Lab: 1) active citizen involvement; 2) clear real-life setting; 3) multi actors/stakeholder participation; 4) combined methodologies approach and 5) co-creation of new city solutions, innovation initiatives. So, ENoLL supports the citizen-centric and citizen-driven research, development and innovation.

In US, the concept of a living laboratory was later released by the Massachusetts Institute of Technology (MIT), which opened its first living laboratory in 2010. The objective was to ground-touching develop new technologies (autonomous vehicles, advanced IoT) in an open all-welcome, public-private environment, and also the city as an end user and its inhabitants. Many American university campuses have used the concept of living laboratories to test the practical use of technology

[307] European Network of Living Labs. https://enoll.org/ retrieved by Jan 2019

solutions, such as The Big Data Living Lab at MIT in Boston, Urban Labs in Chicago (Social projects like job-seekers and Energy Optimization for low-income households), full University connectivity for students at Nebraska (with kiosks at the smart campus), driverless cooperative advanced traffic network at University of Wisconsin, or smart metering for anything on IoT at University of Washington at Seattle. International cooperation is also fostered between living labs like *Copenhagen Solutions Lab* (Denmark) and Queensland University of Technology in Brisbane (Australia) on parking space management.

But the best known LivingLab including the city as a whole is Singapore, the most advanced smart solutions 'test-bed'. The Asian tiger city-state is the main flagship for this strategy. For business reasons and international awareness, the city is projected as a model of SmartCity, SmartTerritory or SmartCountry, landing over an exceptional " *highly connected and wired up island"* (Prime Minister Lee Hsieng Loonen in 2014).

Many other cities are developing the concept in association to a private company, as explained before. Another example could be Denver, Colorado, with the *Colorado Open Lab,* focused on IoT, in association to the specialized company Arrow Electronics.

Now, starting the 2020's we can say they all innovative cities in the world have already settled up or are in the process to build a LivingLab matching the local advantages, Universities specialization, companies investment focus or political reasons.

For those countries with Dirigiste organization, the best, most agile and fastest way to endorse this movement is to create a NewCity LivingLab. Examples are Chinese Chengdu Great City satellite district (2012, completely car-free city for 80.000 inh, now still in development and running the risk to become another ghost city; Songdo City (South Korea), a new from scratch Seoul satellite city claimed as the city of the future; Saudi's Neom huge project aiming to create the post-oil economy for the region, attracting the best investors and brains from around the world; nearby, Abu Dhabi's Masdar City started by 2006 and was used as technology laboratory for sustainable and renewable energies, although not attracting residents as expected.

This exercise reaches its culmination in the development of an ideal, theoretically created, designed and implemented city on a 3D model by a laboratory of experts,

without any inheritance to keep, without a past, without limitations imposed by history, customs or local culture , like a new colonization on a new planet.
This absolute freedom is a dream for private promoters building a new cyber city, from scratch, both physically and materially as well as culturally and sociologically, to attract relevant, talented, but elitist populations. A theoretical, gentrified city ... which normally ends up being a ghost town. They forget that the elites have enough wealth to choose where they want to live and even build their homes with the most advanced technology, while the less rich classes simply cannot afford to live in that so advanced and so expensive new city. In any case, these experiments have stimulated and encouraged the 'from scratch' trend: a new concept of urban modernization, developing new urban spaces from scratch, even if they are limited spaces, but creating only in the physical side, never in the human one, always integrating with the population we want to serve. Transforming an old and populated city is much more complicated and expensive, so why not at least to dream of building a new ex-novo district?

Measure SmartCities Benefits

Before measuring the impact for you project, it's important to define the target: definition and size of who are you targeting, especially considering specific segments of your population and also external kind of people that you would like to attract. All benefits should respond to clear outcomes and better if they are expressed by figures (we want to improve this topic or indicator from A to B in this period of time, savings, service improvement, extra revenues on some specific areas, cost reduction, time savings for citizens, etc).
Benefits should be calculated as a combination of impact and real usage. If we look back to figure 39, then we can observe that services must improve but citizens should use them to realize that improvement. It's a waste of resources to improve the quality of a service that nobody or few people uses, and in the other hand, a little and easy improvement if massively used, brings incredible benefits. In the EU, the European Innovation Partnership on Smart Cities and Communities (EIP-SCC) fosters participant cities to work in collaborative projects to demonstrate how new technology solutions and innovative processes transform current urban environments into smarter and more liveable places. BeeSmartCity categorizes the

benefits in 6 areas[308] (Cost Savings, Environmental Impact, Efficiency Gains, Connectivity, Quality of Life, Economic Prosperity) and I would add a seventh one: Awareness/overall Attractiveness Reference.

As a source for inspiration, this Data-SmartCity Solutions[309] catalog proposes more than 200 solutions available in US, sorted by these expected outcome: Accountability, Awareness, Civic Engagement, Effectiveness, Efficiency, Social Justice/Equity, Systemic Change and Transparency.

ESI ThoughtLab[310] has recently conducted a 100 world cities study and feedback on measurable and significant improvements is notorious: Citizen satisfaction improvement due to smart mobility is noted by 38% of cities, while 32% associate it to productivity and city service delivery time. Impact on health due to smart environmental and energy initiatives is recognized by 45% of the cities, 44% experience pollution reduction and 43% are controlling energy prizes.

Cost Savings

In a world with around US$4 trillion public debt, it is relaxing to know that instead of increasing taxes, Governments have alternatives: a white paper published by ABI Research[311] pointed that SmartCity technologies could save over US$5 trillion/ year by 2022. City of Barcelona published by 2014 some clear tangible savings because of SmartCity technologies: €75m from IoT smart water, lighting, and more, €36m due to smartparking fee increases and creation of 47.000 jobs for the city.[312]

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[308] "The 6 Key Benefits of Transforming a Municipality into a Smart City", *BeeSmartCity*, 2018 https://hub.beesmart.city/strategy/en/6-key-benefits-of-becoming-a-smart-city retrieved by Oct2019

[309] "DATA-SMART CITY SOLUTIONS, ASH CENTER", *HarvardKennedy School*, 2017 https://datasmart.ash.harvard.edu/civic-analytics-network/solutions-search retrieved by Nov2019

[310] "Building a Hyperconnected City. Improved public safety, health, business productivity, and economic growth are just some of the benefits", *ESI ThoughtLab*. published Oct, 2019 https://econsultsolutions.com/esi-thoughtlab-study-reveals-measurable-roi-on-smart-city-investments/ retrieved by Nov2019

[311] ISMAIL, N. "Smart cities could lead to cost savings of $5 trillion – report suggest" *INFORMATION AGE*, 2017 https://www.information-age.com/smart-cities-lead-cost-savings-5-trillion-123469863/ retrieved by Oct 2019

[312] "The Impact of Internet of Everything on Barcelona". *CISCO* 2014 https://www.cisco.com/assets/global/ES/tomorrow-starts-here/Barcelona_Jurisdiction_Profile_final.pdf and http://www.youtube.com/watch?v=p34YUzCyz0A retrieved by Jan2019

Environmental Impact

Most cities are installing sensors to measure air quality, sound levels, temperature, water levels, traffic. Most advanced cities have a plan to become Carbon Neutral or significantly reduce the carbon emissions, as explained in chapter 1.5. Barcelona has a plan to combat pollution by reducing traffic by 21% and ban cars from 60% of the city streets. Antwerp and Malaga have very creative technologies in place to measure air quality by placing sensors on the postal services vehicles. New technologies like smart windows on buildings aim to save up to 26% on cooling and 67% on lighting.[313]

All initiatives on Circular City explained on chapter 1.5 are also clearly impacting environmental care.

Efficiency Gains

Cities also use technologies, and specifically IoT to optimize the management of scarce and expensive resources, such as water and energy. The results of the main smart cities in the world are very good. Some cities have seen approximately 50-60% in energy savings by taking advantage of LED-based smart street lights, while others have been able to reduce water leaks in the supply network by 20%, saving between 25-80 liters of water per person per day. Optimized traffic flow in some areas is helping citizens save between 15 and 30 minutes a day, reducing traffic congestion by 30%, resulting in a 10-15% reduction in emissions. Up to a 66% reduction in the waste management operational costs has also been observed due to the frequency optimization of garbage smart collection based on the garbage dumps used capacity. Intel (Juniper Research) estimates that smart city initiatives could save every citizen about 125 hours/year, mostly due to traffic and congestion reductions: up to 60 hours annually.[314] Carlo Ratti, Director of MIT Senseable Lab,

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[313] TRACY, P. "Smart building technology helps reduce energy costs". *RCRWirelessNews* 2016, https://www.rcrwireless.com/20160725/business/energy-costs-smart-building-tag31-tag99 retrieved by Aug 2019

[314] NHEDE, N. "Smart cities technologies to save citizens 125 hours", *SMART ENERGY INTERNATIONAL,* 2018, https://www.smart-energy.com/industry-sectors/iot/smart-cities-intel-juniper/ retrieved by Feb 2019

noted, "*cars are idle 95% of time, meaning that every shared car could effectively replace between 10-30 private cars*"[315]

Connectivity

As explained in Chapter 1.3, Internet access, good bandwidth is becoming a vital resource for the city's economic growth. But, the European Commission reported in 2017 that an estimated 44% of EU citizens do not have basic digital skills[316], and 15% do not have access to the Internet.[317] As people become more aware of the value of technology, they grow in their expectations that the public sector will facilitate a more digital and interactive society that will provide them with better services by adding value. The digital divide acts as a barrier to smart city access for some citizens. Due to the digital divide, citizens without sufficient access to smart devices, broadband networks, wireless connectivity and other technologies (such as the emerging 5G) derive less benefits from the improvements in the quality of life generated by digital solutions. But the digital divide should not be confused with digital inequality. The sociologist Stefano de Marco explains that the digital divide makes the difference between those who have access to the Internet and those who do not, while the digital inequality is related to the Internet use and is very much linked to the lack of skills.[318] Digital inequality means that a subset of the online population does not take advantage of electronic services such as shopping, tele-learning, electronic health, telecommuting or Mobility as a Service, e-government, mobile banking, travel planning, etc. Local governments need to develop smart city solutions that continue to narrow the digital divide and the digital equality gap while improving the quality of life. Connectivity between citizens and governments is also more fluid in the smart city, where 'Fix my City'-like feedback or reporting applications allow citizens to report incidents and problems through their

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[315] "SmartCircle", *SmartCity International*, 2015, https://www.smart-energy.com/industry-sectors/iot/smart-cities-intel-juniper/ retrieved by Feb2019

[316] EU - EPALE Electronic Platform for Adult Learning in Europe https://ec.europa.eu/epale/en/content/nearly-half-europeans-dont-have-basic-digital-skills, retrieved by Aug2019

[317] CARMONA, M.J. "What will it take to close the digital divide?" *EQUALTIMES*, 2019 https://www.equaltimes.org/what-will-it-take-to-close-the#.Xg9TjnOSkvj retrieved by Nov2019

[318] Ibid

smartphones, and civic forums like "*Better Rekjavik*" or "*DigiTel*" in Tel-Aviv, offer citizens a direct communication line with their authorities, improving relations between citizens and institutions, making better use of available services and initiatives, solidifying the sense of belonging and improving social cohesion.

Quality of Life

The digital divide and differences in quality of life affect the way people interact with local government. In most situations, citizens with low quality of life require more local government public services than those who enjoy high.[319] According to the McKinsey Global Institute, digital solutions could improve many indicators of quality of life by up to 30%.[320] Predictive analysis, for example applied to real-time crime, finds patterns, modus operandi and conflictive locations and attempts to anticipate risky situations. Thus, the presence of guards can be reinforced and avoid these incidents before they occur. The same can be used to predict situations of social divide, vulnerability, energy poverty or gender violence. With the IoT information from all types of systems, small problems can be solved before they could have led from major failures, higher costs to high catastrophes.

According to another McKinsey study[321], cities can achieve quantifiable improvements in the quality of life of citizens through smart city initiatives in social services / health, safety, smart mobility, energy, water, air quality, waste management and basic and relationship digital services for citizens. Some figures due to intensive use of SmartTechnologies are: reduce fatalities (from homicide, traffic, and fires) by 8-10%; incidents of assault, robbery, burglary, and auto theft could be lowered by 30-40%; emergency response times can be cut by 20-35%; cut commuting times (SmartMobility by 2025) by 15-20%; potential to reduce DALYs by 8-15% (disability-adjusted life years (DALYs), the primary metric used by the

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[319] DOWNEY, E. and JONES, M. *Public Service, Governance and Web 2.0 Technologies: Future Trends in Social Media*, Hershey, PA: IGI Global. 2012, p.102

[320] FREM, J, et al "Thriving amid turbulence: Imagining the cities of the future", *McKinsey & Company*, 2018 https://www.mckinsey.com/industries/public-sector/our-insights/thriving-amid-turbulence-imagining-the-cities-of-the-future retrieved by Aug2019

[321] WOETZEL, J. et al "Smart cities: Digital solutions for a more livable future" *McKinsey & Company*, 2018 https://www.mckinsey.com/industries/capital-projects-and-infrastructure/our-insights/smart-cities-digital-solutions-for-a-more-livable-future, retrieved by Jan2019

World Health Organization to calculate the global disease burden, reflecting not only lost years of life to early death but also lost productive and healthy life years due to disability or incapacity); emissions/pollution can be cut by 10-15% due to applied technology to Smartbuildings, dynamic electricity contracting, and some mobility applications; in water management, leakages can be cut by up to 25%; solid waste per capita can be reduced by 10-20% with solutions such as pay-as-you-throw digital tracking; cities can save 25-80 liters of water per person per day and reduce unrecycled solid waste by 30-130 kg per person annually; air-quality sensors helps identify the sources to decide impact with further action, (Beijing reduced deadly airborne pollutants by roughly 20% in less than a year by closely tracking traffic and construction), this can reduce negative health effects by 3-15%, depending on current levels.

Economic Prosperity

Previously explained concept of CityLab, promoting local startup hubs, such as those in Antwerp (Belgium), Amsterdam, Barcelona, Stavanger (Norway) and many other, contribute to create qualified jobs and accelerate new businesses around the city. SmartCity technologies serve as foundation to develop new companies. Those companies can early test their new solutions in the city, as a FabLab, then if successful, they can go to the rest of the world with a first real implementation / reference, and ask for financing not just with an idea, but with a tangible real project.

Awareness/overall Attractiveness Reference

In general, any improvements in Quality of Live because of SmartCity solutions investment on is increasing the city Attractiveness, so talent will better consider that particular city as a target to move to and develop his full potential. That way, the benefits from investing on SmartCities are not only for the locals, but for creating the awareness of a modern, innovative city, perfect to receive talented citizens from abroad to increase prosperity (it's a way to sell the city to the world, and become vocal and participative in remarkable international forums and public scenarios). A clear way on how to measure the city potential (Future) will be to see the level of investment on innovation and specifically the SmartCity Plan. (will discuss this later)

2.4 Humanizing SmartCities

"*The intelligence of a city lies in the intelligence of its residents."* J-L Missika, Deputy Mayor of Paris, 2016[322]. "*Cities are not intelligent, citizens are intelligent*".[323] "*We need tools to empower citizens and not simple to administrate cities*". Adam Greenfield-Ideas for Change, 2017[324].

We have seen how SmartCities use technologies to improve the citizens lives. This should not be interpreted as the complete design of the Smartcity technological scenario. Rather, the Smartcity is above all, how citizens are shaping the city by using technology, from directors and politicians, making the best decisions with the acquired information and knowledge, to each citizen with their contribution in form of data and the use they make of the services and solutions available to the city. The Smartcity is based on how people are empowered through the use of technology, to contribute to urban change and realize their ambitions. The Smartcity provides the conditions and resources for that change. Smartcity is an agent of change, a living and permanent urban laboratory, an ecosystem of urban innovation that is constantly testing, using and requesting improvements in each and every public service. Smartcity is the city's transformation engine, a generator of solutions for the most important problems and challenges. This is how the city behaves intelligently.

Putting people first and foremost is paramount. Today's challenges require a more holistic approach to problem solving that puts people at the center of innovations, with data and technology around, finally facilitating and improving all the city service areas. "*Cities may be getting smarter, but they haven't noticeably changed from a user perspective. It seems like most of the digital advances in cities have been invisible and focused on city operations, rather than on the parts of the city*

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[322] CATHELAT, B. *SMARTCITIES SHAPING THE SOCIETY OF 2030*, UNESCO and NETEXPLO, Paris, 2019 p.208

[323] MORCILLO, F. "Sostenibilidad urbana, ciudad y ciudadanos inteligentes". *UNESCO Extremadura*, 2013 slide25 http://unescoextremadura.com/unesco/upload/ent10/1/9%20Francisco%20Jose%20Morcillo.pdf retrieved by Sep2019

[324] Ibid slide21

that people can see, touch, and use. SmartCities are boring. Give us responsive Cities." Colin O'Donnell, CIO at Intersection, managing NYC Innovative new Internet-WIFI network, LinkNYC[325].

Creating a city that people can co-create, contribute and build every day.

Citizens have a central and crucial role in the city evolution and future. Technology always helps, as an enabler. Citizens should use technology to help coping with the main challenges the world faces today, from the city level. Citizens must make the first personal steps on: Decarbonization, Circular Consumption, City participation and engagement, Trusted Privacy and Artificial Intelligence use. In this way, citizens must be aware of their personal daily carbon footprint, in what they use, in the energy they consume and in their mobility means, and they must consider alternatives that produce less emissions from their origin to their final consumption, even if it involves some additional physical, time or economical effort. Circular consumption, reducing new use raw materials, especially pollutants such as plastics, be aware of the importance of reusing goods, think twice before discarding useful things (without going into problems such as the Diogenes syndrome, storing garbage), and encourage and supporting recycling is also a task of intense collaboration between citizens and cities, and again, will require some additional time and economical effort. Citizens must have the awareness of contributing to their city, the sense of belonging, of permanent solidarity building, of community. It is not just a matter of paying taxes, but of contributing with opinions, time and above all, with actions to improve your city. The privacy of information is fundamental and citizens must know how to protect their identity, but they must be generous with their city, providing information that, used collectively and without personally identifying anyone, contributes to a better understanding of the environment, habits and behaviors and better adapt the services to them, to be more efficient. We must differentiate between allowing access to certain personal

[325] O'DONNELL, C. "Smart cities are boring. Give us responsive cities." *TECHCRUNCH*, 2017 https://techcrunch.com/2017/10/14/smart-cities-are-boring-give-us-responsive-cities/ retrieved by Oct 2018

information to a private entity that will to try to chase us to sell us things or even something worse; and our city, which will treat that information with care, security and without any profit motivation, only to improve the service it provides us. Finally, we must rely on technology and its good use to improve our quality of life. Despite the myths and numerous negative communications about Artificial Intelligence, we must rely on these new solutions and the enormous advantages they will bring us.

But also, in Design.[326] Cities like L.A. are hiring a Chief Design Officer, trying to make new city urban developments more human and beautiful. So, it's not just about technology, it's about making everything more human, even the new physical locations, and public architecture. Combining both, technology and urbanism, citizens can use some tools to cocreate the city. Imagine our citizens could use tools as popular as Minecraft to suggest the city how to design new spaces. Other technologies like augmented reality or even virtual reality like Hololens help to visualize future spaces aspects and make cities more liveable. Mentioned before, Danish urbanist Jan Gehl helped reshape the city of Copenhagen, but also Melbourne and Chicago, by creating urban spaces that foster the social life, cohesion and inclusion, avoiding many serious mental illnesses due to isolation in big cities.

It seems clear that citizens and their data should be part of how cities design new solutions. Civic participation also allows cities to be more inclusive, as all voices can be heard and taken into account. Therefore, the process of creating a SmartCity must be collaborative[327], bidirectional, from city systems to citizens, and from citizens and their devices to the city, in a constant flow of proposals and feedback.

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[326] GOLDSMITH, S. "Designing the Human-Centered City", *DATA-SMART CITY SOLUTIONS*, HarvardKennedy School, ASH Center for Democratic Governance and Innovation, Jan 2019 https://datasmart.ash.harvard.edu/news/article/designing-human-centered-city retrieved by March 2019

[327] "Creating better lives in our cities of the future requires collaboration", *CITIES TODAY*, July2019, https://cities-today.com/industry/creating-better-lives-in-our-cities-of-the-future-requires-collaboration/ retrieved by Aug2019

So far, we have seen how the city is proposing new services and solutions to citizens. This is the inside-out way. Analyzing the needs, Investing on a solution, Proposing that solution for citizen's use.

But we have to consider both directions. The 'outside-in' is made of innovation landing on the city by other actors rather than the internal SmartCity team (or city budget). This could be generated by the community or private-sector initiatives.

By studying the EU report[328] on analyzing the role of citizens in creating SmartCity Solutions, we can conclude that citizens can provide:

- Information & resources – Citizen feedback is very important in project planning phases, and even more relevant as crowdsourcing of information and behavior at the end user level. In this way, the city can better understand the behavior of its citizens and their reactions to the proposals. This information can be provided proactively and consciously through apps that are popular and known connected and that provide certain information (traffic, security, location, payments, etc.) or indirectly through analyzing third-party elements such as social networks or other indicators to determine the so-called 'sentiment analysis'. This interaction also includes awareness, promotion and education, fundamental to the success of any project, which, as we explained, is not only about to propose a new solution, but to be massively used by the population. In this way, citizens are deeply involved, and city moves towards new benefits achievement and changes in behavior.

- Co-design, co-creation, collaborative research; joint decision-making – These are approaches aimed especially at the design stage. We observe as a trend the direct collaboration in pilots and demos, prior testing in small groups of citizens, as well as the increase in the number of new living labs, where these new services are actually adjusted or fine-tuned. A similar revolution occurs in urban planning and policy generation. Concepts such as participatory planning / budgeting, civic crowd funding, and dynamic

[328] "Analyzing the potential for wide scale roll out of integrated Smart Cities and Communities solutions", *EU Commission. D7 Report* .April2016 https://ec.europa.eu/energy/sites/ener/files/documents/d2_final_report_v3.0_no_annex_iv.pdf retrieved by Jan2019

master planning emerge as a never conclusive or determinant, but of unquestionable support tools. Particularly relevant are applications that permit new ways of democratizing decision-making by collecting data, gathering feedback, and improving solutions usefulness. Cities are increasingly exhibiting a number of district or neighborhood level smart spaces such as large-scale demonstrators, living labs or smart streets, which are ideal platforms to explore the needs of citizens as users. In theory, these district level innovation spaces operate as intermediary platforms among cities, companies, research organizations as well as citizens for joint value co-creation, rapid new services prototyping or solutions validation to scale and speed up innovation. But there are cities that go to the absurd extreme of asking about technically complex projects such as an urban plan, running the risk of obtaining irrelevant information, as there are few qualified citizens able to comment on the above. It seems as if someone wanted to avoid the responsibility to govern, based on the confidence deposited by the citizens, hiding after a survey or vote. (not my fault, citizens told me) Citizens can and should participate in what they can contribute and know: background issues and directions, civic sense or aesthetic elements, where a large majority have an opinion with some foundation. There is an open debate about what methods achieve what results and how much is this representative and from whom. Finally, we are seeing new incubation and acceleration techniques, heiresses of successful techniques in the retail sector, such as research laboratories to support the city's service innovation. Joint decision making are often accompanied by new governance models such as representation of citizens on local city boards, although this is very traditional in many cities thru the ‘district boards’ (many local names apply here).

- Cooperative action: social innovation – While this is a new category, it is gaining momentum in specific areas such as social policies, citizen re-skilling, welfare state and climate change. We can find community-based solutions as a whole, as well as individual contributions to the collective plan. These actions require visionary leadership. Some examples are the community energy cogeneration, civic contributions in time and economic

(giving) or the Copenhagen's citizens commitment to use the bicycle in 85% of their commuting to achieve the carbon neutral status (including citizens) target by 2025.

Citizen engagement leads to increased levels of trust in institutions as citizens perceive that their voice is listened, and their contribution and impact are more direct.

Ensuring inclusive innovation

In simple terms, inclusive innovation is the means by which technology is used to develop new services for those who have been excluded from the main group of citizens for reasons of wealth, ethnic or linguistic or any kind of disability. New technologies can be included for the base of the social pyramid: mobile phones, mobile services, telecentres, and more accessible services such as sidewalks with wheelchair ramps, audible traffic lights, adapted means of transportation and public facilities, web / mobile applications adapted for people with mobility, visual, auditory or cognitive disabilities, etc. This means the ambition of the future city to be inclusive for all, including the elderly, the marginalized and especially the poor and unemployed and those who support any degree of disability. Inclusive innovation should focus particularly on the following dimensions:

- Affordable & inclusive social housing
- Social & Community innovation. Ensure inclusiveness at district level, considering all kind of cultural and social diversity.
- Empowering the citizen – Marginalized groups often have special needs such as ICT access, interface design simplicity, etc
- Special solutions for people with any kind of disabilities.

Founded by UN in 2006, the G3ict or "*Global Initiative for Inclusive Information and Communication Technologies*" merges the United Nations Global Alliance for ICT and Development with the Secretariat for the Convention on the Rights of Persons with Disabilities at UN DESA. G3ict promoted an initiative[329] to secure

[329] "Newly Launched Accessible Smart Cities Initiative to Promote Access for Persons with Disabilities and Aging Communities", *G3ict* ,2016, https://g3ict.org/news-releases/newly-launched-accessible-smart-cities-initiative-to-promote-access-for-persons-with-disabilities-and-aging-communities retrieved by March 2019

that the SmartCities development doesn't widen the digital gap for people with disabilities, or aging persons with rest of population, just the opposite: try to use the advantages of new technologies to reduce this social differences.

Waag Society (European consultant focused on using technology for social change) provides some guidelines for city officials when designing a Citizen-Centered SmartCity Strategy.[330] In summary:

• Your citizens know more about your city than you. Not only do you listen but establish an open dialogue about what could be done and how.

• Design and development processes must run unified. You have to make rapid prototypes, get continuous citizen feedback, iterate quickly and be prepared to start over if necessary.

• Combine the fact that the initiatives are civic with the need to be scalable and sustainable.

• Citizens must have absolute control of their data (comply with GDPR). In order for them to rely on the proposed solutions, they must observe transparency throughout the process of capturing and using the data. Thus, they will rely on the management of the city and provide their data with confidence.

One of most advanced SmartCities in the world, Amsterdam, explains in its SmartCity core values[331] the crucial relevance of residents in the city development, directly, or indirectly, thru partners, online community of events. The want to stimulate a continuous public dialogue to foster cooperation between public and private organizations in an open and transparent way.

Some well-known examples on strong citizen participation on SmartCity projects could be Medellín (Colombia), Helsinki, Barcelona, Ghent (Belgium) and Tel-Aviv:

For Latam and other areas where available investment is not high, SmartCities budgets should be very carefully managed and the projects must be chosen to

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[330] "Analyzing the potential for wide scale roll out of integrated Smart Cities and Communities solutions", *EU Commission. D7 Report* .April2016 p.24 https://ec.europa.eu/energy/sites/ener/files/documents/d2_final_report_v3.0_no_annex_iv.pdf retrieved by Jan2019

[331] Amsterdam SmartCity https://amsterdamsmartcity.com/network/amsterdam-smart-city retrieved by Oct 2019

maximize impact, so understanding the citizens first and design the projects then is becoming a must. You should understand first who your citizens are, what they do along the day, how are they interacting with city services, and then prioritize your proposals accordingly.[332] Citizen-centric is not different as customer-focus strategies in the private sector, so many marketing techniques can be adapted and used in public service optimization to serve citizens.

Medellín (Colombia) was for many years very famous for being one of the most violent and dangerous cities in the world, due to the Pablo Escobar cartel. When Federico Gutiérrez (elected in 2016 as mayor of Medellin) was campaigning, instead of exclusively speaking and explaining his program and trying to convince, he held constant meetings to listen to citizens and gather their opinions and needs. With this information, he generated a 400 pages document that serves as a fundamental government plan, collecting proposals on many topics such as security, urban mobility, environmental problems, as well as education, employment, and social equality. "*This government plan was built by walking through the streets of Medellín to really listen to each of the inhabitants, and that was where he obtained the inputs to elaborate his government plan*." [333] Humberto Iglesias, city pilot, Medellin.

Helsinki is another well-known example where citizens are empowered to participate or 'play the game'. Authorities highlight the need to count on good skilled citizens to ensure the right development.

"*For us, the smart city is also about people. In the past, smart cities were focused on technology, but for us the role of people is key. The inhabitants of the Helsinki region will be active participants. Human well-being is based on the knowledge and skills that competent, open-minded and well-educated inhabitants will require in the future."* Johanna Juselius. Senior Advisor, EU Affairs. Uudenmaan liitto

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[332] CADENA, A. and ELLEN, P. "Putting citizens first: How Latin American cities can be smart". *McKinsey&Company*, 2018 https://www.mckinsey.com/industries/capital-projects-and-infrastructure/our-insights/putting-citizens-first-how-latin-american-cities-can-be-smart retrieved by Jan2019

[333] CATHELAT, B. *SMARTCITIES SHAPING THE SOCIETY OF 2030*, UNESCO and NETEXPLO, Paris, 2019 p.154

(Helsinki-Uusimaa Regional Council)[334]. "*We are working to build a culture of trust. Trust is based on openness, transparency and data exchange and how decisions are made. Fortunately, there is a lot of trust in Finland. People say that 'data is the new oil', but that is incorrect: trust is the new oil. The data is cheap, but trust is really valuable*.", Mikko Rusama, Chief Digital Officer (CDO) at the City of Helsinki and Chairman of the Board at the Forum Virium Helsinki.[335]

In Barcelona, citizens participation led the city main projects for 2015-2019. Platform 'Decidim (we decide in Catalonian)' concentrated the citizens direct participation in city government through social networks and direct inputs, ideas, discussions and e-voting. Francesca Bria, former Barcelona's CTO and Digital Innovation Officer claimed for an estimated participation around 40.000 inh and 70% of proposals discussed at city council meetings, turning a 'topdown' management into a 'bottom-up' built decision flow.

Belgian City of Ghent has put people at the very heart of its own definition: "*A smart city reconnects people with their environment and the city to create more efficient relationships between the available resources, technology, communities, services and events in the urban fabric. Reconnecting people also means that citizens regain (partial) responsibility for their environment. Smart cities need smart citizens to be fully inclusive, innovative and sustainable."*[336] Francis Pisani, Architect.

European Union H2020 awarded project '*OrganiCity'* allowed the cities of Aarhus (Denmark), London (UK), and Santander (Spain) to work together on this concept. OrganiCity tries to define a citizen-centric city-making. They found these 8 basic principles for citizen engagement:

"*1.Empower Adjacent Communities and Champion Advocates 2. Design for Trust, Especially Around Change 3. Facilitate Personal/Community Ownership 4. Debate and Co-Create Across the Comfort Zones 5. Use Challenge Areas as Catalysts for*

[334]Ibid p.208

[335] Ibid p.292

[336] PISANI, F. *A journey between SmartCities: From Datapolis to Participolis* UNESCO / Netexplo, Paris, 2015, p.163

Innovation 6. Respect the Value of Venue: Face to Face, Online, Culture & Collaboration 7. Provide a Clear Journey and Value Visibility"[337]

Tel-Aviv is, in my opinion, the model to follow on citizen integration and participation. Known as Israel's 'Nonstop City' because of its intensive life, and rich variety of opportunities for leisure, entertainment, culture, tourism and dining, the city had the same traditional problems with connecting with citizens. Around 2015, the city launched the program DigiTel[338] to engage with its inhabitants. I like this initiative because it is bidirectional: citizens participating and city proposing new ideas and activities in a continuous dynamic. I also love it because it started by citizens endorsement, from scratch, offering a well-designed citizen-centered tool and card and adding more and more as a viral effect till they include most of the 400.000 inh. The city is using its own data, plus the specific citizen preferences. "*We conducted a poll and discovered that citizens really love the city and its dynamic, vibrant, endless day-by-day events. But they weren't so enthusiastic about the government, which they saw bureaucratic and distant. We wanted to change that impression and engage the residents, bring them more value, and create a new kind of city service approach."* Liora Shechter, Chief Information Officer for the City of Tel Aviv-Jaffa. This Digitel Club is open and available for all Tel-Aviv residents aged 13 or more. At the registration moment, the citizen provides very relevant information not registered into the 'official' city records, like interests, hobbies, and other personal information. So, citizens must trust on the city correct treatment of this so sensitive data. That way the city can provide a continuous flow of very much personalized services. Those services (sometimes just pieces of info like announcements or invitations to participate in the many city events) are individually personalized, location-based, and provided at the smartphone. This is not just for fun, all other 'serious services' like taxes payments, reportings, grants, etc are also available from the application. This way, citizens perceive a live city,

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[337] BRYNSKOV, M. et al. *CO-CREATING SMART CITIES OF THE FUTURE. We are all OrganiCitizens Interim Engagement Strategy*. H2020 No. 645198. FutureCities Catapult, 2016 http://organicity.eu/wp-content/uploads/2017/05/D1.2_We-are-all-OrganiCitizens_Interim-Engagement-Strategy.pdf, retrieved by Oct 2018

[338] Tel-Aviv Website. https://www.tel-aviv.gov.il/en/Live/ResidentsCard/Pages/default.aspx retrieved by Aug 2019

nearer, warmer, something like a companion that provides (sometimes surprisingly) all kind of services and opportunities for enjoying a better life. City government is more transparent and next to citizens, also encouraging proactive citizen participation. With all the city at the resident's hands, they appreciate they can make better choices, observe a more sustainable behavior and become more inclusive. All is there, all city options, all transportation including the Tel Aviv Tel-O-Fun (bicycle rental system), parking lots info, etc, without the need to use different applications or jump to different providers. And the other way, the citizens can report whatever needs to be fixed, in a very intuitive and useful way.

In addition to these examples from cities trying to integrate/communicate to citizens, technology also provides new creative alternatives to mobilize citizens and provoke their participation in city life. These new tools are named 'Active Digital Living' or ADL capabilities. So, apart from the most common tools to communicate to citizens like chats, SMS, etc, we can propose technology-based activities to engage with citizens. ADL could be grouped in Gamification Apps, Wellness habits, Physical exercise, Smart Art (interactive), Learning / Training interactive tools. City can take advantage from them to get into citizens lives even more persistently and into usual and friendly activities. Some examples could be: Gamified Recycling tools; Good behavior Gamified rewards/city points; Wellness suggestions depending on city parks conditions and weather, plus fitness coach chatbot; Virtual-reality tools for biking, for treadmills with city projected scenarios; Virtual-reality gaming including local traditional sports, local sport teams; use of new technologies like holograms on public spaces to grab people attention or highlight a place or moment or just for pure artistic aim; Smart art at streets to foster creativity allowing interactive participation; Drones lightshows using LEDs instead of fireworks (less pollutant by the way); special streets or monuments Lighting, or just lighting the desert; offer new advanced MOOC (training courses) to improve population capacitation / employability to mention some.

Possible Cities. Possible Worlds Theory

Where are our cities going? What would be the city model we want to go to? Does it have something to do with the fictional cities that the movies / narratives pose?

Are those cities possible? Our imagination is infinite, but we can link the concept of possible city to the analysis of possible world in literature. When talking about creating a better city, or a new city from scratch, we have to use the concept of a possible world as a reference. A world is any referential entity that our imagination can create and that has related elements. Or put another way, a set of semantically referenced elements, with certain established relationships. A possible world includes a series of certain rules, norms, laws, shortcomings or advantages that give it credibility.[339] The idea of 'possible world' is attributed to the bipolarism created by Gottfied Leibniz and Arthur Schopenhauer. The first argued that the possible worlds were ideas in the mind of God (closely linked to the Platonic notion of idea, although adding divinity) and that therefore, our world as it exists, and due to its divine origin, is the best of 'all possible worlds'. However, the second was projected to the other end, pointing out that it was the worst of all possible worlds because if it were only a little worse it would not exist.

The literary theory of possible worlds uses concepts of real-world logic and applies them to fictional worlds created in texts. In this way, the possible world theory provides an adequate vocabulary, a semantics, a logic based on true / false, possible / impossible, necessarily true / contingent propositions and a conceptual framework with which to describe such worlds. In this logic, a proposition would be possible if it were true in at least one possible world. However, a literary world is a concrete type of possible world within the different possible worlds in our imagination and logic. It happens that a literary text houses its own system of relationships where real worlds (real situations) and possible worlds (possible events) are mixed. In fiction, the principle of simultaneity that implements the dimensional aspect is applied, when it is observed that two or more physical objects, realities, perceptions or non-physical objects can coexist in the same space-time dimension. Some expert literary analysts such as Marie-Laure Ryan, Thomas Pavel[340] and Lubomír Doležel have used the theory of possible worlds to study issues such as literary truth, the nature of fiction and the relationship between reality and fictional worlds.

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[339] ALBALADEJO, T. "Teoría Literaria de los mundos posibles" Conference 25 May 2018, Universidad Francisco Vitoria, https://www.youtube.com/watch?v=d_eLlOs76w8 6'ss retrieved by Nov2019

[340] PAVEL, T. G. *Fictional Worlds.* Cambridge, Harvard University Press. Cambridge, MA, 1986

Possibility scales have also been developed by way of taxonomies that allow evaluating the probability of a fictional world. And also, this theory allows to separate within a text its constituent worlds, possible or real.

In the David Lewis[341] article, Truth in Fiction, we wonder about the truth in a fictional character like Sherlock Holmes, or how the Disney Shrek character might be. Our concept of truth is based on the reality that we handle on a daily basis, by identification with another sure thing, but there is nothing in our world that has a correspondence with Sherlock Holmes or with Shrek, are they therefore true? Bertrand Russell and many others argue the obvious that fictional entities are basically false, because we cannot extract anything true to our reality dimension from them. It is a monistic stance: there is only one world, the real and ours, the rest is simply false. At the other extreme, Meinong argues that anything imagined or imaginable makes some sense and so, it can be talked about, then it has some inherent truth. Finally, the theory of possible worlds promoters indicate that we can think of possible fictional worlds as symbolic entities embodied in texts or other forms of representation, with inherent own characteristics and that can be subsequently reconstructed by the reader. These entities - the possible fictional worlds - do not have an identification with impossible or false objects and we can therefore be used to construct sentences or discourses about their internal characteristics or qualities that can be assumed as true.[342]

If we say: 'Shrek is a green ogre that lives in a swamp' and 'Shrek combines the most human but instinctive and bestial side of the person': the first sentence is simply true by the definition of the character in the Disney series, while the second falls into what Doležel calls a mimetic fallacy[343], because it confuses heterogeneous planes, mixes abstract issues with fictional elements and puts both worlds in contact. Because of the characteristics we understand and humanize from Shrek, it seems true. This can be considered a mimetic semantics between real and fictional entities.

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341 LEWIS, D. "Truth in Fiction" *American Philosophical Quarterly*, Vol. 15, No. 1, 1978, University of Illinois Press pp.37-46

342 VILAR, M. "Introducción a la teoría de los mundos posibles." *Verdad, método y construcción de realidad. Revista Luthor*, no. 9., vol. 2, 2012, p.21

343 DOLEZEL, L. *Heterocosmica*. Baltimore, John Hopkins University Press. 1998 p.36

The same goes for Batman, if we talk about the character in his city, Gotham, or if we say that Batman represents the fight of good against human evil.

Thus, we find individuals who do not have a parallel with those that existed or exist in our daily world, and even with physics elementary laws that are not what we know. For this, the number of examples is simply very large, from Genesis to Harry Potter.

The theory of possible worlds forms the basis of the immersion that Ryan[344] makes within the digital media. By switching to an interactive and intertwined media with hypertext such as the Internet, electronic poetry, digital art, computer games or multi-user virtual environments such as *Second Life,* we find ourselves in a possible world based on three forms of immersion: space - the responds to setting, temporal-the responds to story and emotional-the responds to character. This could threaten narrative coherence, but in my opinion, it makes the base for most of published futuristic cities movies / books. Artificial intelligence adds a fourth purely technological immersion linked to the human by mimesis. The easiest to find result is the construction of possible worlds or possible dystopian cities by negative radicalization of some aspect managed by artificial intelligence. Later, I will comment on this topic.

On the relationship between reality and fictional worlds, we can distinguish three world models general types: the true, the credible fictional, and the non-credible fictional. While in the real one his 'rules are those of the objectively existing real world', in the credible fiction his 'rules are not those of the objective real world, but they are constructed according to these', and in the non-credible fictional 'his rules are neither those of the objective real world nor are they similar to these, implying a transgression of them.'[345]

What defines a possible city? If we think of our future city model or have the opportunity to design a new city from scratch (either by new investment or territory development, or by necessity, as in the case of the city of Kiruna (Sweden) where the danger of collapse because of the exploitation of the underground iron mine -

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[344] RYAN, M-L & BELL, A. *Possible Worlds Theory and Contemporary Narratology*, Univ. of Nebraska Press. Lincoln and London, 2019, p.27

[345] ALBALADEJO, T. *Teoría de los mundos posibles y macroestructura narrativa*, Alicante, Universidad de Alicante. 1998. pp.58-59

the second largest in the world - means that they must 'move' the city a few kilometers East - evidently they move nothing except a historic monument church - and the whole city is built again) then we would put a management team composed of an urban planner, a technologist and a humanist, to balance the three fundamental elements of the city's development, as we saw earlier. If from the ontological point of view, a city is a point in space / time where people meet, for there to be a possible city there must include four fundamental components: a place, a moment in time, humans and relationships between them. Place and time are defined by the physical dimension of the city and the technological parameters that govern it. In fiction, these references are always well shown to us. This makes the rest of the story credible, fictional or not, futuristic or historical, but set into context. A city without humans is a city? What about the texts about non-human cities? Here we must look at the fourth component: relationships, rational socialization. If that space / time is used to deploy social relationships, then urban magic is created, and we could talk about a non-human inhabitants city. If there are no rational social relations, then we only talk about animals gathered for certain instinctive purposes and we end up with the concept of colony, herd, hives or burrows. And what would happen to those futuristic cities composed or dominated by cyborgs? They are not human, but if those machines reach a rational knowledge development through artificial intelligence that allows them to establish rational social relationships - scientists are already working on emotions, feelings and self-conscious machines - taking advantage of the physical environment given by a place and time, then we could think of cities of machines, but we are at a the concept limit, surely a dystopian limit. They won't be human because human dignity will always be lacking, since this is our essential transcendental component, our connection with God, our divine, inherent and inviolable component. If they are simply machines without a social component, it is not about cities, but about warehouses, workshops or hangars. Therefore, the city enables and develops socialization, the encounter, the meeting, the social gathering. If there is a group of humans, but because of the prevailing norms they cannot meet and socialize, then they are not in a city, but in a jail or separate cages. Forever, and ever, and even in the worst concentration camp humans will keep dignity, even if that environment is not a city, because the capacity for socialization is lacking, severed by repression and violence. There is no sense of

collaboration for the development of a better future, there are no social synergies, there is simply a basic survival instinct.

Possible real Cities

A possible city is a possible world where people can live and interact. There may be as many possible cities as places where people have gathered and left their footprints (as constructions, or at least, proof of their experiences). Once we have understood how these possible cities that we want to build and develop can theoretically be, we will know how are the real cities we have and their different types, to understand where we start from. We can talk about cities of all kinds: large / small, developed / emerging zones, North / South, Western / Eastern culture. We know their parameters: Climate, GDP, population, etc. and we could make many classifications. The most informative classification on the capacity of development, competitiveness and evolution of a city is the one studied by the large construction company JLL: "*Typology of World Cities*".[346]

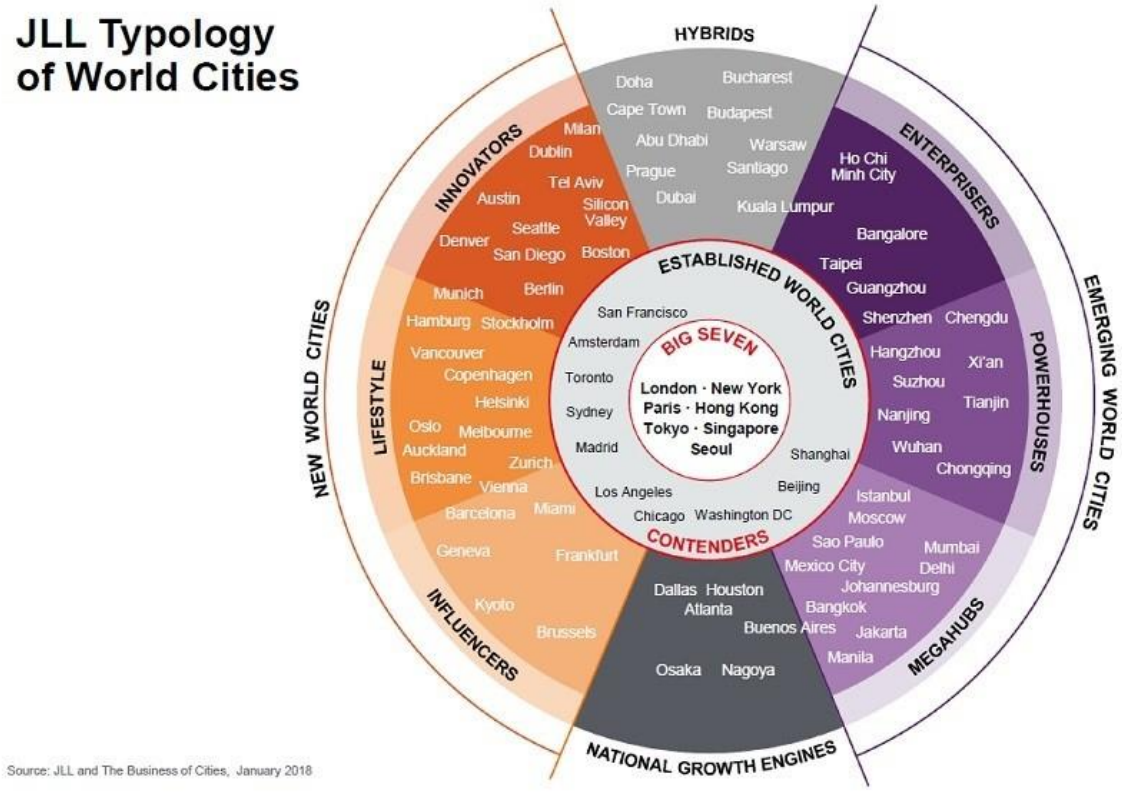

Figure 45. JLL Typology of World Cities. 2018

[346] "CITIES RESEARCH". *JLL*. 2018 https://www.us.jll.com/en/research/cities-research retrieved by Aug 2019

JLL, from its position as a huge construction and real estate company, finds 10 types of cities in terms of their development capacity, mainly urban development, which gives us a good perspective on the strategic position they occupy and their development alternatives. It is clear that if a city is attractive to talent, then the first consequence is a valuation of the place and the real estate sector, so we can consider this study a very appropriate and interesting proxy. Note that in this sector, size does matter, as we speak of a combination of physical and economic city footprint, fundamentally. For Jeremy Kelly, Director in Global Research at JLL, the dynamics, style and amount of real estate required drives the city characteristics, aspirations and priorities and therefore its ability to grow and attract talent and business.[347]

The 10 new city types

Podium is taken by The Big Seven and the Contenders.

The Big Seven are the elite of developed cities and absorb 25% of all globally invested capital in commercial real estate. They are the by-default option for investors and global corporations. You don't have to think hard to guess that it's London, New York, Paris, Hong Kong, Tokyo, Singapore and Seoul. They have everything in terms of human capital and real estate.

They are followed by the Contenders, who are experiencing a very important urban development in the last decade, enormous growth of the rental market, inhabitants numbers, economy and world leadership that places them in this position of challengers to the elite positions. This is San Francisco, Amsterdam, Toronto, Sydney, Madrid, Los Angeles, Chicago, Washington DC, Beijing and Shanghai.

From here on, JLL clearly separates two worlds: a Western one, based on economic, scientific and cultural development as evolution of existing cities, but with strong investment in their future. This investment is ordered, private fundamentally and under democratic political standards, with strong citizen participation and ethical evaluation of practices and results; another, fundamentally Eastern or emerging countries, new Asian cities with rapid developments led by a non-democratic

[347] KELLY, J. "JLL rethinks global city competitiveness for the future". *Cities Today*, 2018, https://cities-today.com/industry/jll-rethinks-global-city-competitiveness-future/ retrieved by July 2019

central government under a planned direction or emerging countries mega-cities where the population volume is not matched by economic development.

In the developed Western Democratic countries side, JLL distinguishes three zones: Innovators, Lifestyle and Influencers. Innovators stand out for their economies of high volume and great appeal to entrepreneurs and talent. In my opinion, all these cities like Berlin, Tel-Aviv, Dublin, Milan, Seattle, Boston, are solid candidates to jump into the area of Contenders. They lack population to reach those investment volumes, but they enjoy all the rest of conditions. Lifestyle cities have developed very high quality of life levels and public services for their citizens. They have achieved this with strong investments in technology (they are the best SmartCities), a moderate and orderly population, where inequalities do not impede development. We find here Stockholm, Copenhagen, Helsinki, Oslo, Melbourne, Vancouver, Hamburg. And finally, in this area, JLL talks about Influencers, as cities of great development due to a strategic position for international investments and with cultural and commercial appeal. Here they place Barcelona, Miami, Kyoto, Brussels, Frankfurt. I think that LifeStyle and Influencers are very similar, and I find Barcelona, Vienna and Zurich on the middle border. Perhaps the only difference is set from the point of view of international relevance and leadership, greater in the Influencers, lesser in the Lifestyle, who devote few resources to this international awareness.

On the other side we have the emerging world of overcrowded massively populated cities, or Eastern cities with dirigiste development and planned economies. Megahubs are huge cities in population, where the economy does not have the same level of development. We find Mexico City, Moscow, the Indi Delhi and Mumbai, Sao Paulo, all within the so-called emerging development zone: BRIC. They are the economic centers of their countries, but they fail as investment destinations. The cities in the Enterprisers area have tremendous development and dynamism, although social inequalities sometimes make them messy and chaotic. We found Bangalore, Taipei, Ho Chi Minh City. By attracting large companies, they hold a very promising future, tending to move to the hybrid area, in between from the developed countries. Finally, the Powerhouses are developing rapidly from a state-led economy - fundamentally we speak of Chinese cities - emerging from a low

value economy and innovation to more advanced positions. We have Shenzhen, Chengdu, Chongqing, etc.

Between both worlds, developed and emerging, mainly Western vs Eastern, we find two intermediate exchange areas: The Hybrids area is occupied by medium-sized cities, with a good real estate market transformation and where transparency in business brings investors trust. We see here Warsaw, Santiago, Kuala Lumpur, Abu Dhabi, Doha, Dubai.

And finally, on the other end, JLL places the National Growth Engines, as stable, reliable, large, but not very dynamic and innovative cities. They resonate in my head as examples of Generic cities. (see Footnote 4 on chapter 0.4). They are Dallas, Atlanta, Houston, Buenos Aires, Osaka, Nagoya. Mega-hubs enter this area as soon as they reach some economic stability.

The beginning for a Social Dystopia?

If the authors of 50-60's science fiction literature had been right, today we would travel in flying vehicles or pneumatic trains. We would travel to work on high-speed moving sidewalks and run through the city on horizontal elevators. For short distances, we would use personal jet backpacks or anti-gravity belts. On the contrary, we are at the beginning of the 21st century and we are still waiting for buses, we are still stuck in traffic jams and trying to cross the street without being hit by a driver who is using the smartphone. Transportation has changed, but not as expected and many important advances are barely perceived.

But technology relevance is continuously increasing, taking over more important roles and responsibility on our cities management. Let's think for a moment on the extreme where only technology matters, becoming not a mean or an enabler, but the core component and the exclusive motivation for our SmartCities strategy, with citizens as secondary actors. Some people, like Noël Mamère, Mayor of Bègles, France[348], are already alerting on this risk. When supervision and surveillance is placed over human rights or just living harmony, then the city moves towards a 'Big

[348] CATHELAT, B. *SMARTCITIES SHAPING THE SOCIETY OF 2030,* UNESCO and NETEXPLO, Paris, 2019, p.142

Brother' concept, when technical progress and advanced technologies are taking social control. If we run to this extreme, then we'll see a disruptive modernization model, where:

.- It is preferred to build cities full of sensors and cameras, from scratch, than to modernize an old city, due to the high costs of maintaining history and identity and combining this with the necessary technological progress. This model guides many new complete or partial new SmartCities (neighborhood) and is adopted for its implementation agility and speed. The problem is convincing citizens to move to those new areas. Many times, their high cost leads to gentrification, being only accessible to some elites.

.- Instead of allowing citizens and politicians to design and create their city, it is considered more successful to give this responsibility to digital technologists along with highly technified and dehumanized urban planners.

.- Instead of respecting and adopting local cultural elements, there is a tendency to adopt a global model derived from technological modernity. Social behavior patterns are marked by an intensive use of technological elements where digital interactions are preferred to social ones. Face to face meetings and social festivities are lost, isolation in front of the screen is encouraged, the telematic message is preferred to the phone call, the online purchase to the neighborhood store (only one physical toy store remains open in Stockholm, all others closed due to online shopping). These global behavior models also reduce costs and speed up the SmartCities implementation.

.- Cities development companies like constructors, couriers, energy, water, telco companies have to place technology frontline in their proposals and products, adding more relevance to IoT, platforms or AI algorithms than any other aspect like aesthetics, human integration, etc. That way, smartbuildings are designed more with technological capabilities in mind than thinking on human perspective. Some new technological wonders are horrible and inhuman, where control and monitoring are preferred to ergonomics and the ability to encourage humans to develop their social facet.

We can talk about CyberCities or Cyborg Cities as a consequence of this Technological Dystopia. Cities run by Cyborgs or intelligent cyber entities.

A Cyborg City would be fully automated and controlled by centralized systems that responded in real time to any circumstance. For efficiency, these automatisms are left in the hands of systems managed by artificial intelligence under certain (or none?) expert technologists' supervision (who needs democracy or politicians?). It seems that the increasing complexity of our cities and the need to offer higher and higher quality services made our cities too large and complicated to be managed only by humans.[349]

If an elite of engineers plan the future and the machines do everything else, observing that citizens simply do not disturb or interfere in these planes, controlling and monitoring their movements to achieve a 'perfect' plain no-problems city, then democracy makes no sense, individual creativity and freedom cease to exist. We would be in a super automated Dirigiste society (Future China?). At the moment, automatisms still do few tasks in the city, but as we trust them more, there will come a point where their responsibility and autonomy will be so great that we must ask ourselves what is the limit where we begin to lose control of our development and our destiny, of our creativity and local cultures, and everything begins to be the same, generic, uniform, sad, but efficient and optimal. See last paragraph on chapter 2.2, or footnote 285 about 'Generic Cities' concept by Rem Koolhaas.

OK, we see this paradigm on the long-term, but we can already perceive some of its aspects today. Some first initiatives of authentic CyborgCities where the fundamental motivation is technology or how it was said: "*A City born and created from and for the Internet*" as the Google Sidewalk Quayside Toronto project have been hardly answered by its possible inhabitants.[350]

We can also conceive dystopian cities from the urban point of view: megacities. The frequent reality of megacities described earlier in Chapter 2.2 is amplified and generalized by the movies images and scenarios, television series, novels and comics. Popular culture presents megacities as huge dystopia in a catastrophic and inhuman future world.

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[349] KOVACIC, M. "Robot Cities: Three Urban Prototypes for Future Living", *SingularityHub*, 2018 https://singularityhub.com/2018/04/13/robot-cities-three-urban-prototypes-for-future-living/ retrieved by Jan2019

[350] "Toronto Resists Google SmartCity Dystopia". *New World Next Week*. Youtube. Jun2019. https://www.youtube.com/watch?v=L0fLEiEzlY8 retrieved by Sep2019

It is easy to search the list of dystopian films on Wikipedia to find about 200 films[351] where technology, urban planning or a combination of both has reached a dystopian extreme. In these films, this exorbitant inhuman influence leads to curtail fundamental rights such as freedom of expression, action, identity, cultural, etc. Social classes, racism, inequality, are frequent elements, combined with enormous brutality. Super technological ideal worlds competing with dangerous and violent underworlds. Machines have taken control, power, or at least, the fundamental role in society. The human being is displaced to a secondary role, to the point of being just an image in the mind of a body fed to purely serve as an energy generation stack for ruling machines (Matrix). Humans struggle to survive in a technological totalitarianism managed by a dominant entity, like the Plotinus 'ONE' in ancient Greece, but as an omnipresent and omnipotent cybernetic superior being.

Some examples of these fascinating visions of cities as shocking as inhuman are: Metropolis, Blade Runner, Welcome to Gattaca, Dark City, Elysium, Total Recall,

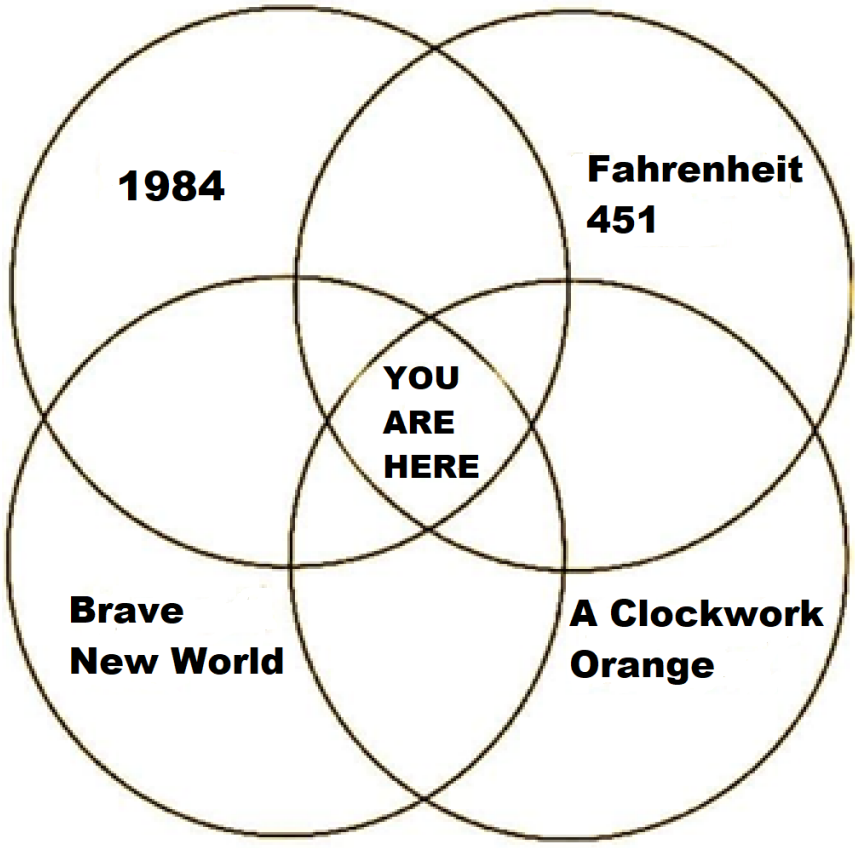

Figure 46. 'Perfect Storm' of Dystopian films. Source: popular meme + author

[351] "List of dystopian films" *Wikipedia* https://en.wikipedia.org/wiki/List_of_dystopian_films retrieved by Oct 2019

1984, Logan's Run, Seven Sisters, Altered Carbon, Ready Player One, Matrix trilogy, Fahrenheit 451, Brave new world, etc

Figure 46 represents a funny meme that describes an extremely inhuman and catastrophic situation. Note the combination of different dystopian films to explain the most disastrous conditions where human values are simply inexistent.

Zero Human

We could land at the situation of a 'Zero Human' city, where artificial intelligence networks, fueled by permanent improvement based on Deep Machine Learning, could completely replace humans in many areas of the city. Without going as far as the '*Singularity'* dystopia, where the artificial intelligence of new cyber machines species is superior in all respects to human beings, who are displaced from the status of world owners to become mere slave servers. Of course, human beings show relative incompetence for certain tasks where high precision and reliability are necessary, and where machines already do it better and more reliably. If I put a security guard to observe a prohibited or dangerous area for 8 uninterrupted working hours, I am sure it is worse and will end with more mistakes than if I put a camera with an intruder detection software in. If in addition to be more reliable and precise, the solution can work restlessly 24 hours, without union problems, medical leave and at a very low cost, it seems that the decision is obvious: robots and algorithms can and should replace humans in many tasks. Taken to the extreme, we could think of the complete humans replacement, modeling the entire city as a set of objects managed by a common intelligent entity based on Artificial Intelligence. Therefore, a radical digitalization of the city could lead to three clear trends:

.- Data has same (or bigger?) value as the reality it represents. The firm belief that the computing platform that manages the city is composed of virtual elements and functions that are as important as the physical elements they handle. That is, the processing of traffic data is as important as the roads and vehicles themselves, the digital electricity smartgrid is as important as the energy production and distribution. We are giving so much importance to virtual management, that it comes to match managed reality. It seems that it is better to have a cyber-controlled system than to have a good physical system coming to the paradox of supporting a really poor system but very well-known and managed. Imagine that the water we

drink is of poor quality, but we can presume that we very well manage the supply network and know exactly how much water we lose in leakages and where those are.

.- Omnicontrol, omni-information. The need to have data about absolutely everything, including humans, through a huge network of sensors, cameras and social network analyzers that allows us to have and cross different sources of information for each of the city dimensions (Security, air quality, water, energy, waste, infrastructure, vehicles, properties, buildings, etc.) but also people, habits, behaviors, health and vital parameters, all monitored, controlled, watched out and measured. At this point, we must ask ourselves where is the limit of what our systems should know to achieve a desired well-being, and balance the impact and ethical cost, privacy, dignity, ... compared to the economic benefit, health, safety, well-being ...

.- Artificial intelligence is more important than managed hardware. Although it is clear that the really important thing is data over hardware (sensors, communications infrastructure, computing, storage), these components cannot be neglected because the data quality, the security and privacy and the availability and resilience of the whole strongly depend of them. There is no point in having powerful artificial intelligence if the data it uses is biased by poor communications infrastructure or poor information acquisition. There is artificial intelligence that tries to solve this problem, but never to the point of fixing it all. That is, one thing is to correct occasional, spurious errors, and another thing is to correct all the data because all (or a large part) are basically false. Therefore, although the software, the algorithm, the artificial intelligence always seem more attractive, we cannot neglect the physical infrastructure that supports the system and the humans who install, manage and maintain it with their hands.

Although we may not realize it, we are using and relying on Artificial Intelligence (AI) every day, every time we use Internet search engines, personal computing tools, any identification system, dictation, etc. We can say that Artificial Intelligence is already omnipresent in our lives. Gartner[352] estimates that virtually

[352] "Gartner Survey Shows 37 Percent of Organizations Have Implemented AI in Some Form," *Gartner Press Release,* 2019. Also https://www.gartner.com/en/newsroom/press-releases/2019-01-21-gartner-survey-shows-37-percent-of-organizations-have retrieved by Oct, 2019

all large companies will massively trust their main systems on AI in 3 years, although only a third are already doing so. The study also suggests that all companies want to start using AI now, although they face challenges related to strategy and execution. Despite all this enormous potential, AI is probably one of the most unknown technologies, mainly because it works discreetly, hidden from the user's eyes, in the backoffice, and is not something that can be touched. Many times you do not recognize that it is there and you understand that its effects are natural or a consequence of others actions or just the result of good programming, basically because essentially, AI tries to simulate human reactions and behaviors. This makes us scared. In the same study, 79% of the participants indicated fear of the unknown as the main challenge in the adoption of AI.

It is clear that it scares us, and it is clear, as we saw in chapter 1.4 (footnotes 112, 113) when describing the 'Moral Machine' MIT experiment that the AI adoption implies moral consequences, since we are leaving fundamentally human issues on AI hands. The AI will do exactly what it has been programmed or prepared for, but in these matters, it will act according to the programmer's moral. As we saw in that experiment, the problem is that there is not a single moral or a single moral code on the planet, but one for each civilization, so that the decision-making that we leave to AI will be marked by morality or the civilization which directs it in every moment.

The consequences of AI misuse could be disastrous[353], and there is not a legislation in place yet. Programmers include ethical decisions into their developments without any rigor or control, simply using their common sense and scale of values, which will be different according to their culture or civilization. Moreover, these decisions and the data used to train the systems are considered trade secrets and are not published. In companies' commercial competition to offer the best performance at the lowest price, are ethical considerations included? What human sciences skills do programmers hold or what ethical control/audits do these developments pass?

Can we lose control and come to situations like those described in the Figure 47 dystopian films?

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[353] DENT, K. "The risks of amoral AI", *TechCrunch*, Aug 2019, https://techcrunch.com/2019/08/25/the-risks-of-amoral-a-i/ retrieved by Oct2019

AI tries to replicate human behaviors in two fundamental areas: sensorial perception and rational knowledge. In sensorial perception, during the years 2016-2019 we can affirm that modern AI systems have reached and exceeded parity with human capacity, that is, they are comparable or better to their human equivalents in vision (object recognition), speaking (recognition of spoken language and speech synthesis), reading and its syntactic and semantic understanding, and simultaneous translation in multiple languages. Precision in objects handling (touch), shapes recognition, odors and gases (electronic nose) and flavors have already surpassed those humans for a longer time.

The next issue is rational knowledge. In this area we talk about 4 phases or 7 types of stages in the artificial intelligence evolution[354]. We start with Reactive AI, in which the system reacts to stimuli or simple information entries by applying established rules (ie. we program the chess rules and the system can play chess looking for the best movement in each case by developing a huge amount of steps forward and possible combinations from the current position). The next step is called Limited Memory AI (similar to the previous one, but with a certain amount of memory, as a source of experience or knowledge base on the known actions consequences). If this knowledge base is constantly fed in each iteration and new situation, then the system learns (machine learning). So far, we have covered the current systems, also called ANI (Artificial Narrow Intelligence), in which the system strictly and exclusively does what the programmer has previously established.

[354] JOSHI, N. "7 Types Of Artificial Intelligence", *FORBES*, June 2019 https://www.forbes.com/sites/cognitiveworld/2019/06/19/7-types-of-artificial-intelligence/ retrieved by Nov2019

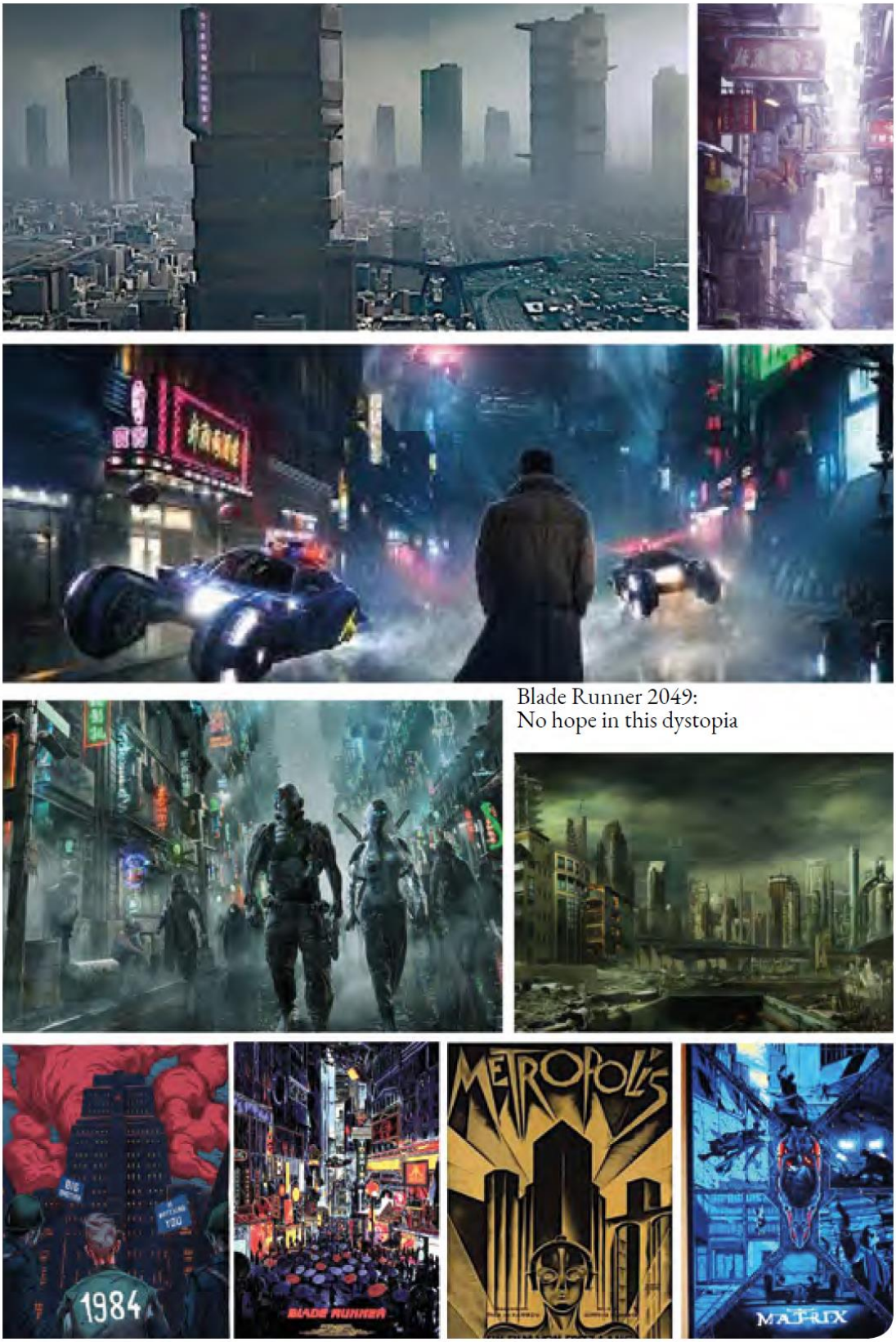

Figure 47. Dystopian Cities in the movies. Source NETWXPLO/UNESCO[355]

[355] CATHELAT, B. *SMARTCITIES SHAPING THE SOCIETY OF 2030*, UNESCO and NETEXPLO, Paris, 2019, p.38

Next phase is the Mindful, Emotional AI, in which the systems have feelings and emotions (it is clear that their original definition on what's an emotion or a feeling is done by humans, but once in operation, their decisions and behavior will depend in some way on their mood. The obvious evolution is the Self-Aware, Conscious AI, where AI becomes aware of its own existence, identity, which opens a nice discussion about rights? obligations?. These more advanced forms are called AGI (Artificial General Intelligence) and we find the machines with learning functions, perception, knowledge and behavior completely indistinguishable (Turing test[356]) of those purely human.

Finally, the constant evolution and improvement will lead to the ASI (Artificial SuperIntelligence), where all the functions will be superior to the human ones.

Conscious City

This AI evolutionary and capacity improvement line brings us to the concept of Conscious City: a city as a self-aware technological entity, not far from the paradigm presented in '*Singularity*'[357], where the city behaves as an autonomous entity which self develops capacity without any human intervention, excluding humans at all decision levels, considered hazardous for the planet and themselves. Without reaching that dystopia, Sensitive Cities or cities that automatically orientate its actions towards objectives such as welfare, environmental sustainability or citizens health or safety, are already in the mind of AI developers. Thus, through the capacity to feel and a certain form of self-awareness, the systems are oriented towards achieving those objectives, marked and supervised by human management. There is a research path around the idea of 'persuasive cities', through the application of psychosocial theories integrated in new urban designs. The intention is to integrate cognitive neuroscience elements in the city daily operations, so that the Conscious Cities better adapt themselves to offer the best citizens well-

[356] The Turing's test sets a challenge where a human can't differentiate whether he is talking to a computer or another human (by electronic chat). Although Google claimed for a basic pass with a 2018 test with a 13year-old human and his system, other researchers like: *Kapor, Mitchell; Kurzweil, Ray, "By 2029 no computer – or 'machine intelligence' – will have passed the Turing Test", The Arena for Accountable Predictions: A Long Bet,* betted a wager of $20,000 about computers passing a full Turing test not before 2029.

[357] KOUBA, R. *Singularity*, 2017

being and happiness, while achieving excellent sustainability. A conscious city could use real-time data, historical planning and citizens known behavior patterns to dynamically react and adapt itself to exceptional situations (resilience) or just evolve according to an established plan, by changing the urban landscape.[358]

In figure 48, City tries to persuade citizens to think twice next time they plan to use car in rush hour and approach city center. Other alternatives like moto, bike or public transportation seem faster. As explained before, with an average speed of 6 mph at Dublin's downtown, worth it a commuting pattern reconsideration?

Figure 48. Example of 'Persuasive City'[359]

[358] PALTI, I. & BAR, M. "A manifesto for conscious cities: should streets be sensitive to our mental needs?" *The Guardian*, 2015 https://www.theguardian.com/cities/2015/aug/28/manifesto-conscious-cities-streets-sensitive-mental-needs retrieved by Nov2019

[359] *Cities. The new deal.* JCDECAUX 2018, Paris, p.35

Created by 2014, the concept establishes that the city manages through AI not only the data coming from sensors (IoT world) that watch out the city physical parameters, the citizens available information, their interactions in social networks, etc, but also (and here is where innovation shows up), city knows about the citizens psychological state, both individually and socially or collectively, to determine their needs, satisfactions or frustrations, moods, and respond by adapting the city and its resources: information, benefits, services, etc. The use of this new type of information (psychological) even if it intends good purposes, raises serious ethical questions about respect for the citizens psychological privacy, or its possible misuse as masses mental control (populism taken to the extreme?, Big Brother, etc)

Future is a mixed model for SmartCities

The most common critics to current SmartCities strategies point at implementations and designs too much top-down from city managers to citizens; evaluation success too much purely economic or financial; too much technology narcissism; data elevated to gold-like status; psycho-sociological impact unattended; dehumanized vision, too much virtual and Proof-of-concept driven (PoCs are excessively frequent), not citizen-centric.

Model should evolve to strategies more focused on:

- Human: Citizen-centric with welfare and quality of life as major goal.
- Sense of community (ideally a beehive) with all citizens cooperating around a collective task or project, with a strong sense of unity, belonging and identity. Multiplicity as the new city social paradigm, where the total sum of ideas, opinions, preferences set the city evolution.
- Self-everything: sufficient in water, energy, matter, people-talent, funding, resiliency...
- Zero-everything: car fatalities (zero vision), pollution, carbon, violence, unrecycled waste, unmanaged water, non-renewable energies, crime, inequality, poverty.
- Sustainability: Social, Economic, and finally environmentally sustainable: Carbon negative, Circular in matter cycle.

- City as social enabler: relationships facilitator, inclusive, social diversity, liveable city, leisure fostering and shared activities.
- Citizens as co-creators: permanent engagement, proud of contribute. City as expression of collective experience. SmartArt as combination of technology and creativity.
- Megalopolis broken: into walking-distance suburbs/districts making them 'next-to' at human scale, spaces for humans, soft heights gradient, boulevards as a urbanism principle, walkable city, bike-friendly.
- Smart-DataSphere: AI-driven Digital Twin models monitoring the physical city (from sensor to IoT to Edge to Cloud Analytics to AI), simulating potential improvement alternatives, but always understanding living humans. Respectful and Ethic technological city, conscious and persuasive city by tracking citizens psychologies.
- Agile, Dynamic and Versatile: Always creating projects, experimenting, listening to citizens, applying feedback, adaptive to new circumstances and needs, developing new solutions and starting over again and again. Always creativity as leading motion.

"Create opportunities, solve problems, innovate. All three are inseparable". Jane Jacobs[360]

- Open, Respectful, Ethic, based on a strong identity and values.

From the technology point of view, experts think about a future where we balance a cybernetic centralized governance, where city resiliently manages all the environment and responds with self-adaptation to human needs (managed by some technocratic experts, so who needs politicians?) with a distributed human collaborative intelligence, where citizens are permanently connected (thru a digital symbiosis) to city, contributing and cocreating.

My personal short-term vision (figure 50) is made of three concentric and permanently interrelated areas: Citizens, Spaces, Data, or a combination of Humanism, Urbanism, and Technology.

[360] LAWRENCE, F. *ETHICS IN MAKING A LIVING. The Jane Jacobs Conference Edited*. Scholars Press Atlanta, Georgia. 1989 Boston College, p.135

While Citizen must be at the center of all activities and initiatives, everything happens in a place or space and technology is always present to help achieve the welfare objectives or as an enabler for other areas actions. Placing the citizens at the center implies to permanently keep in mind the city culture values and civilization ethical principles, fully respecting human dignity. But a city is 'a place where people meet', we said, so to talk about a city, we must include the spatial dimension, and everything happens in spaces: open spaces or even thinking about the whole planet (environmental sustainability, as we have one single planet, same atmosphere, etc), or closed spaces like buildings, homes, transportation vehicles. In the urban area, spaces must be designed with technology, but with citizens service as the main core objective. Look at figure 49, citizens are telling us with their footprints what's the right design. I still remember my childhood and the large amount of hours I spent on streets, playing with my schoolmates. Numbers tell that 75% children played on streets by 1975 and less than 15% do so today. We need to reconquer streets for humans, now cars are ruling them. All are benefits from that: physical activity, sense of community, social activities, business growth,…

Figure 49. Example of wrong design for humans[361]

And all is producing data, continuously, data that can be monitored by technology to increase city welfare, controlling the physical city and understanding citizen's

[361] *Cities. The new deal.* JCDECAUX 2018, Paris, p.19

needs, converting all that massive raw data into insights, to make well-informed and right decisions and to fully engage with citizens in the future city construction. So, a SmartCity design should continuously flow thru these three concentric concepts, in-out and out-in, but always considering the citizen, the user of any city service, the Lord to serve, in a space that must be carefully adapted and leveraged, always with the most advanced technology and taking advantage of the incredible innovations and new possibilities it brings.

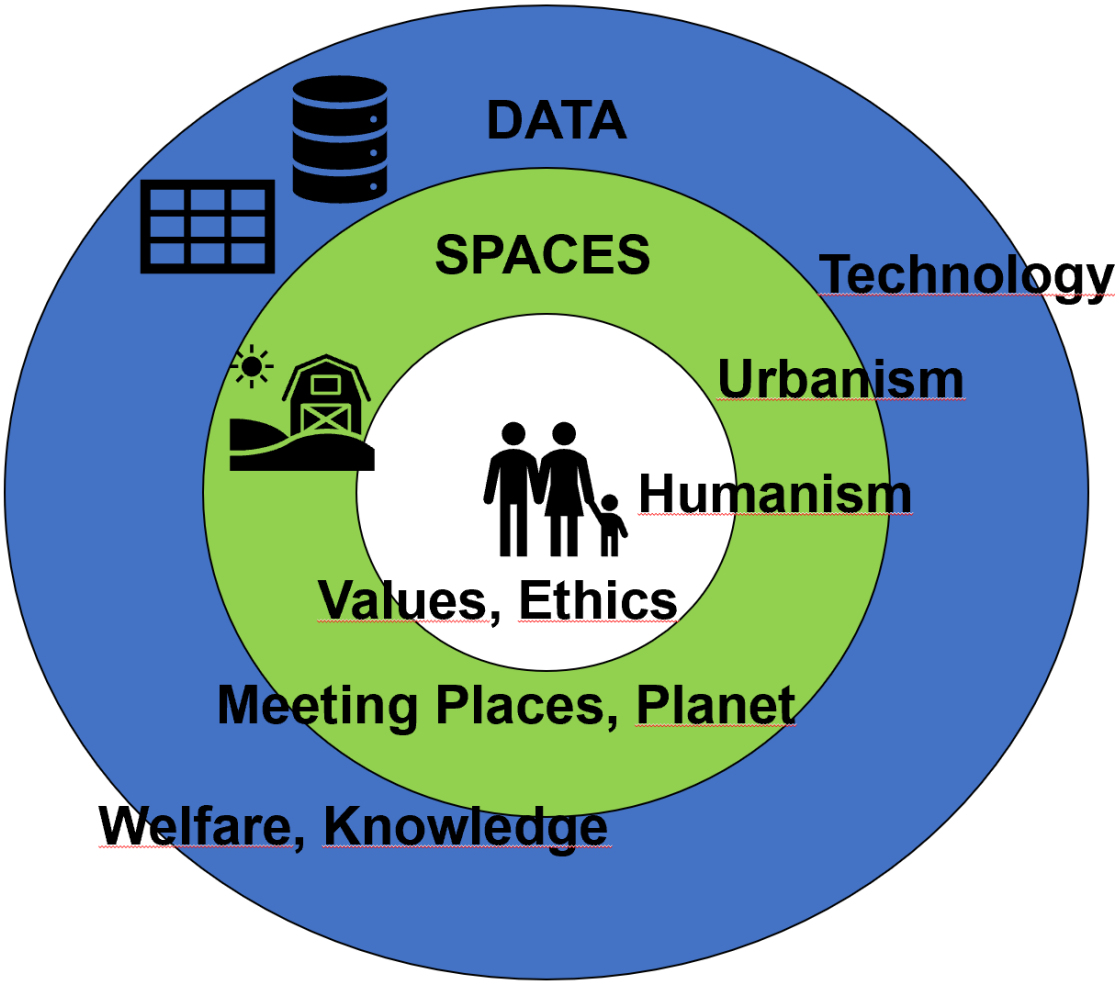

Figure 50. SmartCities Concentric Vision. Source: Author

SmartCity Ethics principles

As technology accelerates innovation, it becomes more and more inevitable, omnipresent and indispensable. So, technology adoption is a question of time, investment capacity, as Bill Gates once said: "*It's neither easy, nor cheap nor optional*", then question is to define the ethical limits and choices for technology to operate.

The increasing role of Technology in the SmartCity strategies is raising criticism from different angles:

- Concerns about technology impact: usefulness of big data and Opendata, credibility of algorithms and its applicability to everything, innovation speed that makes humans lose control. Innovations improvements and citizen's real use of them.
- Concerns about technology displacing socio-cultural assets. Interest for culture is declining, for reading, for arts, as everything can be found immediately from Internet. Cities are losing soul, humanity, charm, becoming generic, grey, unhuman huge amounts of concrete.
- Concerns about technology accelerating economy globalization, paying no attention to micro-economy, inhabitants real concerns.
- Concerns about technology gaining power in detriment of elected officials and politicians. Algorithms make less mistakes, better operate the city, so politicians are less relevant. No way for creative governments, every initiative should be the informed consequence of analyzed data.

With technology in all city aspects, we should balance the non-Human City (Robot City) automatic operations, where technology could work in an automatic way, and the Human Collaborative City, where digital citizens use technology to contribute and influence the city evolution, as cocreators of City's future. Both worlds could coexist depending on the city complexity, always seeking for the best future quality of life. Some areas must be automatic or semi-automatic as technology can manage it much better than humans while other will use technology as an enabler, a companion, a facilitator for pure human decision making. This will turn the

SmartCity strategy / plan as a core component of any electoral campaign, an attractive component to gain citizen-voters and win elections.

Main ethical discussion about AI applied for cities is the use of citizens data. Citizens identity, personal circumstances, preferences, sexual options, race, gender, mobile phone number or other identification systems like id-card, social security number or driving license, face recognition, fingerprint, iris scan, and also properties, wealth level, not to mention healthcare conditions, DNA, defines a person but all these data are PII (Personal Identifiable Information) and must be protected. EU GDPR and many others are strictly forbidden the use of this kind of data without explicit owner consent, and fines are huge.

But non-PII or collective information, patterns, aggregated info is very valuable for making right decisions and offer the best city services. Ok, but this kind of information is based on different sources of PII…To what extend citizens are forced by some Internet solution providers to give access to some PII information in exchange to some popular services, sources of information, useful tools? In other words, do they have alternatives or options, or must they accept or assume they will be considered asocial, weird citizens?

We must balance the real need to make all citizens traceable for good (need to know my citizens to deliver better service), but avoid the evil (espionage, Grand-Father repression, intrusive marketing). So, we need to operate in a triangle that is always looking for: a) Fully respect privacy, b) Understand citizens behavior, c) foster economic and human growth by collecting all needed data and properly manage it by an (anonymous, aggregated, secured, trusted) way. All SmartCity strategies must combine these statements, and working with the three main actors: a) Citizens, always under pressure, need basic training to protect their virtual identity from Internet sharks while allowing city officials to benefit from it, b) City Managers, defining the data management rules, compliant with regulations, and obsessive about data misuse and potential leakages, c) Data Providers, from those managing sensors, cameras to those processing software and data, which must be very respectful with the data they manage, otherwise get ready to receive fines and critics (remember recent Facebook, Google, other scandals). Problem raises when some of those companies' business is precisely based on making money by means of the

data they grab and process, so they are permanently gambling with soft regulations in some data acquisition methodologies vs strict rules like EU GDPR.

Data use discussion moves around concepts like OpenData (freely published anonymous data to foster economic growth based on better city knowledge), City Data Control (IoT Data to manage physical parameters), Civic Data (data about citizen behaviors, mostly coming from social networks analysis), Data Privacy (related to all PII information and trading, companies, safety secrets or Intellectual property), Data Business (all related to economy and business trends, but mainly fed by personal investments, transactions, wealth status), Data Concession (patterns and methodologies to get citizens consent to allow some private data), Data Safety (Cryptography, BlockChain, other technologies). All these concepts move between this ever fight between the good and evil. Other dimensions like time (old or fresh data), truth (true or false), accuracy (biased or exact data, error margins), ownership (who controls or owns it) are forgotten or not taken into consideration and then, all analytics and conclusions based on that data could be false, manipulated, inaccurate, inexact, leading to wrong decisions.

So, legislation about data acquisition, use and the way it us managed needs massive improvement, and lawmakers are not skilled enough while technology is continuously accelerating on performance and possibilities. Countries make laws, not cities, ok, but cities are final responsible for citizens data, and they are reacting. Amsterdam, Barcelona and New York City formed last Nov 2018 the "*Cities Coalition for Digital Rights*"[362] with the UN-Habitat support. Many other cities (aim to reach 100 soon) UCLG (World Organization of United Cities and Local Governments) and EuroCities Associations have joined as well. Participant cities agree on signing a 5 key principles declaration on Digital Rights:

"• *Universal and equal access to the internet and digital literacy.*

• *Privacy, data protection, and security.*

• *Transparency, accountability, and non-discrimination of data, content, and algorithms.*

• *Participatory democracy, diversity, and inclusion.*

• *Open and ethical digital service standards."*

[362] CITIES FOR DIGITAL RIGHTS https://citiesfordigitalrights.org/ retrieved by Dec 2019

This initiative demonstrates the cities concern for the lack of legislation that seriously compromises ethical values (especially Western ones) when applying certain digital technologies. Universal, inclusive access to these technologies is defended as humanity's progress, but it is established that such use must offer due guarantees. Any activity or action ethical assessment underlying problem (as we saw in the MIT Moral Machine problem) is the fact that there are different ethics according to the different civilizations that dwell our planet, although many considerations might emanate from the Universal Declaration of Human Rights, signed by all nations. As an example, Western Civilization is based on three fundamental pillars: Reason (with Athens as a reference), Rights/Law (Rome) and the Christian religion (Jerusalem), but there are other civilizations and other lighthouse cities.

This lack of legislation also presents a challenge for technology providers, who must determine the limits impose on their developers and balance the business opportunity with the underlying ethical impact. Some companies like Microsoft have publicly stated that they will never put business up front of ethics. But the fierce competition from companies based in countries with a lax ethics in this regard makes companies have to consider what is ethical and what is not, and assess whether they invest in certain technologies or just lose those business opportunities. As an example, face recognition systems are on hold and under question by many Western Companies while some Chinese ones are accelerating and leading that market. The leading technology companies' relevance is increasing as they become ethical judges, due to the international organizations lack of consensus or just basic guidance. Users (cities) will decide with their investments whether they reward these ethical considerations or punish them (by investing in their competitors). As an example, let me include here the "*Microsoft AI Ethical principles*[363]*:*

- *Fairness. AI systems should treat all people fairly*
- *Inclusiveness. AI systems should empower everyone and engage people*
- *Reliability & Safety. AI systems should perform reliably and safely*

[363] Microsoft: Our Approach to AI https://www.microsoft.com/en-us/AI/our-approach-to-ai retrieved by Dec2019. Also at: *The Future Computed. Artificial Intelligence and its role in Society*. MICROSOFT, Redmond, Washington, USA, 2018 pp. 57-73

- *Transparency. AI systems should be understandable*
- *Privacy & Security. AI systems should be secure and respect privacy*
- *Accountability. AI systems should have algorithmic accountability*"

I would like to highlight the deep reflection on human dignity, equality, social inclusion that this series of principles raises. The main AI basic problem must be taken into account: the data licit origin and accuracy, avoiding bias. Biases are practically inevitable and may compromise the usefulness of the entire AI application. Another main topic to think about is transparency in developments: should software companies report on the algorithms they are working on?, how they work (to verify their information ethical management) and their purposes or the purposes for which they are being created? Should there be an UN-dependent body that knows about these latest innovations? And on the contrary, should legislation be established that defines what AI abusive uses should be considered crimes for humanity and then judged by The Hague Human Rights Court?

Cities Ethics under Lopez-Quintas' Reality & Conduct Levels Analysis

Universal history is citizen history. The city gathers everything that refers to mankind and none of his competencies is foreign to it.[364] The city is multiple, diverse, constantly changing, it is the place where humans develop and exercise their social facet. And they do it fundamentally through the encounter. The encounter gives human meaning to the city, turns humans into persons, so they collaborate, develop their creativity. The philosopher Alfonso López-Quintás[365] develops his theory about the human levels of reality and behavior on this fundamental question: the encounter. Since the encounter, men enrich their lives through ecstasy, as a creativity expression and from the knowledge growth. Below the encounter, we can find the vertigo spiral that begins in objectification and individualism, to lead to violence, anguish and despair, then death.

[364] CHUECA GOITIA, F. *Breve Historia del Urbanismo,* Alianza Editorial, Madrid, 1968 p.8

[365] LOPEZ QUINTAS, A. *Descubrir la grandeza de la vida.* Desclée de Brouwer. Bilbao, 2009 pp93-123

Encountering (as social) is far more than just formal meeting. By means of the encounter, people grow, both personally and collectively.

In the EU Urban Charter Manifesto[366], cities are considered the ideal place for meeting, for gather, the best place where social life fully deploys, and without which, as Thomas Hobbes once said "*life is nasty, poor, solitary, brutish and short*" "*There is nothing more attractive in cities than other people*". Jan Gehl [367]

In the López Quintás' theory, we can find positive and negative levels of reality and behavior. Positive levels express human development, from people as things (level1), to encounter and socialization (level2), to the maximum expression of human values (level3) reaching the transcendent (level4). This positive progression is called by the author as ecstasy. Guided by the expression of human values from dignity and cultivated by knowledge, it rises developing all human potential. It is a positive spiral. In the other way, we find a negative spiral, a vicious circle that leads to anguish, despair and the worst human being known expressions. This path is described by the author as vertigo, giving the sense of fall, self-destruction. We start from insensitive selfishness (level -1) to possession, domination, including violence and phycological and physical abuse (level -2). The next phase (level -3) reaches death and war, the denial of life. The author comes to describe a (level -4) as the outrage to a dead's memory as the supreme expression of human evil.

We must not confuse ecstasy / vertigo with good / evil, vice / virtue. Ecstasy is supported / fed by creativity[368] and knowledge[369]; vertigo is an expression of moral evil[370] in all its degrees. Ecstasy attributes are: Humility, Love, Stability, Realism, Creativity, Respect, Responsibility, Perseverance, Leisure, Relationship, Trust.

Vertigo attributes are marked around: Arrogance, Egomania, Hedonism, Instability, Arbitrariness, Pragmatism, Reductionism, Indolence, Sadomasochism, Greed.[371] In

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[366] "Manifesto for new urbanity", *EU Urban Chapter* p.44. https://rm.coe.int/urban-charter-ii-manifesto-for-a-new-urbanity-publication-a5-58-pages-/168095e1d5 retrieved by Jan2020.

[367] GEHL, J. *Cities for People*. Island Press, Washington DC, 2010 p.68

[368] LOPEZ QUINTAS, A. *Vértigo y éxtasis. Bases para una vida creativa*. Asociación para el Progreso de las Ciencias Humanas. Madrid. 1992. p.77

[369] Ibid p.338

[370] Ibid p.43

[371] Ibid pp.327-331

cities, as places where many humans live, we can find all these levels of reality and behavior. We can match different city areas, places, buildings to those levels, depending on their function and human values expressed there.[372] But, like humans, cities as a whole can also develop levels of reality more pronounced than others and could be clearly identified with levels of reality and behavior (city ethics). We will apply these levels to cities to find role models as inspiration in their development and strategy and as learning on what we should not look for or the abyss in which some cities are sunk.

Level 1 describes a physical reality. It's the world of things. People here simply live as individuals, basic functions like working, moving, resting.

Values: Efficiency, savings, time-speed. The human being is reified. Vice as a lifestyle such as gambling, or prostitution is also included in this category. People are just elements to be used. If there is dominion or repression, then we would fall into level -1.

Cities in Level 1: This is the level of Koolhaas' Generic Cities. Unhuman functional concrete cities. No human touch, no history, no traditions, no flavors, no spaces for connection, meeting. Just things managed by IoT, all under control. Efficiency for citizens, but without the citizens. Those large cities are numb, petrified cement monsters. Those midsized are typically bedroom suburbs. Very unlikely to find a small city in this stage, as small size foster citizens cooperation and sharing. These cities are not fostering social behavior. It exists, ok, citizens are finally humans, but there is no affect or human relationships in these city models. In these cities' definition, love doesn't exist[373] like in the most famous dystopian novels: Brave New World by Aldous Huxley and 1984 by George Orwell. It's city of Data, not of Humans. The IoT Kingdom with Data as the city center, The Generic cold City.

Cities Examples: It's hard to assign cities to this level, as all of them include some human aspect, although most times is very hidden behind all that cement walls. It

[372] Cf. CASADO. M. *Trabajo Fin Máster de Humanidades.* UFV. Madrid. June2019

[373] GRÄF, L. "Love and Sexuality in Dystopian Fiction. An Analysis of 'Brave New World' and 'Nineteen Eighty-Four'", *GRIN*, 2015, https://www.grin.com/document/319788 retrieved by Oct2019

comes to my mind long walks over long grey cement streets in Atlanta or Los Angeles' 'beautification'[374] initiative, as a reaction to this Generic City image?

I had a similar experience in Helsinki, but that's because of cold climate, functional ugly soviet-like urbanism. Also, in some Swedish mid-sized cities where neighbors don't know or talk[375] to each other, and this combined with cold weather makes streets empty like ghost cities. Another vision comes from the very famous 'sin Cities' like Las Vegas (USA) or Macau (China) which promote the worst human vices like gambling, sex, possession, prostitution, etc. Humans are only customers, with the aim to make them spend the largest amount of money: the false idol.

Historical City: Looking back to history to find models in this stage when technology was not present, I could point to Tomas More's Utopia[376], an ideal dehumanized perfectly organized city. That way we can't point to technology as the only precursor for this model, the Spartan unhuman city model was invented long time ago. There, citizens were just doing and complying with basic functions and activities like work, rest, move, fight (defend the city), trade. To match 'sin cities', the obvious historical reference are the biblical cities of Sodom and Gomorrah.

Level 2 City as a person, with reality and conduct/behavior. This is the main model: a city where citizens can develop their creativity and express the human social dimension. Main socializing driver is encounter, not mere meeting, but more like an engagement, a joint desire to collaborate and do things together.

Values: Basic values lean on respect, generosity, regard, esteem, friendship, love.

Cities in Level2: City fosters these behaviors with right spaces for leisure, for meeting, trading, agoras to talk and discuss, theatres to dream together, to express creativity, open spaces to play, enjoy and kindly compete, all over a basis of freedom. A city model where citizens are treated with equity, respecting rights and dignity. These cities create the sense of belonging and citizens feel proud of living there.

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[374] Los Angeles Office of Community Beautification http://laocb.org/ retrieved by Nov2019

[375] GEE, O. "Swedish people just don't understand small talk" *The Local*, 2013. https://www.thelocal.se/20130702/48816 retrieved by Dec2019

[376] MORE, T. *Utopia*, 1516, London, England

We can see in Figure 51 an example of these spaces that promote social integration and share knowledge. Traditionally, these spaces have mainly been religion driven meeting spaces like churches, abbeys, monasteries or civil squares, markets, and occasionally theatres, stadiums, then Universities, schools, bars, boulevards, now we are finding open smart spaces in urban parks, recreational areas, natural parks, smartworking spaces where nomads and start-ups shine, and the virtual social spaces. By 80's, many experts pointed to technology adoption as a dangerous asocial isolation driver leading to scattered cities with almost no human face to face connection. Reality has proven this wrong, with social technologies connecting people from distant places, but finally they meet and greet, and never replacing the social live with nearby people (family, coworkers, neighbors, etc)

Figure 51. Cities are meeting spaces.[377]

Historical City: Many cities have promoted social human expression, like NYC, Paris, London, San Francisco, mainly as a consequence of intense attraction because of the three Industrial revolutions happening there.

[377] *Cities. The new deal.* JCDECAUX. 2018, Paris, p.64

Level3. The next step forward means reaching the ideal of Beauty, Truth, Justice, Good-Goodness. Citizens reach full personal development. It is the apex of human creativity, in freedom, and always over the basis of respect for dignity.

Cities in Level 3: The city flourishes in the sciences and arts with maximum expression of human creativity. The city offers the optimal conditions for the best human qualities boosting and we can say that its inhabitants are fully happy.

Historical City: Although several cities have hosted very notable groups of artists and scientists who have contributed to mankind progress (Paris, London, Madrid, NYC, Los Angeles-Hollywood, Boston, Geneva, Stockholm to mention some), these have shone in one or several disciplines, partially. Only two cities have been able in a historical moment to gather all the best experts and geniuses of that time in all disciplines and get them to live and work together: The Aristotle's Athens (around 350 BC) and the Wittgenstein's Vienna (around 1900). Already explained at chapter 1.0, these two cities, and at that exact time could be considered the richest expression of human creativity. I also find at this level the concept of community, collective effort, people union around a common goal. We would be at the stage of SmartCities 4.0 already explained, of collective consciousness. Several cities lived this communion forced by circumstances (fight for freedom or achieve an extraordinary goal). I could mention cities besieged in various wars, or Sausalito (CA) with men and women tireless building destroyer ships in WWII, Bletchley Park (UK) (decoding the Nazi Enigma cypher), Dubrovnik (Croatia) reconstruction, Cape Canaveral (FL), Houston in the space race, MIT headquarters (MA), CERN (Switzerland) and many other cities where citizens have lived in community. The Copenhagen Carbon Neutral status objective including citizens (the entire city) implies that everyone must use the bicycle in at least 85% of their commuting, demonstrating how a collective effort towards a common goal achieves an extraordinary human development.

Level 4: Above level 3, only the concept of transcendence can be described. The human being connects with the divine from its deepest essence, from its dignity.

Values: Unit, transcendence

Cities in Level 4: Many cultures such as Islamic, Jewish, Buddhist, consider the city as a sacred place. For centuries, the human activity development has been centered around the city temple, and human knowledge has been generated and

transmitted in monasteries, precursors of the current Universities. Some cities inspire mysticism, inviting us to elevate our thinking and abstract ourselves above our crazy life and the speed with which we do things, without reflecting, often without a clear sense and without contributing anything to our personal development.

Historical Cities: Several cities and in several times seem clear expressions of this level like Rome, Toledo (Spain), Jerusalem, Mecca. The clinking of the candles at the temples together with the dim light creates atmospheres that invite memory and personal reflection. The sound of Tibetan bells and prayer wheels in Buddhist cities, the song of the muezzin in the Islamic, the incense in the Shinto Japanese shrines and at Santiago de Compostela's (Spain) cathedral welcoming pilgrims create a mystical halo, a relaxing and sublime atmosphere to achieve complete meditation. 170 cities around the world can be found in Wikipedia as Holy Cities[378]. It seems clear that this concept of a transcendent city makes no sense without observing the man religious dimension, something very important for some and less for others. In any case, this classification as a sacred city means a reference, a historical branding, a city powerful attraction for some. If a city attracts pilgrims, it holds the opportunity to make itself known from a different dimension than just the purely tourist or business one.

Level 0: Not in the López Quintás' theory, I would like to add this level as a tipping point.

From an individual point of view, level 0 marks the border between falling into the spiral of depression, anguish, despair, which can end in suicide, or initiate a vital ascent towards socialization, friendship, love and human values. This level 0 is brutally illustrated in Pink Floyd's "*The Wall*"[379]. That wall is precisely that threshold: level 0.

This artwork is a double Waters' autobiographical album and is the best-selling double album in music history. It describes the life of a rock star named Pink. Since his childhood, Pink has been building a defensive 'wall' against a hostile outside environment that constantly mistreats him. His various fears and traumas constitute

[378] "Holy Cities" *WIKIPEDIA*. https://en.wikipedia.org/wiki/Holy_city retrieved by March 2019

[379] GILMOUR, D. and WATERS, R. *THE WALL*, Pink Floyd, 1979

the bricks with which he is forging it: the death of his father in World War II, sacrificed in a key battle in Italy, the dominant maternal overprotection, childhood without a father, the British postwar oppressive education system, a government that treats its citizens as chess pieces, his tyrannical and superficial ego as a famous artist, his sentimental failure with his unfaithful wife, the drugs world that surrounds the stage, his asthma, ...

But this wall, instead of protecting and isolating from what oppresses him, leads him to a spiral of self-destruction that comes to question and try suicide. Friend's help and self-reflection lead him back, to explore if there is something / someone beyond that wall and finally, to tear it down to find a new life. Pink builds his wall exactly between Vertigo and Ecstasy and chooses the descending path of anguish and despair to fall into the ditch of dehumanization. He is the antihero. The suicide attempt with drugs marks the bottom of this abyss of self-destructive loneliness and isolation, the point of definitely embracing madness. But here Pink is subjected to a trial of self-analysis and reflection. This judgment condemns him to tear down the 'wall' and explore the outside world: 'flow' again, like a 'fluid' fluid in allegory to 'Floyd' and rediscover the new reality as a liberation, a catharsis, a reinvention, a rebirth, the discovery of Ecstasy.[380]

A masterpiece developed from anguish situation, constantly going up and down the vertigo slide towards destructive loneliness. The wall separates and isolates from reality and prevents glimpsing the possibility of ecstasy, of positive construction of a happy life. It is a tremendous social denunciation of the postwar situation and the conditions in which those generations lived. The creative tone is surrounding level 0, between -1 and 1, the people objectification in an accepted order as necessary to trace and rebuild a society destroyed by war. At that zero-point, Pink builds his wall based on traumas and fears, as a barrier to the outside. There are few references to a level 2 with the relationship of love / hate with his mother and love for his wife, although unfaithful. Very few at a level 3 of values, although the denunciation of the unjust and the oppressive aims at the ideal of justice and truth. In the video, there is a stroke of the transcendent, when it seems that Pink falls into the

[380] Cf. "PINK FLOYD. THE WALL. A Complete Analysis" http://www.thewallanalysis.com/ retrieved by Dec 2018

acceptance of suffering looking like a bereaved Christ. Finally, self-reflection and external help make their judgment and the wall falls to begin to glimpse that there is another world, a world that starts in ecstasy and leads to happiness. Too bad the work ends when Pink begins to look at it with enthusiasm, because we are left without knowing it. The work is wonderful from the musical point of view, but it immerses us in a permanent situation of denunciation and anguish, of pain. And just when we see the light, the wall falls and it all ends, with what we are left with the expectation but at least, with the satisfaction that the wall has finally fallen.

This allegory has been adopted as a symbol by numerous social demands, such as apartheid, the reaction to the Argentine dictatorship and the Berlin's wall fall, the city liberation and unification. It was not thought in that line, but the Pink Floyd concert in Berlin in 1990 was really epic, celebrating the anniversary of its demolition.

From the city perspective, level 0 makes the difference between respecting the law, verifying minimum standards of democracy and ethics in the city, in contrast to places where living poses a risk to people life and basic elements such as democracy, freedoms and ethical values are seriously threatened or subjected to dictatorial power.

In The Economist's Liveability Index[381] we can find that cities scoring under 50 have severe limitations on the normal human life development. Those under 80 have aspects of normal living impacted and the consultant suggests companies that want to hire employees there to compensate them with an allowance. This Liveability Index score 80 would correspond to level 0 of this reality / behavior scale.

Level -1: In the other way, the negative, that of vertigo, we begin with level -1 as people showing a selfish behavior, exercising others explicit domain through threat and repression. Another expression of this level could be good people but fallen into vice, which can only lead to bad consequences for their lives and relatives.

Anti-values: There is no freedom, there are no voluntary activities, everything has a directed purpose. There is no personal time or spaces, there is no place for leisure

[381] "The Global Liveability Index" 2019, *THE ECONOMIST*, p.5. Also at https://www.eiu.com/n/the-global-liveability-index-2019/ retrieved by Jan 2020

or creativity, everything has a predefined purpose. The selfishness and irresponsible consumption from some means poverty and despair for many others, in situations close to slavery.

Cities in level -1: Cities at level -1 are cities with a poor or non-existent democracy, no/few freedoms, and human rights are very inhibited. Dirigiste cities, where the omnipresent authoritarian regime decides absolutely everything, what can be done, what to say, learn, listen, etc. They are Asian cities with communist regimes and other cities in other places where a military or royal dictatorship prevails. In these cities, individual privacy is not a right and video surveillance reaches the maximum expression by observing and evaluating the citizens behavior, as a Big Brother. Chinese Cities are examples of this. We can also apply this level to cities with a very unbalanced society and high levels of poverty, underworlds or slums, such as Cape Town and many Latin American cities like Rio de Janeiro's favelas or Africa's Accra's beachfront slum, Kibera in Nairobi, India's Delhi, Karachi or Gecekondu in Istanbul . In these suburbs the law of the most armed prevails and life has little value.

Historical Cities: Most cities went through this phase totally or partially, especially during middle Ages. The periodic famines that hit Europe brought their inhabitants to these situations. As we enter the modern age, improvements in health, industrial development resulted in very significant advances in social welfare and it was observed how many cities went from a basically -1 to +1 status, with first outbreaks of +2. As an artistic reference we can think of Victor Hugo's Les Miserables [382]to illustrate this level.

Level -2: Linked to previous level of anti-values, we have level -2, where violence, abuse and extortion are common, and fear of others is quotidian.

Anti-Values: Contempt for life, physical and psychological violence, fear, frustration. Injustice, insecurity, racial, social and gender segregation. Fear drowns creativity and any other human form of socialization; surviving is the only thing that matters.

Cities in Level -2: An example would be Ciudad Juarez (Mexico) at the time of the Juarez drugs cartel, where living was a constant challenge. We could indicate

[382] HUGO, V. *Les Miserables*, 1862, Paris

Caracas (Venezuela) as the city with the highest number of homicides or 120 / 100k inh by 2015.[383]

Historic Cities: The history of the city is associated with the sad story of murders and violent acts that happened in it. It's easy to review the most famous murders in history to find the moment that these cities lived, and the panic its citizens felt.

Level -3: It is an evolution of the previous level, where death and murder are usual.

Anti-values: Evil, injustice, violence, murder. Destruction, War.

Cities at level -3: Continuous and long-term war place Damascus (Syria) here.

Historic Cities: We live in peaceful times. Although the twentieth century saw World War II with 66 million dead and the horror of the Holocaust, the worst massacres in the mankind history happened before the twentieth century. These episodes of extreme cruelty happened especially in Asia, where the Mongol conquests of the 13th century, or the civil war of the Tang Dynasty, killed 35 million people in 8 years in the VIII century. Genghis Khan in his conquest of China in the XVII century killed 25 million people. The two opium wars in the 19th ended with 60 million dead. Perhaps the example of a city with maximum horror could be Nanjing (capital of China at that) in 1937, where the Japanese army killed 300,000 in 2 weeks with a barbarism and cruelty never seen in the mankind history. Basically, they wanted to annihilate the base of Chinese civilization. And it was done viciously, in front of international observers, horrified.[384]

Level -4: And finally, this level puts us in cities at war, where destruction is the objective, death is a path for victory at all cost. The greatest degree of vileness is reached, destroying the defeated memory, as did the Taliban with ancient monuments.

Anti-values: Destroying even enemy's memory to kill even other's dignity.

Cities at this level -4: Palmira (Syria) was destroyed and wrecked down by Taliban, even historical places were devastated, in an attempt to delete memory. Taliban also destroyed the Buddhas of Bāmiyān, two monumental statues of Buddha carved

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[383] "Caracas World's Most Violent City: Report" *Insight Crime*. 2016. https://www.insightcrime.org/news/brief/caracas-most-violent-city-in-the-world-2015-report/ retrieved by Nov2019

[384] CHANG, I. *The rape of Nanking.* Basic Books, 1997 New York. Pp90-100

on the sides of a cliff in the Bāmiyān Valley in Afghanistan. 8 world heritage cities have been destroyed by ISIS in the 20th century.[385]

Historical Cities: There have been many cities completely destroyed to erase the culture that flourished there, and from which, we only have few ruins, or even worse, the original location is still a mystery. To highlight one of the most famous, we will talk about Troy, in ancient Greece. In the Iliad, Achilles killed the Trojan prince Hector, tied his corpse to his carriage and dragged him wildly on the ground in view of all, to leave it without burial and to be devoured by the vermin, as a way of posturing and post-mortem humiliation. Priam, king of Troy and Hector's father offered numerous goods and begged Achilles to return his son's body to bury him. Achilles, moved by the pain of the king, his courage and his dignity, returned the body of Hector in the midst of a long cry for so many terrible tragedies that the war had led to Greeks and Trojans.[386]

Artistic expressions generally impact the viewer by playing with situations or actions that go through these different levels of reality, causing a strong impression and, therefore, a better message fixation. Thus, a novel includes passion, love, violence, domination or even murder or rise to reflect on supreme values such as beauty or truth. That way up and down the scale of levels of reality and behavior makes a sublime and human artwork. These contrasts can be seen in all kind of arts. Let's look at an example in a song dedicated to the city. There are many songs dedicated to cities, because the city inspires us and contains most of the levels explained above.

In the song "*Neon Heart*"[387] by the Mondragón Orchestra, we can see those levels, those contrasts, that love / hate relationship that we often feel for our city.

"*The city where I live has grown with its back to the ground*
The city where I live is the map of loneliness

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[385] "8 Patrimonios de la Humanidad destruidos en el siglo XXI" *UNHCR/ACNUR* 2017. https://eacnur.org/es/actualidad/noticias/eventos/8-patrimonios-de-la-humanidad-destruidos-en-el-siglo-xxi retrieved by May 2019

[386] HOMER, *Iliad*, II,24, written: 750 BC, first published 1844

[387] GURRUCHAGA J., MARTINEZ SABINA, J., CARMONA,T. *CORAZON DE NEON, Ellos las prefieren gordas.* ORQUESTA MONDRAGON, 1995

The one who arrives receives a candy with the poison of anxiety
The city where I live is my prison and my freedom
The city where I live is an ogre with gold teeth
A fancy lover that I always wanted to seduce
The city brings together God and the devil, the official and the transvestite
The city where I live is a boy cleaning a rifle
Heart, heart, heart, cement heart // Heart, heart, heart, concrete heart
Heart, heart, heart, pollution heart // Heart, heart, heart, neon heart
The city where I live is a seven-headed monster
It's a wounded bird wrapped in cellophane paper
A huge barrel of beer that will suddenly burst
The city where I live is the temple of good and evil
Barcelona, Moscow, Casablanca, Brussels, Madrid, Rome, Tokyo, Los Angeles, Naples, London, Berlin, New York, Stockholm, Donosti (San Sebastián), Mexico, Rio, Tangier, Paris, New Delhi, Caracas, Cairo, Warsaw, Madrid"

These contrasts can be observed in all cities. To highlight a city where they are spectacular, I want to remember a tourist excursion in NYC called 'Contrasts in Manhattan'. It consisted of an explanation of the wealthiness, life style and customs of lower Manhattan with ChinaTown, Little Italy, the financial district, the very expensive mid-Manhattan, then crossing Central Park, the impressive MOMA, the Dakota Hotel where John Lennon was assassinated, arriving in Upper Manhattan with Bronx, Harlem, graffiti, the burned buildings, the gospel, then go to the multicultural Queens ... It was an incredible experience of aesthetic and cultural contrasts.

This aesthetic richness that brings the city reached an incredible notoriety and expression in the work of Chesterton[388], with London in the center, establishing a continuous dialogue between his characters and the City, imaging the modern metropolis.

[388] Cf. BEAUMONT, M, & INGLEBY, M, *G.K. Chesterton, London and Modernity*, Bloomsbury Academic, 2013

With the new technologies and advanced information collection systems, we could try to understand the citizens' reaction to the environment, to the urban space, climate, to the cultural, interesting, exciting or dramatic and stressful events that happen every day in the city. We could interpret your mood messages on social networks or even measure with smartwatches your vital signs reacting to those situations.

Australian researchers Chris Murray and Charles Landry[389] have been working to find the connections between the city and the minds of the humans that inhabit it. Following the natural and human tendency to personify all things, these researchers wonder about the city personality and have even developed a test to evaluate it.[390] It seems clear to us that cities are more outgoing, introverted, more open and friendly with the visitor or expat, more direct or more complicated to understand, more aggressive in human treatment or more inclusive, more detailed with the rules, or more lax, and the most important thing: how to use neuroscience tools to understand how the citizens way of being is conditioned by the city conditions and activities, and vice versa, how citizens, especially new incoming ones, are transforming the city. As we said before, we can explain that the city acts as the sum of the collective attitudes, experiences and life styles of its inhabitants, and those, are influenced by the environment and urban layout, also by the city directors (mainly Major leadership) decisions. It's clear that we are in front of a dynamic ecosystem. Charles Landry has been especially prolific on this subject, publishing 13 books about it.[391]

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[389] MURRAY, C. & LANDRY, C. "Psychology of the city." https://charleslandry.com/themes/psychology-the-city/ retrieved by Nov 2019

[390]MURRAY, C. & LANDRY, C. "Urban Psyche Assessment and City Personality Test." https://www.urbanpsyche.org/ retrieved by Dec 2019

[391] LANDRY, C. *Psychology & the City: The hidden dimension*. *Comedia* 2017 Comedia Publications Limited, Perth – Australia, and his blog: https://charleslandry.com/blog/psychology-the-city-the-hidden-dimension/ retrieved by Nov 2019

3. Main Cities Objective: Become the most Attractive city for talented citizens and investors.

We explored in (Chapter 1.1) how the consecutive industrial revolutions have meant a competition for talent. Talent is attracted to a new disruptive technology that flourishes in a city or area. If this city is open enough to admit and collect the talent that wants to go there, we land at the magic formula of the 3 T's: Technology + Talent + Tolerance (first described by Pf. Florida)[392], as a recipe that has made the most successful cities prosper. We also analyzed that Artificial Intelligence needs three fundamental components: Data (a huge amount and rapid availability of data), Cloud Computing (a massive capacity for process and data analysis), and guess what? talent , yes, talent again, to develop algorithms that achieve spectacular results (Chapter 1.1). It is clear, then, that talent is the key component of the city's development.

Ok, let's create the conditions for this talent to stay or go to a particular city. What's making a city attractive or not for those talented citizens and investors?

Let's start by understanding what attractiveness means. According to Cambridge Dictionary[393], the word attractiveness has two meanings:

- "*the quality of being very pleasing in appearance or sound:*
- *the quality of causing interest or making people want to do something*"

I want to focus this study on the second meaning, that is, it is not just a matter of beauty. In my approach, attractiveness means attraction more than something nice or beautiful. It is the attraction that makes a talented person consider a city as a possible destination to develop his life, his potential. It is a decision among many alternatives, it is like a marriage, like a life option.

We would be considering the word attractant, which has the sense of tempting, inviting, attracting like a magnet, but this word is very unusual, and I can't miss the attraction because of beauty, personal taste, emotional component.

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[392] FLORIDA, R. *The Flight of the Creative Class.* Collings. New York, 2007 p.37

[393] "Attractiveness" *CAMBRIDGE DICTIONARY.*
https://dictionary.cambridge.org/es/diccionario/ingles/attractiveness retrieved by Oct 2019

Retain vs attract. The cities and in particular, the mayors must balance the daily effort in offering the best services in an orderly, safe and sustainable city to retain the talent who lives there with the concept of investing on an attractive city to attract possible talents. That is, make good governance for locals' vs 'selling' the city advantages to attract outsiders. In this process, they must combine to provide a good service against having enough appeal for the millions of millennials who are out there evaluating and considering the city of their dreams to live. And as in many companies, it falls into the error of giving better conditions to attract new customers than to retain good existing ones. This issue seems irritating to me and should be treated with great care so that local taxpayers do not think that their taxes are spent on superfluous ornaments to woo outsiders. On the other hand, having good internal governance does not guarantee being attractive. Good governance is a basic condition, but one more among the many that we are going to study.

The most successful cities will be those that retain and attract the best talent, by creating an attractive city for humans and the physical and economic conditions that stimulate the growth of companies, entrepreneurs, universities and investors.

When talking about Cities of Future, The European Urban Charter (The Council of Europe) states that:

"*An ideal city is one which succeeds in reconciling the various sectors and activities that take place (traffic, living working and leisure requirements); which safeguards civic rights; which ensures the best possible living conditions; which reflects and is responsive to the lifestyles and attitudes of its inhabitants; where full account is taken of all those who use it, who work or trade there, who visit it, who seek entertainment, culture, information, knowledge, who study there.*" [394]

Then, when we think about how to create an attractive city, we should consider that we are serving citizens (humans front and first), developing advanced public services and enhancing economic factors.

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[394] "Manifesto for a New Urbanity" *European Urban Charter II.* Council of Europe Publishing. 2008 p.49. Also at : https://rm.coe.int/urban-charter-ii-manifesto-for-a-new-urbanity-publication-a5-58-pages-/168095e1d5 retrieved by Nov2019

Consulting company Mercer, very famous for its analysis 'Quality of Living Cities ranking'[395] highlights the attractiveness as the pre-condition for the economic success, attract investors, and becoming more competitive in the globalization era.[396]

Unfortunately, academic literature does not provide a solid detailed description of city attractiveness concept, nor has it ever been addressed in its complexity.[397] The European Commission points as attractive city elements to an excellence in economic development, mobility, accessibility, sustainability and an inspiring and pleasant natural, cultural and touristic environment. Urbanist Irma Neminei also addresses the issue from a combination of city benefits: economy, housing, supplies, transport and traffic and a pleasant environment, together with a 'secret' ingredient that she calls 'something special'. UK Government focuses this definition of an attractive city into quality of life: environmental quality and public spaces, and adds human elements such as habitability, vitality, livability and city image.

These approaches suggest that what makes a city attractive is not just the portfolio of services it offers to citizens. There is something else, there is an aesthetic component, a human perception, a personification of the city in something that attracts us.

VALUER.ai,[398] an important Danish start-up incubator that has also developed an AI tool to find market opportunities and connect with corporations, has conducted a study to determine the 50 most attractive cities to establish a new business. Using the experience of its associated companies extensive network in more than 25 countries, they determined that the elements that make an attractive city for entrepreneurs are, apart from the obvious ones such as regulations, access to capital, market, infrastructure, there are others more related to existing human capital as talent, culture, communications skills or global mindset.

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[395] "Quality of living Cities Ranking" *MERCER* 2019 https://mobilityexchange.mercer.com/Insights/quality-of-living-rankings retrieved by Nov2019

[396] *MERCER CITY ATTRACTIVENESS. HOW COMPETITIVE IS YOUR CITY?* MERCER 2019 p.3

[397] SINKIENE, J. & KROMALCAS, S. *Concept, Direction and Practice of City Attractiveness Improvement*. Kaunas University of Technology, Kaunas, 2010. pp.148-150

[398] "50 Best startup Cities in 2019" *VALUER* Feb, 2019 https://valuer.ai/blog/top-50-best-startup-cities/ retrieved by Nov2019

It is clear that it is not just about attracting investors or new companies, but attracting humans. We have already seen the problem of building new gentrified cities that nobody wants to live in. Cities must also be attractive from an aesthetic and human point of view. The School of Life addresses this issue and defines 6 principles that a city must meet to be attractive from those angles. It seems that the art of building beautiful cities has been lost, although few dares to say that modern architecture is fundamentally horrible. This is true, simply if we understand the association that exists between an appealing city and its age. It is difficult to find new cities with charm, cozy, pleasant, and this is due to modern architecture, which has built generic cities, without identity, without soul, homogeneous, functional, fractal, which lead to deep boredom.[399] Mostly urbanistic suggestions, the School of Life shows a nice video-tutorial on these six principles to create beautiful cities:[400]

- Neither too chaotic nor too orderly. Both extremes are horrible, one because of the disparity of heights and styles, without harmony, without beauty. Another because it seems a fractal succession of the same pattern, as directed by a communist regime. It is about finding harmony from the diverse, the vividness, the color, but within an order, as a whole, as a musical symphony. The ancients constantly used the aurum ratio as the basic element of beauty, because it seems a play of dimensions that pleases us, that seems harmonious to us. This relationship is found from the Parthenon to the credit cards that we carry in your pocket. It is a rectangle where the short side compares to long as long compares to the sum of the long plus short. Its resolution is 1:$(1+\sqrt{5})/2$ or 1: 1,618
- Find visible life. See that the city is alive, vibrant, with people doing things in the streets, with places to socialize, to meet, with public activities, with urban furniture that citizens can use and enjoy, with smart spaces.
- Compact A city with a correct combination of distances that allow human communication and integration. Neither claustrophobic nor with enormous

[399] KOOLHAAS, R. *Acerca de la ciudad*, GG, Barcelona, 2014 from "The Generic City" Domus, núm. 791, Milano, 1997 pp. 35, 44, 63

[400] "The book of life. On How to Make an Attractive City". *The School of Life* https://www.theschooloflife.com/thebookoflife/how-to-make-an-attractive-city/ retrieved by Dec 2019

insurmountable walking distances. And all this with artistic elements that recreate the look and inspire creativity. Also compact refers to high density, a positive component as described in chapter 1.0

- Combine orientation and mystery. A city neither labyrinthine, closed or impossible to understand, nor flat, basic, boring. And with a certain mystery, with a story to tell associated with each corner, to the collective experiences of those who previously lived there.
- Scale. Joseph Campbell says that "*to understand the true beliefs of a society, you just have to look at what the tallest buildings are dedicated to*."[401] If we look back some centuries, the answer is clear: the cathedral or mosque's minaret or similar main tower as an inspiring element of that society marked by religion and dedication to God (each one with its own name). If we look now, we find that the most important buildings are dedicated to financial, oil, pharmaceutical or sports companies. Our fundamental aspiration is money, wealth, notoriety. Our city managers have entrusted their development to private investment, and wealth owners have built these huge buildings. The city management has been reduced to transparent and efficient governance. Has the city aspiration and identity passed into private hands? No public money to build what should be the symbol of the city? We see examples such as Bilbao (Spain), which have taken the right direction when betting on a public urban transformation that marks the new city image (see Guggenheim Museum), but we also see other cities whose identity is a downtown plenty of commercial brands. And citizens remain indolent, mute and numb, afraid to get out of their intellectual confusion about what is beautiful or not and raise their hands proclaiming that all those buildings are simply ugly!
- Make it local. It is important to lead the world and observe best practices, but you have to adopt them and make them your own without losing the city personality and identity. The same with innovation and technology: use it to the fullest for the benefit of citizens, but adapt it to respect for local customs and to strengthen the local identity.

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[401] CAMBELL, J. *The Power of Myth*, PBS Documentary, New York 1988. Episode 3.

Coming back to the competition for talent, we can see that cities (and mainly their Universities) are the center of skills generation, human capital, creativity and innovation. These creative class citizens characterized by their enthusiasm to search for something new, have historically been gathered in cities. Those cities have set the pace of economic growth. Cities bring together activities, businesses and investments that create wealth and, therefore, are and will be the main driving force behind the future economy. This makes cities the new centers of power and hubs of global influence, way beyond their countries. They compete to develop an attractive image to attract creative classes not too much tied to their birth or raise places, to nomadic elites, and obviously, the new techno nomads. Cities are creativity workshops, driving forces for sustainable economic development. The peripheral rural areas are integrated in the metropolis because of increasing public transportation efficiency. The furthest ones will disappear, losing talent little by little, without access to good Internet bandwidth due to the telcos lack of economic interest on those areas, and without the necessary human density to generate wealth and attractiveness (another metropolis). Only those with a special natural attraction can survive around such space.

Cities already rule the world. It is no longer the countries that compete, but cities.[402] Each city must create a competitive advantage to differentiate itself from the rest. Agile, creative and competitive cities that can diversify their resources and offer cultural, social and economic opportunities to their citizens will succeed. Cities that are better equipped to produce innovative, inclusive and ethical solutions to face the increasing challenges will better cope with them and emerge as leaders. Cities will compete and collaborate globally as interdependent entities, compete for talent, collaborate for the planet and other UN SDG's.

Cities are embarked on a hidden (not at press, not public) war/competition to attract the most talented citizens / investors.[403] Cities which fail will become elder people

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[402] BODUR OKYAY, Z. "This is what a Smart City should do for its people". *NEWCITIES*, 2018, https://newcities.org/the-big-picture-this-is-what-a-smart-city-should-do-for-its-people/ retrieved by Jan 2020

[403] KNEESHAW, S. "The war for talent in cities" *EU URBACT*, 2017. https://newcities.org/the-big-picture-this-is-what-a-smart-city-should-do-for-its-people/ retrieved by Nov2019

bedrooms, home of just tied people because of different reasons (personal, family, unpaid mortgage,…) then disappear.

And people move. New generations (mainly Millennials) are world citizens. Mobility is very affordable. World is getting smaller. People movements/flows are faster than ever before. War/famines/conflicts are no longer the main reason why to move, but the desire to live in the best possible place, in the most appealing city to deploy your full potential, a city where you will be happy, safe, healthy and with an excellent personal realization.

For some cities, and due to the high cost of mortgages, it happens that the poor cannot move because they have to pay for their home, and if they leave or do not pay, they will lose their home and what they have already paid. They are 'caught' for their loan. Thus, being able to emigrate is considered a privilege only available to independents, without family charges and without loans to pay. This IMF[404] study highlights these areas where people are tied to a place because of housing. If we look at the destination city then we see the same problem: the price of housing is proportional to city attractiveness, so that the best destinations also have the highest prices. We reach the situation where the premium we make from a good employment in a star city does not compensate for the housing extra cost. Only the highly qualified can withstand this situation with a very high salary. In addition, this situation has a positive feedback: high salaries, higher living standards, then higher housing prices. On the contrary, those who have not been able to move, see how their properties are worth less, even passing the limit where they worth less than the mortgage outstanding capital. This is producing a social fracture in areas like Silicon Valley or Seattle in the USA. An authentic urban sclerosis where emigrants are highly skilled young people from the upper & middle classes, seeking high salaries in line with their qualification.

Best possible City is idealized / imagined:

Theoretically: By Majors, Citizens, mainly by immigrants.

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[404] BAYOUMI, T and BARKEMA, J. "Stranded! How Rising Inequality Suppressed US Migration and Hurt Those Left Behind" *IMF Working Papers*, June 2019, https://www.imf.org/en/Publications/WP/Issues/2019/06/03/Stranded-How-Rising-Inequality-Suppressed-US-Migration-and-Hurt-Those-Left-Behind-46824 retrieved by Aug 2019

Practically: By Urban Planners / Designers, and Technology Implementers.

If this process is like a wooing between the city and the talented person, then global easy mobility is making possible some previously impossible marriages.

See below in figure 52 the dynamic map of Migrations.[405]

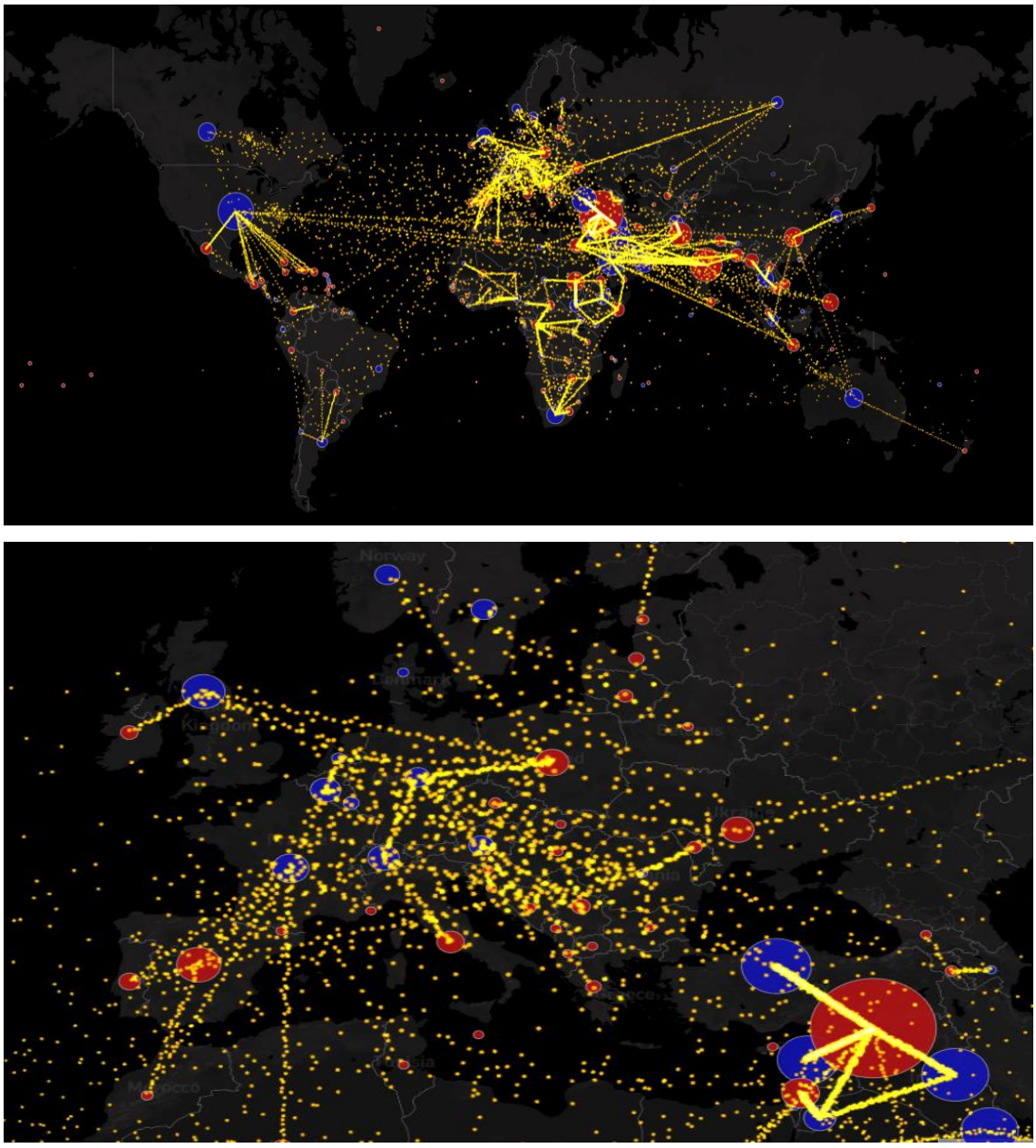

Figure 52. Global Immigration Paths and volumes. Metrocosm

In Figure 52 we can observe the main planet migratory flows. In blue, countries with positive balance and in red, those with negative balance, or losing net

[405]"All the world's immigration visualized in 1 map" *METROCOSM*, June 2016, http://metrocosm.com/global-immigration-map/ retrieved by Sep2019

population. The first photo is the global map. The second is an example of the strong migration that is happening in Syria due to the war.

If this study could eliminate migratory movements due to precarious situations such as poverty, famine or fear of war / violence, and we were taking only the voluntary movements of citizens in search of the best city to realize their potential, this thesis would not make sense and simply by observing the cities with the greatest positive balance we would have the most attractive ones as a citizens decisions aggregation. We could, for example, conclude that Australia is a highly attractive place, since it has a positive balance even with the USA. We assume the fact that, as rational humans, these decisions are the result of a benefits of that movement certain analysis and how attractive that city can be for living. As such an analysis does not exist, because it would mean asking all migrants (about 244 million in 2015, with an increase of 41% since 2000)[406]about their reasons for emigrating and accounting only for those who have done it voluntarily, without being forced by circumstances, just putting their talent as a value for the target city to open its doors, then let's analyze what makes an attractive city. Thus, we can help many citizens to make an informed decision with a series of evaluative criteria, and on the other hand, help many cities to prepare, to be more attractive in this global competition for talent.

Few decades ago, the companies' location or jobs availability, was the most important factor, and many people made their choice of city subject to this fundamental issue. Today, it is not like that. Companies decide new offices looking at where talent is, not the other way. We have recently seen Amazon deciding where to base its second HQs. This was a race to get maximum public grants and offerings to choose the location. Many US cities and states offered exorbitant aid, low taxes and almost insulting conditions for companies that are already based there. All with the aspiration of attracting the giant, to set talent and generate wealth in the city. But finally, company decided to move to a place with guaranteed talent provision,[407]

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[406] "17 goals to transform our World" *UN SDG's* https://www.un.org/en/development/desa/population/migration/publications/migrationreport/docs/Migration_increase_digitalcard.png retrieved by Nov2019

[407] "Amazon to split second headquarters into two locations – report" *The Guardian*, Nov,2018 https://www.theguardian.com/technology/2018/nov/05/amazon-second-hq-two-locations-cities retrieved by Oct2019

well, two locations to be more accurate: Arlington (Virginia) and Long Island City in Queens, New York City.

Imagine the extreme situation of a super attractive company placed in a desert, people (especially new millennials) won't even consider it. Access to good employment is an important component, especially for young people, but it is not the only one nor is it the determinant in most cases. It is, therefore, an important cities effort to become attractive to citizens, especially for the talented, for the creative class, which will generate wealth in the 4th industrial revolution.

Global Competition is here to stay, hidden, fierce but bloodless, leading to even larger urban areas vs non-so-attractive cities extreme declining or depopulating.

Figure 53. Cities paying for talent[408]

This issue is becoming dramatic for cities or metropolises that see how they are losing talent after having invested a lot of time and resources in nurturing it. It's about 'hunting' talent and retaining it in the city to generate wealth, contribute to improve the city performance then attract more talent, in a virtuous cycle. The

[408] HARRISON, D. & RAICE, S, "How bad is the labor shortage? Cities will pay you to move there", *WSJ*, April 2018. https://www.wsj.com/articles/how-bad-is-the-labor-shortage-cities-will-pay-you-to-move-there-1525102030 retrieved by Nov2019

opposite is to lose: lose talent, wealth, investment and therefore the ability to be attractive, which leads to greater loss of talent, in a vicious circle. In origin, talent is distributed homogeneously on the planet by birth or DNA, so that the areas with greater population, or rather, with greater birth, have greater talent in origin. This talent in origin can be missed if there are no conditions that develop it, education and universities. The education system converts that raw talent into operational, useful, updated and desired talent. And here comes the fundamental question: at that point where talent is formed and ready, is when people look at the world and the cities that shine in it, and decide where they can reach the maximum. This is where the issue of City Attractiveness is evaluated and where cities bid for those talents, such as an art auction, pay (see figure 53) money, grants for paying back student loans, home purchase helps, other, only for those with great potential.

In that way, Cities are becoming large HHRR departments, trying to nurture the local talent retention while attracting the foreign.

Cities must also compete locally with the private sector to hire talent.[409] They try to compensate for their disadvantage in lower wages with the plus of working for the common good and for improving the city. In any case, cities need very good professionals to address the challenges we have previously detailed. Specifically, they need data analysts and scientists, urban planners and humanists (psychologists, neuroscience experts) and specialists in social networks and community management. Otherwise, they will simply be unable to cope with these challenges, no matter how much technology they use, because they will not understand their own data or their own citizens.

Let's look at some examples of this 'talent hunting'. I like next examples, where countries and mainly cities are openly offering advantages to those talented citizens seriously considering to move there:

- UK has offered 'Exceptional Talent'[410] visas aimed at attracting workers from the tech sector and providing additional opportunities to apply for UK

[409] ANDREWS, J. "How cities are attracting tech talent" *CitiesToday*, Feb2020, https://cities-today.com/graduating-to-a-city-job/ retrieved by Feb2020

[410] GOV.UK Exceptional Talent visa. https://www.gov.uk/tier-1-exceptional-talent retrieved by Oct 2019

settlement after three years of citizenship probe (work or study). This has changed with Brexit, but new plan keeps trying to directly attract talent.

- China[411] launched a high economic value plan to attract American scientists. Now it is accused of taking advantage of this to get intellectual property.

Many cities and American states have launched ambitious plans to 'hunt' talents as soon as they leave the 'talent factory - University', especially those who leave the Boston area, offering financial aid to pay for study loans, housing aids , moving, etc., only with the commitment to settle down in the area.

Other examples: Indianapolis[412], Wisconsin[413], Virginia[414], Michigan[415], Hamilton Cincinnati[416] or Queensland (Australia)[417]

More discreetly, other places do not offer direct advantages, but they invest in generating the conditions for the expatriate who arrives there to be welcomed with open arms. If you decide on Sweden, the cities there will help you with all the

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[411] BARRY, E. & KOLATA, G. "China's Lavish Funds Lured U.S. Scientists. What Did It Get in Return?" *The New York Times*, Feb, 2020, https://www.nytimes.com/2020/02/06/us/chinas-lavish-funds-lured-us-scientists-what-did-it-get-in-return.html retrieved by Feb2020

[412] "$1.4 million Lilly Endowment grant to support TechPoint talent attraction and development initiatives" *Indianapolis*. Central Indiana Corporate Partnership. 2015 https://www.cicpindiana.com/1-4-million-lilly-endowment-grant-support-techpoint-talent-attraction-development-initiatives/ retrieved by Jan2020

[413] "TALENT DEVELOPMENT, RETENTION AND ATTRACTION" *Wisconsin Economic Development Corporation.* https://wedc.org/business-development/talent-attraction-and-retention/ retrieved by Jan2020

[414] "Student loan repayment talent attraction program" *Virginia Tobacco region Revitalization Commission,* 2020 https://www.revitalizeva.org/grant-loan-program/student-loan-repayment/ retrieved by Jan2020

[415] "REGIONAL WORKFORCE DEVELOPMENT AGENCY: MICHIGAN WORKS!" p.2 http://www.discovernortheastmichigan.org/downloads/final_report_for_workforce_talent_development_and_retention_112014.pdf retrieved by Jan2020

[416] JAMES. A. "Hamilton Gets Back to Business with Innovative Talent Attraction Efforts" *Hamilton* Cincinnati. 2018. https://redicincinnati.com/blog/articles/hamilton-gets-back-to-business-with-innovative-talent-attraction-efforts retrieved by Jan2020

[417] "Recruitment / Talent attraction" *Advance Queensland*. 2020 https://advance.qld.gov.au/can-we-help/recruitment-talent-attraction retrieved by Jan2020

information you need. When we see a website in 33 languages, we would think of a tourist motivation. Not at all, the motivation is to explain to the foreign talent the advantages they are going to get, access to housing, employment (and Swedish classes!, or course) that you will enjoy if you choose Sweden as a destination to establish yourself. Swedish cities ready for immigrants in 33 languages![418]

When we create an attractive city, it is attractive to all kinds of people. So, the question is how to filter only those who are talented. How to filter? They need new workers to pay for welfare society with their taxes, but talented. This question is obviously, classist. Yes, but you cannot deny the right to a city to choose or try to find the best future citizens. Nobody wants beggars, homeless, social charges or people who are not going to contribute taxes, and especially with wealth generation, with creativity, with talent. They prefer and fight for talent. It is not a matter of sex, race, religion, etc. It is simply talent, the ability to have a basic languages skills and creativity to generate value. As we said before, the repetitive, mechanical, routine work lefts for the robotization that 4th industrial revolution brings us. Filtering creative vs non-creative classes is not an easy task. We are all creative in one way or another, a lot or a little, what is not creative for many is their job! So, we should better create creative jobs, but the problem will come when it is not growing as fast as job destruction because of robotization. It is clear that the works must also evolve towards more creative, more human environments, where social relations, empathy, the ability to innovate, create are more important and where routine, the sequence of rules are less important.

Cities (or countries, as we still have borders) can set a test or exam and admit with a visa only those that are talented enough. This is socially inadmissible, classist and discriminatory, although each country is sovereign in deciding who gives a residence permit to and who does not, and can set the criteria they want. It is started to see movements in this regard, of course, from the most classist societies:

United Kingdom will implement a points/scorecard system for the immigrant workers admission from January 1, 2021.[419] It seems a plan inspired by a social

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[418] Swedish Migration Agency. https://www.migrationsverket.se/Other-languages.html retrieved by Jan2020

[419] "The UK's points-based immigration system: policy statement". *GOV. UK*. Published by 19 Feb 2020. https://www.gov.uk/government/publications/the-uks-points-based-immigration-

Darwinism and is being pushed back by important economy and social services sectors. It is about only incorporating workers with high professional preparation and good English skills. Employment has increased a lot, but without raising productivity. There are many entrepreneurs who need labor and are not willing to pay a bonus because the immigrants must be more qualified. The most relaxed EU position frontally clashes with this plan.

Others are more discreet and moderate, and simply demand knowledge of local language. This seems less classy and more reasonable, although if we consider how difficult it must be to learn Finnish/Suomi for a non-native, it is also a filter for people with high intellectual capacity and obviously talented.[420]

In Australia they are more direct and pragmatic. There, within the new Global Talent Independent program (GTI)[421], if you probe that you will get a high salary (the level is set at AUD 148,700 or 87,800 EUR / year) either with a job offer or with a high academic qualification, get a visa and subsequently a permanent residence has many facilities and is quite simple. What's more, Australian talent recruitment offices have been opened in Berlin, Dubai, New Delhi, Santiago, Shanghai, Singapore, and Washington DC. It is about letting the companies' HHRR departments act as a filter. It is assumed that if they offer a high salary to a foreigner, it is because she/he has the talent they are looking for, so, open doors to those.

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system-policy-statement/the-uks-points-based-immigration-system-policy-statement retrieved by Feb2020.

[420] "How to apply for Finnish citizenship?" *infoFinland.fi* https://www.infofinland.fi/en/living-in-finland/settling-in-finland/finnish-citizenship/how-to-apply-for-finnish-citizenship retrieved by Nov2019

[421] "Global Talent Independent program (GTI)" *Government Australia*, 2019, https://immi.homeaffairs.gov.au/visas/working-in-australia/visas-for-innovation/global-talent-independent-program retrieved by Dec 2019

3.1 Problem: How to measure / track City Attractiveness.

Worldwide competition for talent is clear. Therefore, we must improve and adapt our cities to be attractive, in the ways explained before. Let's try to find what makes a city an attractive one. The attractiveness components will be those that we must improve or maximize to increase our success attracting talent.

A Dozen Reasons for Denver

Today, 20 March 2019, I have received this (figure 54) email in my inbox.
The US organization Smart Cities Connect was announcing its next big event in Denver (CO)[422]. In the decision justification for Denver as host city for this innovative event, they made a summary assessment on why Denver is a very attractive SmartCity. Are those 12 reasons clear indicators of what's making a city attractive? Maybe they are not the only ones, but they are definitely contributing to make Denver as one of most attractive cities in US.
Let's analyze them:
There are reasons or facts defining Denver and describing the city's main characteristics: one-mile high, sunshine hours, parks. I would add other attractions such as the mountains, the amazing natural 'Red Rocks Park and Amphitheatre', or for being founded as a gold mining town, always a meeting place for miners, workers, and travelers, mainly pioneers who went to explore the American West. It is interesting to see the mention to sports teams, as a projected city image and as a leisure attraction. These elements make main Denver's identity, can't be changed overnight and are not related to city services, or smartcity plan.
This is an American event, then the choice of which American city is going to host it does not take into account the living conditions in that city compared to the entire world. If we talk about Denver in a global context, we should consider the political system, conditions of equality, opportunity, social services, respect for diversity, etc.

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[422] SmartCities Connect. Spring Conference & Expo. https://spring.smartcitiesconnect.org/ retrieved by April 2019

Why We Chose The Mile High City for Smart Cities Connect Conference and Expo

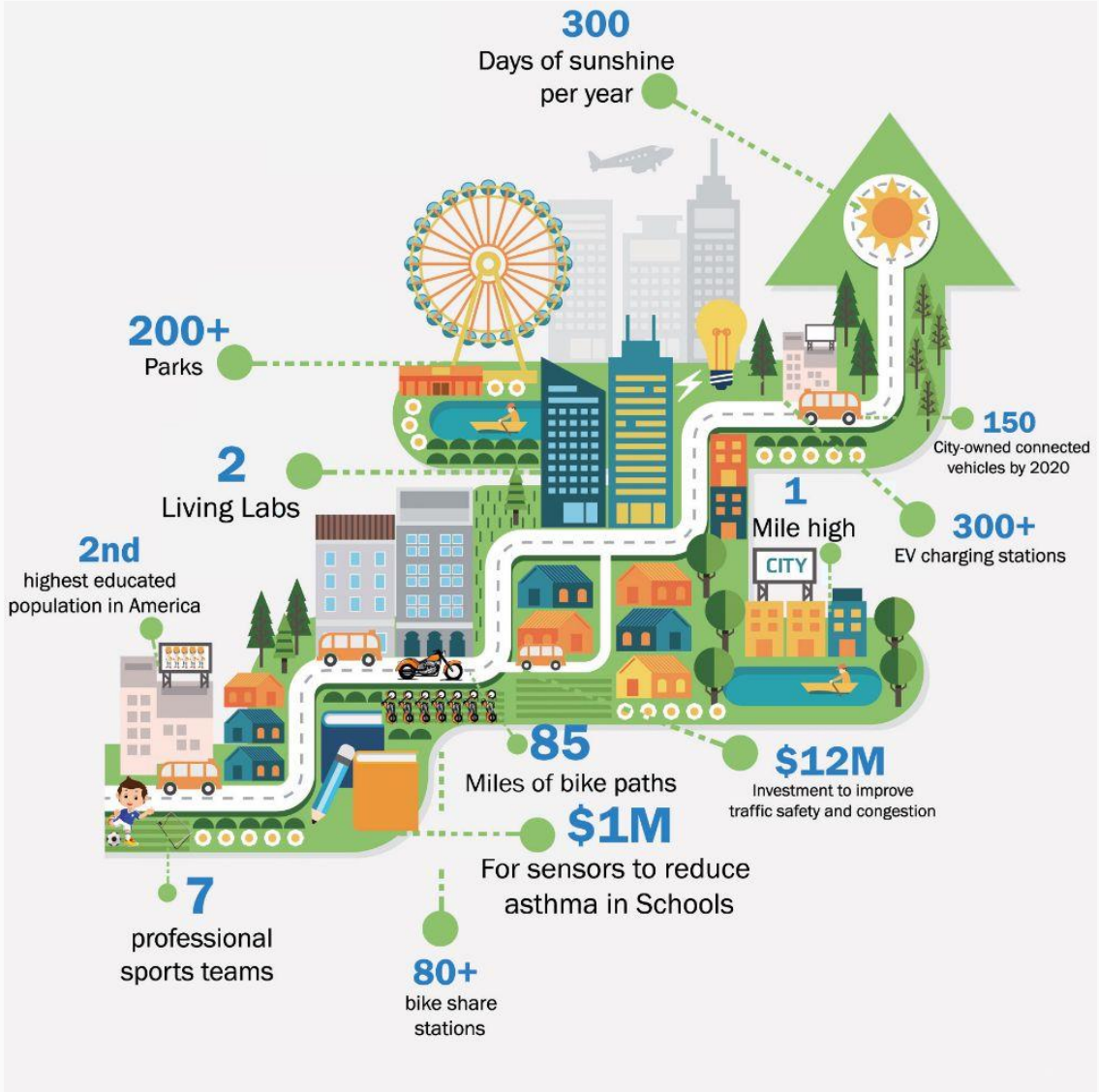

Figure 54. A dozen reasons for Denver. Source: Email from SmartCities Connect. See previous footnote

These living conditions are quite similar for many US cities, and therefore are not considered in this internal election, but they are very important in a global context. Most of the reasons are focused on the quality of public services such as transportation, education, traffic, safety, health, and these are very differentiating elements where the results of a good investment in your SmartCity plan are paying off. The mentions of sustainability, decarbonification / electrification to make a clean and sustainable city stand out. The orientation to the UN SDG's is clearly appreciated. These topics are obvious Denver attractions if compared to other American cities. If we thought about Denver from a global context, we should also consider economic issues such as average salary, taxes, cost of living, etc. Again, these components are similar for many American cities, so they are not too much important from an internal decision perspective, and therefore we do not find reasons of this kind: low taxes, high salaries, high net purchasing power, low cost of living, etc.

Anyway, these twelve reasons mean a good scorecard of how much attractive Denver is presented to us (within an American context) and gives us many clues about the indicators to be considered in a global study.

If we think about a city that tries to be attractive in an international context, and from a highly competitive area like Asia, then Singapore could be a great reference. Let's see how they are 'selling their city/state', how they use their branding to attract the 1.7 b millennials that are looking around the world for the best city to develop their full potential. We see that the authorities are marketing Singapore mainly to companies: ease of doing business, taxes, protection of intellectual property, access to financing and some attractions that indirectly stand out for citizens, such as low taxes and excellent security. The 5G logo is placed over the bay as an added sticker in figure 55, indicating the city adoption leadership in this connectivity revolution. I am missing important attractions such as the avant-garde image in architecture, sports events, excellent urban mobility: wonderful public transportation combined with the pressure to eliminate private traffic.

In my trips I have found cities that did not dedicate efforts (not even a good website) to present their city and its attractions to potential talented foreigners. They are cities that either do not compete in this race because they have many other basic problems to fix, or because they think they do not need it: they are attractive enough

without having to promote the city or invest in an advanced SmartCity plan. No longer. These arrogant or narcissistic cities are realizing that they need to attract talent. Their high living standards and low birth rate indicate that they must welcome emigrants to sustain their society model. Thus, we can say that there are only two groups: the cities that struggle to achieve minimum quality of life standards, and all others, which are embarked on the global competition for talent. If a city does not identify itself in any of these two groups, it should be concerned about the quality of its managers/politicians, isolated from the world or carefree, asleep in ephemeral laurels. Time to wake-up and react!

Figure 55. Singapore justification[423]

[423] "EBD Singapore". *Singapore government* https://www.edb.gov.sg/en/why-singapore/discover-the-singapore-difference.html retrieved by Aug 2019

3.2 City Attractiveness = City Magnetism x City Profitability (yield)

By how cities are prepared and offered to talented citizens and investors and on the other side, how citizens decide whether or not to move to another city to improve their quality of life and opportunities, we can conclude that we are ahead of a similar decision process to a marriage or to a purchase. It looks like a marriage because there is a certain compromise between the parties, some love is necessary, or at least attraction, and it is not a decision to last short time. It is not exactly a marriage because one part, the city, simply sets minimum conditions: talent, and perhaps, language skills or a certain period of cadence time until the expected visas are granted, and these conditions are for anyone who wants and can take advantage of them. It is more like a purchase. The talented citizen 'buys' to move to live in a city and contribute to its economic and human development, and the city 'sells' its attractions, advantages, and even offers special advantages, as we have previously seen. There is no economic transaction, although it is clear that a price is paid due to differences in purchasing capacity (net purchase power) for the same citizen with the same kind of job, but done in different cities. We have, therefore, that it is a human decision process among many alternatives, where mercantilist / trading benefits are involved, but also aesthetic and ethical questions about the possible destination cities. Do I like that city? And what about that city lifestyle? These seem to be previous questions to those related to conditions (wage, safety, taxes, environmental care, services,…)

If we analyze the components of every human decision making, we can observe two main motions: the emotional and the rational.[424] In the rational arena there is no emotions, but pure functional and economic arguments / facts. But humans are emotional beings, so the emotional component is very relevant, very frequently the most. For Kellogg's marketeers, it is very hard to assess before they prepare a campaign or a new product launch, because emotional goals very often come from subconscious. If we distinguish for the rational part the benefits or functions component and the economic component or price or cost and maintain the

[424] TYBOUT, A & CALDER, B. *Kellogg on Marketing.* WILEY. 2010. New Jersey p.8

emotional component, we conclude that the combination of those three areas (Performance, Economy, Emotional) are leading the final decision making.

Then, if we talk about what makes a city attractive, we must think about an emotional component and a rational double component (Services and Benefits of the city, and 'price' or cost of living or opportunity cost because of living in that city). Let's go deeper on these concepts:

EMOTIONAL AREA.

We can say that this is the decision-making part based on emotions. It is a first step or pre-condition: From all the cities that I have some good feeling with, then I will choose the best in terms of performance and my self-convenience. Let's call it City Magnetism, because it works as a magnet, attracting or repelling me.

CITY MAGNETISM = 'I like it'. This is the Emotional part of the assessment.

A human will not even consider living in a city that he does not like at all unless he is forced by circumstances. Each person has an idealized image of a city. It is an image formed by what you know about that city, its projected image, what you have been told about that city, what you can know from outside, from the balcony, about its living style, basic questions about the economic and political stability, and over all, what you know from citizens who live there and know that city very well and act as ambassadors for you. This generates a positive or negative emotion about an unknown city. Sometimes it is a broad filter and we can simply eliminate the cities in which we would never go to live because their living conditions do not meet my minimum standards or are simply lower than those I already enjoy where I currently live. There are also previous or boundary conditions / determining factors. Basically, we can identify three main:

- Language: Language is an advantage or a barrier. If a city is a meeting place and I cannot communicate with my fellow citizens, then I will not be able to properly develop my life there. There are three languages that can be listened anywhere in the world: English, Spanish and Chinese. These three top the list of native speakers and total number of speakers.[425] If I can speak any or some of them then I will have a great ease of communication

[425] JAMES, L." The 10 Most Spoken Languages In The World" *Babbel Magazine*. 2019 https://www.babbel.com/en/magazine/the-10-most-spoken-languages-in-the-world retrieved by Jan 2020.

wherever I go. Or simply, I must demand that my possible destination city has a good percentage (>50%) of people who can speak English as a universal language. Thus, I will be able to consider that city because I will have the opportunity to develop my human being social aspect: communication.

- Civilization / Religion / Ethics: The city ethics or scale of values intrinsically depends on the civilization in which it is framed. Each civilization has a different ethic, justice, equality concept and human rights. Huntington describes 9 great civilizations in his book on 'Clash of Civilizations' (see Figure 56) where he argues that the great post-Cold War conflicts will happen between civilizations and not between countries. Analyzing these 9 civilizations, which we could reduce even further, down to 7, assuming Orthodox and Latin American as Western, we see their close correspondence with the major religions. In that way, the consideration of the city's majority religion will identify a civilization and therefore a scale of values. For many people, when choosing a city, analyzing the preferred ethics will be determinant or negative way, choosing which Civilization ethics are unacceptable for your basic principles.

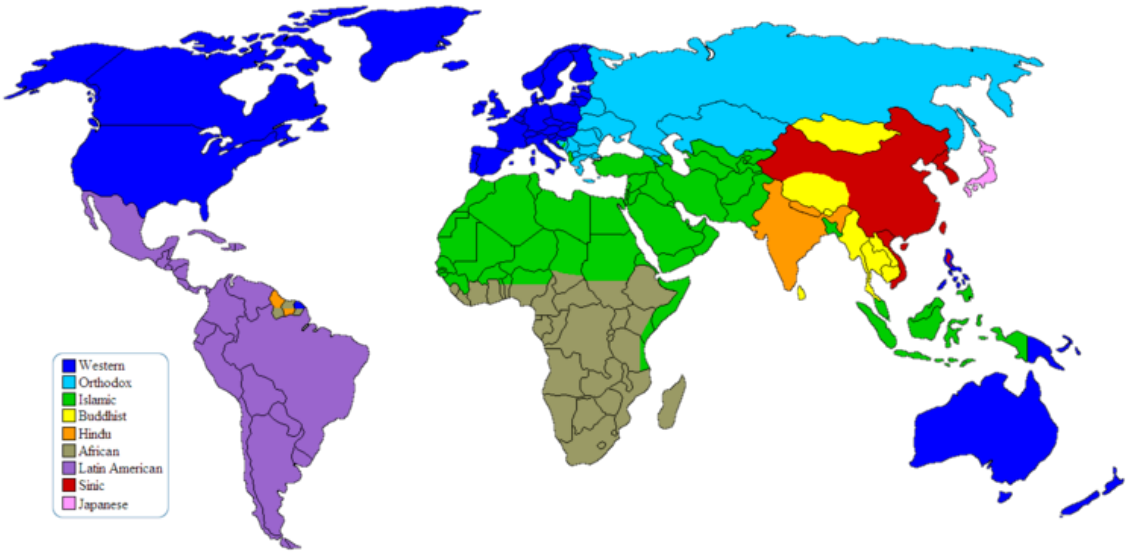

Figure 56. Map of Major Civilizations according to Huntington's Clash of Civilizations Theory[426]

[426] HUNTINGTON, S. *The Clash of Civilizations?: The Debate*. Foreign Affairs. Simon & Schuster, New York, 1996. p.26

- Landscape (aesthetic question about environment): Sea / Coast, Mountains or both? I like the sea (Barcelona, Sydney), or the Mountains (Denver, Zurich) or I want to get both nearby (Seattle, Santiago),… Or on the contrary, if I need to do scuba-diving every day, then I can't live in Madrid, or if I have rheumatic problems and I must flee from wet places, I cannot live at the coast. After that, there is a landscape aesthetic component.

These pre-conditions are filters when choosing the most attractive city from all possible.

We see how this emotional component has a lot to do with our tastes, preferences and emotions, and fits perfectly into the city aesthetic and ethical facets.

If we humanize the concept of city -obvious, as it is a live ecosystem-, clearly this component would be the city soul, while the rational part would be the physical part, the body. Cities are not just places and spaces where you can live in, they are living entities with emotional components, they have 'soul'[427]. This concept of soul can be perceived, breathed and appreciated in most cities. It is what makes a city 'special' (look back at 'secret component' in City Attractiveness definitions). It is part of its essence, the series of emotional, intangible, qualitative elements that make a difference and distinguish them. It has to do with the environment and above all, with the people who live there and their lifestyle. This city personification is clear in very famous literature works like Paris, as one main character of Victor Hugo's *Notre Dame de Paris* (1831), Dublin at James Joyce's *Dubliners* (1914) and *Ulysses* (1922), New York in Jacques Tardi's and Benjamin Legrand's novel *Roach Killer* (1984), London in Peter Ackroyd's book *London-The Biography* (2000)[428]

RATIONAL AREA

This is related to world as a Cities marketplace where citizens, depending on their preferences at that moment decides to 'buy' a city and dedicate their lives to that city since then. I want to point out the concept of time. Citizen preferences may

[427] ALCALDE, I. "Ciudades con Alma en la Era Digital". *CITIZEN*, 2017 http://thecitizen.es/cultura/ciudades-con-alma-en-la-era-digital retrieved by June 2019

[428] VANDERBEKE, D. *The city as a Superorganism. The Mighty Heart or The Desert in Disguise? The Metropolis Between Realism and the Fantastic*. Tübingen: Stauffenberg Verlag, Jena (Germany) 2007 pp.162-165

change over time. Depending on the times when you plan to change city, you may have some preferences or others. Thus, you can give more value to employability when leaving the University, or to social services when you reach your retirement age. Depending on your family dependencies (children or seniors), your priorities may vary as well.

We studied that the rational area consists of: city benefits or city performance (functions, services, variable elements that the city provides to the citizen and that are tangible and valuable) and an economic component (the ability to acquire things or the net purchase power that the citizen will achieve in that city, compared to others). It is, in short, a deal. We will name that deal as City Profitability, in the sense of yield.

CITY PROFITABILITY = 'I want to Live / Work here'. This is the non-emotional part, more related to city merits (Economical and Performance indicators).

Based on that, the decision about my preferred City for living/working (temporarily or long-term) follows these steps:

First: Select cities with an acceptable City Magnetism (I could live here). No primary blockers. (Cities scoring The Economist's Liveability Index[429] over 50 which means no severe limitations on the normal human life development there). Then select those which I have some good feeling with, attraction, some magnetism.

Then, assess City Profitability = Services I get from City / Cost associated to living in that city.

Services: The services received can be weighted as well per my perceived scale of values and specific time circumstances, as explained. We can group them into 10 main AREAS (as per studied SmartCity main components): GOVERNMENT ADMINISTRATION (Governance) – EDUCATION – EMPLOYABILITY – HEALTH/SOCIAL SERVICES – SAFETY – ENVIRONMENTAL SUSTAINABILITY/UTILITIES – CONNECTIVITY – URBAN MOBILITY/TRANSPORTATION – TOURISM/CULTURE

[429] "The Global Liveability Index 2019", *THE ECONOMIST*, p.5. Also at https://www.eiu.com/n/the-global-liveability-index-2019/ retrieved by Jan 2020

So, we have a clear definition of city Services and we can assess them, then weight each one depending on its relevance for us according to our scale of values.

Cost associated to living in that city: On the other hand, we must measure the associated cost to our personal economies from living in that city. Imagine we have same kind of job and life standards in two different cities. At month end, we'll make different net money to buy what we want. That's the price we pay because of living in that city in comparison with other. We can consider as well the cost of opportunity or how much we are losing today because of not moving immediately to a better place with better opportunities and possibilities to develop our full potential A good approach will be based on AVERAGE WAGE – (DIRECT TAXES + INDIRECT TAXES + SOCIAL CONTRIBUTIONS) - COST OF LIVING (Net Purchase Power) = NET INCOME. In other words, working on same kind of job, and after purchasing my needed things according to my lifestyle status like food, housing, education, healthcare, mobility, utilities, how much money will remain in my pocket at month end? Important to note that some cities offer high salaries, but also high taxes or high cost of life. Some others may pay you less wage, but if taxes and cost of life is more affordable, then your numbers will be better.

So, our intention is to create a City Attractiveness Annual report, as a WW Observatory. But the objective is not to create another ranking. Every citizen will provide his/her preferences for main Magnetism three Areas and his/her sorted priorities on 10 main Profitability City services. Then tool will provide a list of top cities matching that criteria, as best reference to explore. This will be also available by a smartphone app.

3.3 Cities Selection. Criteria.

We already have the master areas to research on what makes an attractive city. Now we have to select a list of cities and study their attractiveness.

There are many city rankings, according to different indicators. Professor Ayyoob Sharifi, from Hiroshima University has studied most rankings, finding as many as 34[430], grouping all available information in 7 main themes and 44 sub-themes. But most are partial in subject or geography, many only provide the top10 list, which is not long enough for this researcher, some other are based on surveys, not facts. The 7 most important city indexes are shown in figure 57 (some were not included into Prof. Ayyoob extended list!). Of those 7 main rankings, we chose two that cover most of areas to study and which we can get access to a long list of cities and detailed info.

Ranking by city	CIMI 2018 (IESE)	Global Cities Index 2018 (A.T. Kearney)	Global Financial Centres Index (GFCI) 2018 (Z/Yen)	Global Power City Index 2018 (MMF)	Quality of Living City Ranking 2018 (Mercer)	Global Liveability Index 2018 (*Economist* Intelligence Unit)	Sustainable Cities Index 2018 (Arcadis)
1	London	New York	London	London	Vienna	Vienna	London
2	New York	London	New York	New York	Zurich	Melbourne	Stockholm
3	Amsterdam	Paris	Hong Kong	Tokyo	Munich	Osaka	Edimburgh
4	Paris	Tokyo	Singapore	Paris	Auckland	Calgary	Singapore
5	Reykjavík	Hong Kong	Tokyo	Singapore	Vancouver	Sydney	Vienna
6	Tokyo	Los Angeles	Shangai	Amsterdam	Düsseldorf	Vancouver	Zurich
7	Singapore	Singapore	Toronto	Seoul	Frankfurt	Toronto	Munich
8	Copenhagen	Chicago	San Francisco	Berlin	Geneva	Tokyo	Oslo
9	Berlin	Beijing	Sydney	Hong Kong	Copenhagen	Copenhagen	Hong Kong
10	Vienna	Brussels	Boston	Sydney	Basel	Adelaide	Frankfurt

Figure 57. Main 7 City Rankings. IESE Business School - IESE Cities in Motion

These two indexes are Mercer Quality of Living 2018 and IESE Cities in Motion 2018. Then, we can approach world best Attractive cities based on:

[430] AYYOOB S. "A critical review of selected smart city assessment tools and indicator sets." Hiroshima University. *Elsevier Editorial System(tm) for Journal of Cleaner Production*. 2018, pp. 6-8

- Selection Criteria: Top cities at Quality of Living (Mercer)[431] AND Cities in Motion (IESE)[432] AND scoring over 50 (no personal risk or severe living restrictions) at Global Liveability Index (The Economist)[433]. First two are superior quality reports in detail and richness of components (indicators), coming from very well-known high reputed sources. The addition of Liveability Index minimal threshold responds to a basic fact: nobody wants to go living to a city where his life will be threatened, or basic living conditions are severely restricted. Those cities are not attractive at all!
- Quality of Living (Mercer) included 180 cities and Cities in Motion (IESE) analyzed 200. We took the top140 cities overlapping both main sources to include as many countries as possible and all continents while not increasing complexity too much. We did that for analysis diversity and globality. It would have been easier to take only 50 or less top modern world cities, but let's include the emerging ones as well to show them the path to become attractive, fix basics and then compete globally. All used indicators must be available for all, or most, so if we add more cities, then the study will be could be biased because of lack of data. So, these 140 are very representative and quality data is available for them from most sources. Ok, let's go studying the Main Most Attractive 140 World Cities! (See at APPENDIX II the full list)
- Like any good/useful set of indicators, all info included from external studies/rankings must comply with some basic principles: It must be benchmark-able, repeatable, data acquisition cost trending to zero, facts/data-based (no surveys, rumors, opinions, subjective topics), relevant to the analyzed topic, fair, manageable, so we can compare apples to apples

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[431] "2018 Quality of Living Mercer Index." *MERCER* https://mobilityexchange.mercer.com/Insights/quality-of-living-rankings retrieved by March 2018

[432] BERRONE, P. & RICART, J.E. "2018 Cities in Motion Index". *IESE*. https://media.iese.edu/research/pdfs/ST-0471-E.pdf retrieved by March 2018

[433] "2018 Global Liveability Report". *The Economist.* https://store.eiu.com/article.aspx?productid=455217630 and https://www.eiu.com/public/topical_report.aspx?campaignid=liveability2018 retrieved by March 2018

(based on cities on same situation), and dynamic/evolving (plan to update it yearly), as the cities change and a new indicator could show up and better describe one particular topic, and also new services, tools are available, for example, we should soon add 5G deployment status when significant.

Figure 58. World of Cities. Vienna's Airport. Dec2017. Source: Author.

The selection of indicators to use follows the Metanalysis methodology: researching all available docs and indexes, then choosing those matching previous criteria, and avoiding biases. Main source of bias is the lack of information for all researched 140 cities. All used indicators must be available for at least 75% of them. When not, the remaining 25%, they must be easily extrapolated from other cities from same country or from general country or region information. Some very important indicators are only available for countries. The drill down by city does not add significant detail or differences, for example, the government model or level of democracy.

4. City Magnetism

4.0 Intro. Defining and searching how much Magnetic a city is.

"I hope I go to Heaven, and when I do, I'm going to do what every San Franciscan does when he gets there. He looks around and says, 'It ain't bad, but it ain't San Francisco.'" [434] Herb Caen, American newspaper columnist for the 'San Francisco Chronicle'.

We talk about the emotional component. That magnetic part that attracts us to the city. It is difficult to explain if you have not lived there, so the exercise is extremely difficult, because it is about emotions, a kind of love relationship with our city and that it is associated with the elements that define that city, its essence.

Figure 59. Love Cities Collage. Source: Author

Cities know this and try to cultivate that relationship of belonging, even with direct symbols or messages, like what we can see in the composition in Figure 59. Ok, but what makes up this city essence that attracts us like a magnet? If we have on the one hand that the essence of things is fundamentally the invariable and permanent nature that constitutes them, and the city is in essence, a point in space / time where humans meet / encounter, then the city essence is determined by the humans who

[434] CAEN, H. *Herb Caen's Guide to San Francisco*, Doubleday & Company, Inc., Garden City, New York, 1957

have previously lived and currently live there. Every minute we live in the city we can observe it, we can understand that there are things behind everything we see, more lost sounds behind what we hear, there is a point of view waiting to be explored. I perceived the extreme of this situation in Rome, where each corner has a rich history behind it, and suggests you try to discover it, challenging. Nothing is isolated or constitutes a comprehensive experience by itself, but always in relation to what surrounds it, to the sequence of events that happened there, the memory of past experiences.[435] The city is like it has been designed, built, destroyed, modified and changed by the humans who have lived there and continue transforming it every day. There is, therefore, a direct relationship between the elements that make a city magnetic and its evolution over time from its foundation till today. And beyond, even projected to the future, because from its ability to retain and attract talent it depends its future as a city, to the point of compromising its development, prosperity or decline and disappearance.

Also, we can observe the evolution of a city according to the notion of time that its inhabitants hold. There is a very Western conception that reaches its maximum expression in the USA in terms of time as a push forward, towards the future, never looking back. It is easy to understand why this happens when your story is very limited and not rich in relevant cultural contributions. In general, in the Western civilization we look forward as future and backward as past, as we see a river going in one direction and passing in front of us.

However, the Jewish tradition thinks just the other way around: the past is in front of us, we face it 'in Hebrew: lefanim' (literally: at our face), while the future is placed behind us 'in Hebrew: leajor' (literally: what is behind). This has a certain logic, because you know and see and you can study the past, while nothing or very little you know about the future, like what you have behind, is unknown, because you do not see it. The future comes from behind, it shows up to us in the present and we see it moving away to the past.

We also see time in the Jewish tradition as a cyclical element, where the great stages and movements are repeated. Many times, we have thought about this concept when talking about climatology, migratory movements, stock market developments,

[435] LYNCH, K. *The Image of the City*. The MIT Press, Cambridge (MA, USA) 1960, p.1

history, everything we repeat at same date every year, every month, week, or even every day, etc, and especially when talking about human behavior, good and evil, human progress and corruption. An ancient description of this conception is found in the Bible, "*what it was is what it will be, and what was done is what will be done, and there is nothing new under the sun*"[436]

Therefore, the concept of time[437] in Judaism combines the idea of periodicity, of the cycle, and the conception that the world is moving towards a certain goal. We can say that the timeline describes a helix, such as a hair ringlet, the vines' tendrils or a DNA chain.

The historical methodology will be able to offer us an accurate analysis of any hypothesis about the city, because in itself, it is the repository of history.[438] This will help us understand its foundations as a physical structure and as a synthesis of values, and as a collective imagination, as if we could see past, present and future intertwined in the city. Therefore, cities are living history. They are a constant historical evolution, a passage of time reflection. The city must respect and balance modern development with the preservation and retention of its historical heritage.[439] It is a sustainable development, where new things are added and integrated without destroying or ruining the old, but constantly learning from them. A city without history is like a man without memory. Humans leave traces of their lives, their experiences and their effort and work, their history, all in the city. They do it in the form of monuments, neighborhoods, trees, constructions, spaces, parks, churches, libraries, institutions, universities, ... All this constitutes the city collective legacy and allows a sense of continuity to be established for its inhabitants, understanding where they come from and get prepared for the future. Therefore, the City Magnetism is the result of human action, and will cover three moments: past,

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[436] Ecclesiastes, 1,9

[437] SHTEINSALTZ, Rab. Adin. "El concepto del tiempo en el pensamiento judío." *Bama* http://www.bama.org.ar/sitio2014/sites/default/files/_archivos/merkaz/Jomer_on_line/ST_conceptoTiempo.pdf pp.2-4 retrieved by Oct 2019

[438] ROSSI, A. *La arquitectura de la ciudad*. Ed. Gustavo Gili. Barcelona. 1978. pp148-149

[439] PINTO, C.A. "Manifesto for a new urbanity. European Urban Charter II". *Council of Europe*. Strasbourg, 2009. p.49 https://rm.coe.int/urban-charter-ii-manifesto-for-a-new-urbanity-publication-a5-58-pages-/168095e1d5 retrieved by Aug 2019

present and future, in an progress and prosperity ascending line or a destruction and decline descending one, as we studied in López Quintás' theory: ecstasy vs vertigo. And this evolution will follow the human cycles: life and its behaviors, in a perfect and infinite helix. We see therefore the city in its evolution all from a human perspective. We could say that to the city, "*nothing human is alien to*".[440] This absolutely humanistic conception has been adopted as the main theme by the Autonomous University of Mexico City.

For KPMG,[441] 'Magnet Cities' have strong leaders, great ability to raise funds (fundraisers), attract young wealth creators (talent), experience a constant physical renewal, and have thus generated a new definable city identity.

Let us study these three groups of magnetic components.

Cities Past.

The Past marks, defines and writes on stone the city identity. It is like its DNA, the addition of collective contributions from its former inhabitants, all adding parts of that DNA, evolving, constantly recombining itself. It can evolve, but slowly. It can be transformed by a long, complex process. It will take, with a well-defined, funded and widely agreed plan, at least 15 years to start watching new identity traits, which will not be consolidated until they are adopted by the citizens as their own, as part of themselves. Bilbao's (SPA) famous full reinvention took 20 years. See figure 60.

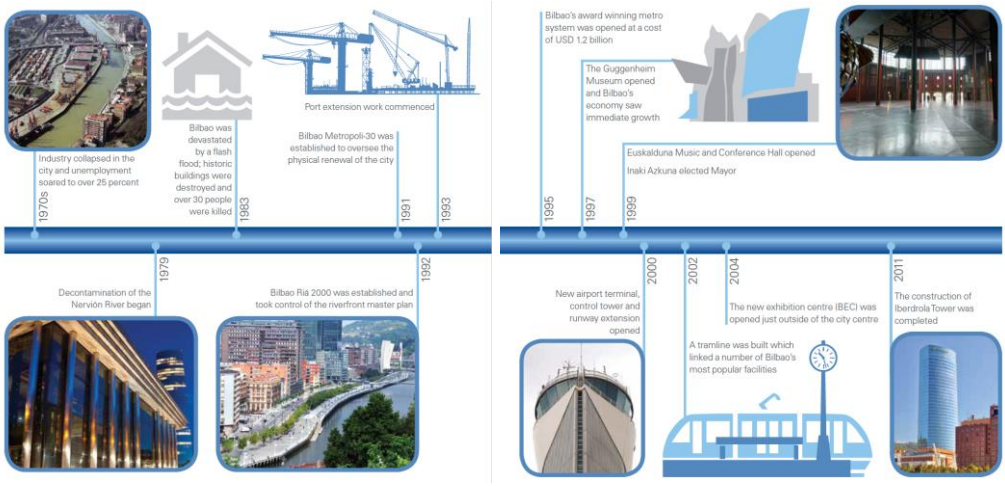

Figure 60. Bilbao's Identity Transformation Timeline[442]

[440] TERENCE (Latin: Publius Terentius Afer) *Heauton Timorumenos (The Self-Tormentor)* written 163 BC, Act I, scene 1, line 25 (77). "Homo sum: humani nihil a me alienum puto."

[441] HAYNES, C. *Magnet cities. Decline | Fightback | Victory,* KPMG. 2014 UK pp. 4-32

[442] Ibid pp.56-57

The City identity city is thus defined by those elements that make up its essence and that have been defined throughout history, such as its culture, customs, gastronomy, type of society / Government. Also fixed determinants such as geographic location, climate and environment, green spaces, or the risk of natural disasters. And finally, the city has been nurturing its reputation, its external or projected image, its branding, through the impacts it has brought on the media in history and continues to provide in the present, such as cultural or sporting events. Here we are talking about Culture as identity (past) expressed in the city (monuments, museums, events, etc.), not as a service or benefit.

Cities present

City's present moment is defined by the citizens' daily activity. This ever changing and different activity every day is also a magnetic element. We talk about the cities' psychology, about their ethics, about how people live in them, how they make a living. The present is the City Dynamism, how are the relations like between its inhabitants. If Identity laid the foundations of Magnetism, Dynamism establishes the actions. The city attracts me by its Identity, when I arrive it delights me, welcomes me, motivates me, encourages me, moves me, helps me or quite the opposite!, with Dynamism or its lack thereof. The identity would act like the brochure of a holiday vacations agency, the dynamism are the excursions that I can do at the destination.

City Dynamism will be marked by its activity, creativity, competitiveness in business and in human activities, attracting investors, promoting entrepreneurship and generating employment. Also, in the way of human relationships, participation, accessibility of all, inclusion and integration. It will be noticed in the citizens happiness, all in a city with ethical values, marked by parameters of equality and tolerance. It is about how much vibrant the city is. In the era of new technologies adoption acceleration, speed is attractive, immobilism is boring. The main difference between our society model and previous ones is the speed of change.

Cities Future

And the next obvious question is about Future. How can the future become an attraction driver for the city? When we fall in love with someone, we cannot predict how that person will evolve in the future, but we are attracted by her/his potential,

or at least preparation/skills, strength, motivation,.. various indicators on how that person will face the future and seize opportunities. This is unpredictable, of course, and has a large degree of pure betting. We all know people who have surprised everybody by her/his achieved level of development from a modest position and others who have just wasted their potential.

Therefore, the city planned future is also a strong magnetism component. It is always more beneficial to get on a wave of progress and innovation when it starts to lift off than when it is already consolidated. But it means betting, and involves the risk of being wrong.

So, what do we expect from a city with Future? We expect it to have a solid plan (a SmartCity Plan), which includes the components we have already studied (leadership, projects, ambition, financing, strategy, and above all, enthusiasm and hope, desire to progress). What makes that plan work? Remember the rule of City prosperity, (chapter 1.1), the 3 T's (Technology, Talent, Tolerance). We need investment in Innovation as a fundamental and permanent driver and, of course, talent, human capital.

Then, we can conclude that City Magnetism model can be approached by three groups of indicators:

- Identity (Past)
- Dynamism (Present)
- Strategy (Future)

And we are going to study them by using the best available and accurate proxies matching the criteria selection definition.

4.1 City Identity (Past)

City Identity is a sum of all contributions derived from its place and physical conditions, its history, its past inhabitants and all the imprint they left in the city which created and built, for the good or bad, its current shape. Most times, the environment strongly marks this identity.

"*I was born in Cartagena, a city on the shores of the Mediterranean with more than three thousand years of history. And I am born in a library, in my grandfather's, where are the stories of that sea; the stories of the Crusades and the Greeks and the Peloponnese and the battle of Salamis. Of the corsairs, of the Berbers ... For me, the sea is school, it is memory, it is history. And it is my city.* "- Arturo Pérez-Reverte (Spanish writer)[443]

We studied in the reflection from Rem Koolhaas[444] how the lack of identity leads to generic, soulless, inhuman cities, as a repetitive, fractal collection of the same gray, horrible constructions, where humans voluntarily live in little apartments-cages like rabbits. The generic city eliminates human creativity, cancels it out, humans are productive robots wandering in a sea of cement.

Each city must work with its unique geographical location, political, demographic, economic, fiscal and historical/cultural characteristics.

Identity crisis. The City Identity must be preserved. Otherwise it can be deteriorated, damaged or even lost, except for archaeologists' memory. Cultural singularity is lost as the lack of inclusion grows because the traditional inhabitants are displaced to the periphery from the center, which is empty of people but full of expensive offices, some gentrified luxury neighborhoods, or sub-housing areas that emigrants occupy offering basic services or Historic places preserved only for tourists, because local young citizens don't even know them. The sense of community that fed the city's identity for decades or centuries is disappearing. Creative density is lost, citizens no longer meet, the city ceases to make sense then losing its essence. It looks more like a set of closed boxes where people live, linearly arranged in a warehouse called urban area, with space to access each independently.

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[443] PÉREZ-REVERTE, A. https://akifrases.com/frase/125400 retrieved by Aug2019

[444] KOOLHAAS, R. *Acerca de la ciudad* GG, Barcelona, 2014 from "The Generic City" Domus, núm. 791, Milano, 1997 p.35

The city is less and less inclusive, pushing low-income citizens to the outskirts, near the industrial estates.

Identity takes many years to develop and be perceived. This happens for planned cities, built from scratch. Some cities planned in the sixties and seventies such as Chandigarh (India, 1966), Bhubaneswar (India, municipality since 1979, although it is the city of temples, some as old as century I), Almere (Netherlands, 1975, gaining land from water) or Milton Keynes (UK, created by 1974, independent since 1997), are now beginning to project something similar to a specific urban character.[445] We could conclude that a new city takes a minimum of 50 years to develop a perceptible own identity. Or the other way around, Identity can't be changed overnight, it takes long time and invested resources.

Figure 61. City Identity Quiz. Source: Author

[445] KEETON, R. "When Smart Cities are Stupid". *International New Town Institute*. Rotterdam, 2020 http://www.newtowninstitute.org/spip.php?article1078 retrieved by Feb 2020

To better illustrate the City Identity concept, let’s take a look at figure 61. Which city is behind those symbols, photos?

We are going to make a small quiz to discover the city behind those symbols.

Looking from top to bottom, we find:

An artifact with balls that looks like a molecule of united atoms.

A large door as a monument. A statue of a boy pissing. And a comic character face.

Have you already guessed? Do not?

Let's look at the gastronomy: chocolate with a flag, cabbage, waffles, beer, and a pot of mussels. At least you will be clear about the country, right? Not yet?

If you still have doubts, look below and find a very large building full of European Union flags, and a football team flag called Anderlecht.

Yes now? Ok, it is clearly Brussels, the capital of Belgium and the European Union. The artifact with balls is a unique building: the Atomium, symbol of Brussels since the World Exhibition of 1958. The door is the triumphal arch at the Cinquantenaire Park, built for another world exhibition in 1880 commemorating 50 years of Belgian independence. The pissing boy is the famous Manneken pis, symbol of the city together with the Atomium and the Grand Place. The comic is ... Tintin, the super well-known character of the amazing Belgian artist Hergé, which was published from 1930 to 1976, becoming one of most influential European series. Then, Belgian chocolate, Brussels sprouts, waffles, beer from one of about 180 Belgian breweries (many of them former abbeys with more than 1150 different beers), mussels: the famous and traditional 'moules-frites'. The European Commission headquarters in Schuman Square and the most important local football team, Anderlecht. Anderlecht is one of the 19 small towns that make up the Brussels region, or rather, the Brussels metropolis.

It seems clear that the identity of a city is composed of unique symbols, places or special people that are strongly associated with that city, entrenched customs, gastronomy and events or elements that frequently project its image to the rest of the world.

City Identity model includes all relevant known components which provide information and help describe that identity. A model is always a simplification of a complex reality. The list of components that can be used as a proxy to uniquely

identify a city is not exhaustive, it's the best approach using the available sources of information and respecting the criteria selection rules described before.
Known best City Identity proxies:

- Identity: History/Culture as Identity

Why is this proxy relevant?

As we explained earlier, a city needs at least 50 years to start creating certain identity marks on the minds of its citizens. The city permanent construction or destruction by its citizens in a historical process means that the city is like a history archive[446], like a book that has been written day by day since its foundation, with happy and sad episodes, glorious and painful, of brilliant splendor and decay. The cities, more than linked to history or to the events that have been happening, are history in themselves, as part of its essence. The city is a changing physical structure and it is spirit (soul), so it is a historical being[447]. By establishing itself as a historical being, a two-way relationship is developed with History: History is made in the city, and this forces the city to become History. Universal history is urban history.[448] Therefore, the city history will give us a lot of information about its identity, so much so that we can establish a direct relationship between both concepts.
Intimately linked with history we have cultural development, as a human expression during all that past time. We are going to try to approach this concept as an identity generator, not as a public (cultural) service (it will be studied in Chapter 5). It is very difficult to measure the cultural impact on the city identity, although its enormous relevance and permanent footprint are patent. Should we count the monuments, the pieces of artworks that were made there or with the city inspiration? Let's not lose focus: it is about valuing what a talented person can appreciate and what can be compared with other cities. There are two elements that give us a good proxy of this cultural impact: the UNESCO-World Heritage consideration, and the presence of important museums. There are many other elements that we could

[446] CHUECA GOITIA, F. *Breve Historia del Urbanismo.* Alianza Editorial, Madrid 1968 p.9

[447] Ibid, p.43

[448] SPRENGLER, O., *La decadencia de Occidente*, Editorial Austral, Barcelona, 2013, vol II, p131

consider as historical contributions to the city identity, such as important events, battles, treaties, agreements, mentions in history books, but a model must be simple and with great descriptive power. Trying to add many more elements would make it complicated and provide very little added value.

To be included in the UNESCO World Heritage List,[449] cities must meet at least one of the 10 selection criteria. These criteria specify that the city must be / contribute a unique universal value, exceptional in terms of history and culture. List includes 1.121 places/cities (869 cultural, 213 natural and 39 mixed)

To summarize them, the candidate cities must be an outstanding example in one of these areas, always related to the culture-history binomial (the first 6 are human creations, while the additional 4 are natural spaces):

1. Masterpiece of human creativity.
2. Exchange of human values in an era / time.
3. Testimony of a cultural tradition or a civilization.
4. Architectural or landscape environment.
5. Human settlement in relation to the environment.
6. Associated with events, traditions or artistic works of universal importance.
7. Nature-Aesthetics.
8. Nature-Earth History. As Registry.
9. Nature-Evolutionary Earth history. Ecology and Biology.
10. Nature-Conservation-Preservation biological diversity.

Museums have traditionally been dedicated to the protection, preservation, collection and exhibition of objects with high cultural and historical value.[450] They are, therefore, history storehouses. In the last decades, the sense of research has been greatly developed, from disclosure/cultural dissemination, with continuous activities such as thematic exhibitions, interpretation sessions, conferences, auditions with experts, etc. A clear expression of the relevance of museums is their growing number, which means that cities are investing on these spaces to improve

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[449] "World Heritage List" - *UNESCO World Heritage Centre*. https://whc.unesco.org/en/list/ retrieved by Aug2019

[450] WERNER, A. "Making history. Museums and history." *Archives UK* https://archives.history.ac.uk/makinghistory/resources/articles/museums_and_history.html retrieved by Oct2019

their attractiveness (some have based their transformation around a museum, such as Bilbao (Spain) with its new Guggenheim's museum). On the other hand, the importance that is being given to old museums that were falling into oblivion due to the Western society cultural decline is noticeable. These museums are being recovered, revitalized and promoted, to reinforce their role as cultural icon and hallmark. This accelerated growth in the number of museums has opened its conception to an incredible variety of subjects, some with relatively little cultural value, offering just a curious topic or an evolution of collecting. Therefore, we are going to select the most important ones. As it is complex to determine what is important or not in a cultural environment, so we will select the most visited. Although these lists are summarized on Wikipedia, they come from reliable sources such as the annual Art Newspaper exhibition, and the TEA / AECOM Museum Index, a Fortune 500 consulting company. The list includes museums of art, history, science, but does not include archaeological sites or historical monuments such as palaces, unless those palaces include important museums.

How to measure it?

We have to value from 1 to 10 the 140 cities considered according to their history / cultural history.

Age. The age of a city is a key indicator in its history. The older the better, the largest history, obviously. We will take, then, the year of its foundation as starting data. As there is a wide variety and dispersion, from relatively new cities to multi-millennial cities, and there were dark times in history such as the low Middle Ages with little cultural contribution, instead of taking that data as an absolute value, we will make a ranking. This ranking is grouped into 8 groups, with group 1 being very old cities and group 8 being very modern ones. We assign one point to each group number, so we give 0 to 7 points.

UNESCO. We will add 2 points to those on the UNESCO list.

Museums And we will add an extra point to those that appear in the list of cities with top visited museums (62 museums with more than 2m visitors/year (2018)) or top art museums (77 museums with more than 1m visitors / year (2018)).

In excel, we use the formula:

X_i=8-ROUNDUP((141-RANK.EQ(a_i;AGE))/17,5;0) + IF(UNESCO="Y";2;0) + IF(TopMuseum="Y";1;0)

Main Data Source (Weights):

Class	Weight	Indicator	Subindicator	Entity
History	70	Age		Wikipedia
	20	UNESCO		UNESCO[451]
	10	Top Museums	Most visited. General/Art.	Wikipedia. Two Sources[452]

Weights. The most important indicator is history. UNESCO consideration is very important and has an enormous correlation with human historical activity, although it is also given to unique natural spaces. These spaces also make the city that enjoys them unique, singular and attractive. I consider this indicator an enhancer of the history indicator, as it is a recognition. Museums quality are also strongly correlated to history, although some respond to a modern effort by some cities to improve their attractiveness. We then assign 70% of weight to Age, 20% to the UNESCO indicator and 10% to Museums.

(See class History data at APPENDIX III)

- Identity: Climate

Why is this proxy relevant?

The climate of a city is a fundamental component of its identity and its attractiveness. Although the human being is the only animal adapted to any climatic situation, the human development living conditions are highly conditioned by climate. Within the climate we can evaluate the temperature (too hot and too cold places prevent the outdoor social life development, the city essence). Also, rain precipitation (here we also see the extremes that make cities too dry or too rainy / humid, and these extremes also inhibit social development and economic growth).

[451] "World Heritage List" *UNESCO World Heritage Centre*. https://whc.unesco.org/en/list/ retrieved by Aug2019

[452] "List of most visited museums." *Wikipedia*. https://en.wikipedia.org/wiki/List_of_most_visited_museums List of most visited art museums https://en.wikipedia.org/wiki/List_of_most_visited_art_museums both retrieved by Aug2019

Additionally, a social life determining component is the sunshine number of hours. Luminosity (real sunhours, not those related to latitude, but those clear skies) invites you to enjoy the city, social relationships, outdoor activities, go out for leisure, social, shopping, etc, it is even a psychological component that provides emotional stability and happiness. This is very well studied at Psychiatry.

Decreased sun hours or exposure has been linked to a drop in serotonin levels, leading to a higher depression with a seasonal pattern incidence. The serotonin production is induced by light entering the eyes. This light impacts certain areas of the retina that release serotonin. Thus, this type of depression is associated with winter and areas with low levels of sun exposure.[453] Seasonal affective disorder (SAD) is a major disorder, a subset of mood disorder in which patients exhibit depressive symptoms at the same time every year, usually in winter. Common symptoms include low energy, reluctance, overeating, and sleeping too much. The term was coined by Dr. Normal Rosenthal at Georgetown University to describe the so-called winter sadness/gloom/blue: feelings of sadness, hopelessness, and listlessness, the lethargy that occurs when the external weather forces people to spend more time indoor and there are few opportunities for natural light exposure. Rosenthal wondered why he slowed down during the winter after moving from sunny South Africa to New York. When he experienced increased exposure to natural, non-artificial light again, he observed a clear health improvement. Some people have speculated that our modern lifestyle, which keeps people under artificial light for so many hours, may be encouraging a form of permanent SAD throughout the year. The main therapy is simply light, bright light therapy as a common treatment for seasonal affective disorder and circadian rhythm sleep disorders.[454] Winter depression is a common depression in the mood of many inhabitants of most Nordic countries. In Alaska it has reached a rate of 25%, falling to an approximate estimated 10% in the Netherlands and reaching only 1.4% in

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[453] NALL, R. "What are the benefits of sunlight?" *Healthline*, 2018 https://www.healthline.com/health/depression/benefits-sunlight#mental-health retrieved by Aug2019

[454] WU, D. "Let the sun shine: Mind your mental health this winter" *Harvard Health Publishing*, 2017 https://www.health.harvard.edu/blog/let-the-sun-shine-mind-your-mental-health-this-winter-2017012311058 retrieved by Aug2019

Florida. In Spain, there are hospitals and tourist resorts specialized in receiving Norwegians for 2 weeks as a cure for their depression. The Norwegian government pays for these health vacations as they are more effective and cheaper than the use of drugs and expensive hospital rooms. Aside from better mental health and sleep quality, sunlight has other very beneficial health effects like Vitamin D production, which improves bone strength by fixing calcium and better blood pressure.[455]

The hurricanes risk or other unique meteorological elements will be included in the risks section - GeoRisks.

How to measure it?

As we have seen that in climate, extremes are bad, therefore we will use the difference between each city data vs world average in temperature (about 15ºC) and in rainfall (884 mm or litres/m^2) as the main indicator. On top of this, we will add a corrective factor relative to the gradient of that indicator, since it is not the same to have an average temperature without great differences than strong heat/cold waves/spells, or in a matter of rain, having frequent soft rains or periods of high drought combined with downpours.

This data about city average temperature, rain precipitation and daily sunhours is available from Climatemps.[456]

World average temp is 15ºC. Same result we got as average from our 140 cities, so that means we have a good balanced sample. We will always take average temps. So, we will take the city annual average temperature difference with 15ºC. This number will be amplified with the gradient. Gradient is the difference between average temp in the hottest month vs coldest. This difference is ranked for all 140 cities to get a % (from 0 to 1). This percentage will be added to previous indicator as deviation. So, best cities with be those with average temp nearest 15ºC and smallest range of temperatures between hottest and coldest months, in other words, mild weather, wonderful to stimulate human activity. In the other extreme, a city very hot or very cold, and extreme differences between months averages will have a very bad indicator and amplified by near 100% or multiplied by 2.

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[455] "5 Ways the Sun Impacts Your Mental and Physical Health" *Tri-City Medical Center*, Oceanside, CA https://www.tricitymed.org/2018/08/5-ways-the-sun-impacts-your-mental-and-physical-health/ retrieved by Aug2018

[456] CLIMATEMPS http://www.madrid.climatemps.com/index.php retrieved by June2018

Excel formula will be X_i=ABS(AvgCityTemp-15)*(1+(Ranked%(Max-Min)))

World rain precipitation average is 990 mm. Our 140 cities average is 884 mm, meaning that we have less cities from humid tropical areas than cities from drier areas. We'll follow same way: the difference in precipitation vs the average will be weighted by the % of gradient obtained by the difference between the month with the highest precipitation and the month with the lowest.

Temp and Precipitation Gradient Deviations are available at APPENDIX IV.

Excel formula will be X_i=ABS(AvgCityPrecipitation-884)*(1+(Ranked%(Max-Min)))

Sunlight hours/Day can be directly obtained from Climatemps, then normalized. Note that this indicator refers not only to the presence of sun due to earth rotation and latitude, but to the availability of direct (cloudless) sunlight.

As an example of these data, see the whole set for the city of Madrid in figure 62:

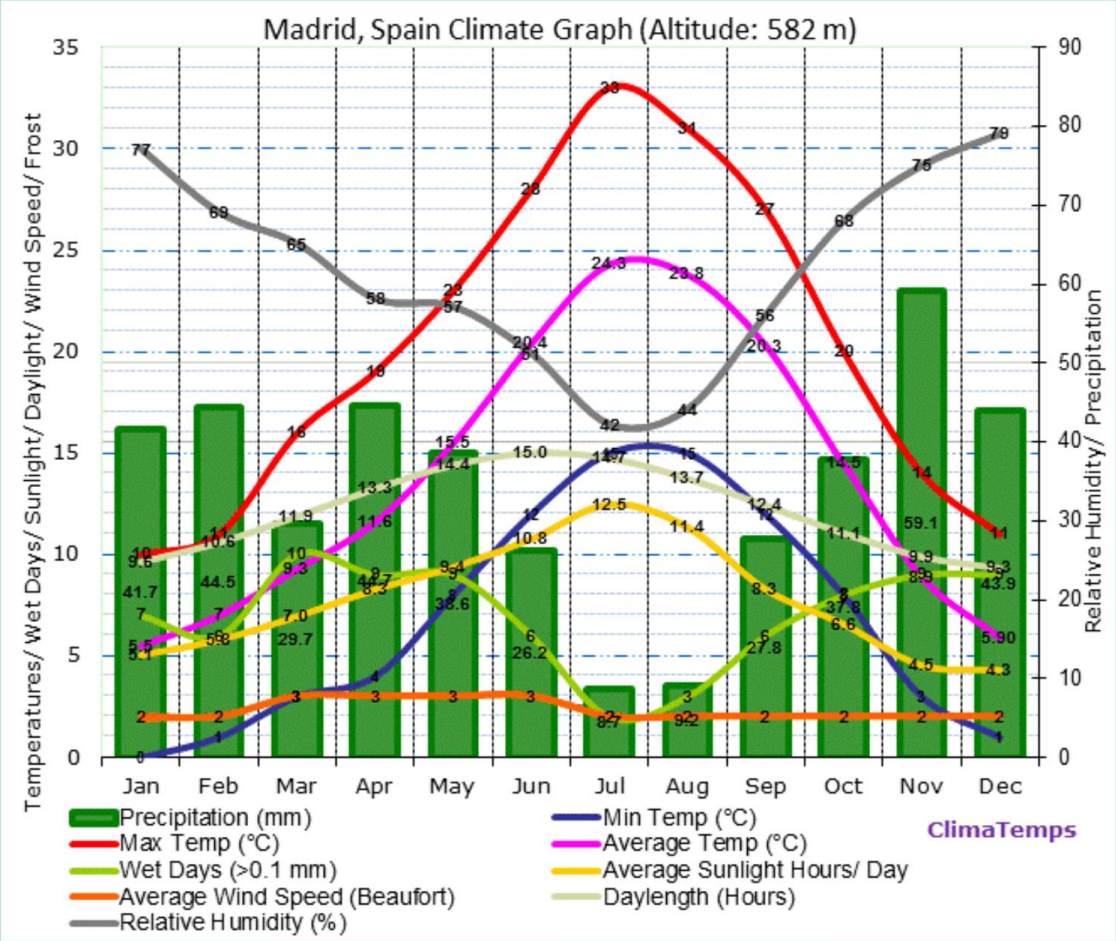

Figure 62. Climatemps data for City of Madrid. 2019[457]

[457] Ibid

Main Source:

Class	Weight	Indicator	Subindicator	Entity
Climate	33,3	Avg. Temperature Deviation	Gradient	Climatemps
	33,3	Avg. Precipitation Deviation	Gradient	Climatemps
	33,3	Avg. Daily Sunshine hours		Climatemps

Weights. Daily sunshine is more impactful on citizens mood, but temperature and rain precipitation are more important to city activities and rhythm, so we will treat all three equally weighted.
(See class Climate data at APPENDIX V)

- Identity: Space. Green Areas. Density

Why is this proxy relevant?

The extension and space available are other basic hallmarks. Here we find a contradiction: we want ample spaces to develop our lives, but, as we said previously in chapter 1.0 and Figure 2, maximum human density is necessary to strengthen economic and social development. How do we solve this dichotomy? Easy, we need green large spaces for leisure, and as a forest city lung, cleaning the air and contributing to the carbon neutral objective. These are spaces associated to the city, but without / or little urban population. The population must be concentrated in high densities (but without abusing from verticality), that is, at short distances, or rather short periods of time with an efficient public transport system.

The environmental policy dimension of green cities addresses the problems of sustainable urban development through the concern for pollution control, the reduction of carbon dioxide emission and the limited consumption of resources, highlighting the important role of urban vegetation and ensuring a high quality of life. The development of a green identity aims to achieve a better position in the general context of cities, as an advertising slogan for potential external citizens that

we want to attract and as an indicator of greater environmental policy for existing citizens.[458]

The urban form and spatial pattern of land and space use determine how cities use and generate matter, resources, and dispose of waste. This also conditions and impacts the quality of life of its inhabitants.[459] The World Bank indicates that the most compact and contiguous cities enjoy efficiencies and advantages in transportation and infrastructure. Likewise, density, agglomeration and proximity are fundamental for human progress, economic development and social equity.[460]

Therefore, we must measure the % of green space and the density.

How to measure it?

The data referring to the % of space dedicated to green areas is sometimes found directly in the information related to the city, while other times it must be calculated directly as green spaces out of the total city space. With the new concept of city dimensions that brings us the increased efficiency in urban mobility (see chapter 1.4, figure 16, where we associated to a single metropolis everything reachable in less than 90' commuting time), we must be very careful and consider as urban green spaces only those enabled for its use as such, that is, parks and gardens, and do not fall into the mistake of adding the natural spaces and countryside that surround the city. Main source of info will be World Cities Culture Forum.[461] To add needed data for additional cities, we'll take it directly from Wikipedia and others[462], then make calculations.

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[458] GULSRUD, N. *The Role of Green Space in City Branding: An Urban Governance Perspective*. Thesis. University of Copenhagen, 2015. pp.26-27

[459] DEMPSEY, N. & JENKS M. "The Future of the Compact City*" Built Environment* Vol. 36. No. 1 Alexandrine Press, Marcham, Oxon, UK, 1978, pp.116-121

[460] SWILLING M. et al "THE WEIGHT OF CITIES. RESOURCE REQUIREMENTS OF FUTURE URBANIZATION" *United Nations Environment Programme*, 2018, p.53, also at UN-20180906-peso-ciudades-informe-weight-of-cities.pdf retrieved by Oct 2019

[461] "Global Leadership on culture in cities." *World Cities Culture Forum. Bop Consulting*. http://www.worldcitiesscultureforum.com/data/of-public-green-space-parks-and-gardens retrieved by Oct2018

[462] "Cities with the most % of public green space (parks and gardens)" *SKYSCRAPERCITY* http://www.skyscrapercity.com/showthread.php?t=1660203 retrieved by Oct2018

Main source for Density will be Demographia[463]. Demographia includes metropolitan areas in an exhaustive analysis. Data is taken in inh/km^2, then normalized.

Main Source:

Class	Weight	Indicator	Subindicator	Entity
Space, Density	50	% Natural Spaces	Total space	Wikipedia, Skysrapercity, worldcitiesculturefforum
	50	Density (inh/km2)		Demographia

As both indicators are complementary, we consider both as equally relevant, then we assigned a 50-50 weight. Then, a perfect city should have both in high levels or a balanced used of space for green areas and its associated objectives and high density for human development.

(See class Space, Density data at APPENDIX VI)

- Identity: GeoRisks

Why is this proxy relevant?

Each city, due to its geographical position, its type of construction and preparation for possible natural disasters, will experience a more or less significant risk. This risk is measured as their exposure to these natural phenomena weighted by their vulnerability or potential damage and resilience to minimize their impacts. This natural risk and its possible impact mark the lives of the citizens of that city. The citizens of Seattle know what an earthquake is, the Japanese are very used and prepared for that circumstance. In Santiago de Chile they know that every few years they suffer an important one. Other natural disasters such as droughts, floods, hurricanes, are increasingly frequent due to the impact of climate change. The Dutch know that they live below sea level, and many coastal cities in the world fear that the sea could rise, just as many cities near a volcano do not stop thinking about it. These events are part of the city life, they have historically marked it and will

[463] "Demographia World. Urban Areas. 15th Annual Edition: 201904" *Demographia*, pp.81-123 Also at http://www.demographia.com/db-worldua.pdf retrieved by Oct2019

continue to impact it. They are part of its identity, unfortunately not as an attractive topic but as an obstacle. On the other hand, citizens who are considering that city should know the associated risks.

We are not considering here the economic, geopolitical, societal or technological risks, as those will be evaluated at the City performance in Chapter 5. We only consider here the environmental / natural risks. To know a full report on Global Risks, I recommend the one from World Economic Forum 2020.[464]

How to measure it?

The WorldRiskIndex[465] was developed by the Institute for Environment and Human Security at the United Nations University (UNU-EHS). It is published annually since 2011 by Bündnis Entwicklung Hilft. Since 2017, the Institute of Peace Law and Armed Conflict (IFHV) of Ruhr University Bochum has been the responsible entity for its scientific research, management and calculation. The WorldRiskIndex is calculated using 27 indicators and rates natural disaster risk for 180 countries due to five main natural hazards: cyclones, floods, droughts, earthquakes and rising sea levels. The WorldRiskIndex does not predict when and with what probability the next natural disaster will occur or its magnitude, but tries to assess the potential risk in terms of material damage and victims, depending on its nature and the exposed territory preparation. It is calculated country by country by multiplying Exposure and Vulnerability. The Exposure covers threats to the population and material damage due to those natural disasters. Vulnerability encompasses the impacted social and structural sphere and is made up of three components, which are equally weighted in the calculation:

• Susceptibility describes the structural characteristics and framework conditions of a country in relation to possible damage. It is harm likelihood.

• Resilience or coping includes the skills, experience and reaction conditions to minimize negative impacts and damages. Capacities to reduce consequences.

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[464] "The Global Risks Report 2020". *World Economic Forum*. 15th Edition. Geneva. 2020. Also at http://www3.weforum.org/docs/WEF_Global_Risk_Report_2020.pdf retrieved by Feb2020.

[465] "The WorldRiskReport" *Bündnis Entwicklung Hilft and Ruhr University Bochum – Institute for International Law of Peace and Armed Conflict (IFHV),* printed Berlin 2020. pp.56-61 https://weltrisikobericht.de/english-2/ retrieved by Jan2020

• Preparation and adaptation include measures and strategies in anticipation of this risk and is understood as a long-term process that includes structural changes.

In excel: X_i=ROUND(10-((a_i-MIN(WRIndex))*10/(12,6-MIN(WRIndex)));2). Note that we have taken 12,6 instead of max value. Max value is very deviated: Manila 20,69, and using it would mean a large concentration and loss of relevance for all other, so we have taken 12,6 as a number a bit bigger that next biggest (Montevideo with 12,52) to avoid this loss of meaning by data dispersion. Manila is then set to zero.

Main Source:

Class	Weight	Indicator	Subindicator	Entity
GeoRisk	100	World Risk Index		WorldRiskIndex

(See class Natural Disasters, GeoRisk data at APPENDIX VII)

- Identity: Government Type (Basics)

Why is this proxy relevant?

Governance is a kind of city performance and will be covered later, but Government Basics and Safety are strongly marking the kind of City Identity. In a city without democracy, or with basic security problems, with restrictions on freedom of expression and assembly, the city is restricted in its capacities for economic and social development, and cannot express itself in its essence, in its abilities as a encountering place. The city identity is also marked by these living conditions. You can still see the difference in the buildings on both sides of former Berlin wall. The identity of cities under harsh communist or dictatorial regimes is highly influenced by the political and security situation in which they find themselves. As we said in the selection criteria, we do not contemplate studying cities that do not meet a minimum score in liveability: they are simply cities where nobody would want to go, and their innate talent will very likely want to leave as soon as possible. But the level of democracy and basic safety are issues to value as a city's perceived identity. In next chapter, we will study the services the city offers as performance, and we will return to studying citizen security services. Here we include the basics, customs in terms of safety, not as services, but as characteristics of the city, as components of its identity. It's mainly about the perceived sense or image of safety associated

to a city, not to the real security/safety processes or services in place efficiency. We want to assess cities as safe places to move and live, Safety services performance will be evaluated in chapter 5.

How to measure it?

Ranging from top full and best democracy in Norway to worst conditions in North Korea, The Economist's Democracy Index 2019[466] provides a snapshot of democracy development status for 167 independent countries / territories. From full democracy through to authoritarian regime, all countries are assessed around Government style. The Democracy Index is based on the assessment of five categories: electoral process and pluralism; government functioning; political participation; political culture; and civil rights/liberties. Using this range of indicators, each country is classified into one of four types of regime: "full democracy", "flawed democracy", "hybrid regime" or "authoritarian regime". Only 45,5% of all studied countries can be considered as democracies.

The Economist's Safe Cities Index[467] summarizes the multidimensional components of urban safety, approaching the concept using 57 indicators into four different areas: digital, infrastructure, health and personal security.

It should be noted that the concept of safe city as a key component of its identity does not lean on solely on the traditional personal security provided by the armed forces and the police. The idea is much broader, encompassing the security of the whole city's infrastructures and their resilience, safety and guarantees in the health service and, in an increasingly relevant sense, in the digital environment, protecting identity, privacy and communications with citizens. This expanded and comprehensive concept of safe city will attract or inhibit talent preferences for it.

Main Source:

Class	Weight	Indicator	Subindicator	Entity
Government Basics	50	Democracy Index		The Economist
	50	Safe City Index		The Economist

[466] "Democracy Index 2019. A year of democratic setbacks and popular protest." *The Economist*. 2020, London. pp.10-14. Also from https://infographics.economist.com/2019/DemocracyIndex/ retrieved by Feb2020

[467] "Safe Cities Index 2019 Urban security and resilience in an interconnected world" *The Economist*, 2020, London, p.15. Also from https://safecities.economist.com/safe-cities-index-2019/ retrieved by Feb2020

Both are basic principles for an attractive City Identity, so we are equally weighting them. (See class Government Basics data at APPENDIX VIII)

- Identity: GeoEconomics (due to location)

Why is this proxy relevant?

The term geo-economics was first used by the American economist Edward Luttwak. It tries to connect economies and resources with a place in geography, time and specific politics. Luttwak postulates the change in global power from politics (military strength, diplomacy or propaganda) into geo-economics, where governments are using economic power to invest on research, market control, production intervention and other to gain significant advantage against other competitor areas. Winners take massive profits, losers will take, if local market is large enough, only some assembly lines to create jobs, nothing creative or value-added business. He names this politics style the turbo-capitalism.[468]

This association of economic power capacity with a geographical area makes the city more or less attractive, in terms of economic development capacity or in terms of the achievable / accessible market at close/cheap range. This is part of the city identity because it is inherent in its geographical location, in the economic bloc it belongs to. From the talent attraction point of view, it is a matter of evaluating the development capacity of your job/activity in relation to the economy of the surrounding area where you would live. In other words, if I live in a place where there is great wealth around me, the impact of my work will be greater than if I live in a more isolated area from main economic power circuits. We must therefore evaluate the influence or the weight in the world economy from the area where our city is the center. It is clear that if we can influence a greater economic area with our talent, we will obtain an important number of advantages and we will be able to better develop our potential.

How to measure it?

[468] LUTTWAK, E. *Theory and Practice of Geo-Economics from Turbo-Capitalism: Winners and Losers in the Global Economy*. HarperCollins Publishers. New York. 1999. p.134.

It is not easy to find an indicator of the area of economic influence centered on a specific city. If we think about how many customers I can connect or visit in the same day, then we should think about flying on the same day and returning home. That puts us on more than 2.5 hours flights. Well, how much world GDP % is located at less than 2.5 hours flight from my city? That is the area of direct economic influence. I know that we have the Internet, and that flights are becoming faster and cheaper, but it is clear that distance is still an important handicap in foreign trade and the world continues to be governed by large blocs or areas of influence. There are areas that accelerate their development due to proximity to other more powerful ones, such as Mexico, and there are others that, although very attractive due to their excellent conditions, are far from major economies and clients, such as Australia.

We will measure the sum of GDP of all achievable countries in less than 2.5 hours flight from our city as % of total world. In the case of large countries like the USA, we will use the GDP of each reachable state. It is like measuring the area of economic influence with a compass centered on the city and a radius of 2.5 hours commercial flight.

The way to do it will be own research work with flight data, GDPs.

Main Source:

Class	Weight	Indicator	Subindicator	Entity
GeoEconomics	100	GDP Proximity	%WW GDP	Own Work

For GDP we take m$ (2017).

For world total 2017 GDP, we take Worldometers data.[469]

(See class GeoEconomics data at APPENDIX IX)

- Identity: Gastronomy (Food)

Why is this proxy relevant?

Gastronomy is one of the most important city hallmarks. When we plan a trip to discover a city, we previously study what to see, but also what to eat and drink. We must eat to live, but the act of eating becomes in many cultures a fundamental social experience. It is about meeting others, sharing experiences, enjoying life, it's a

[469] "GDP". *Worldometers*.. https://www.worldometers.info/gdp/ retrieved by Aug 2019

social ritual. [470]It is the first exported to other places cultural component, and for this reason, cities with a rich cultural diversity are full of diverse cuisines restaurants. Many dishes and types of food and drinks are intrinsically associated with a city. Spaghetti Bolognese, Calamari a la Romana, Brussels Sprouts, Hamburgers, Port Wine, or Sherry wine, or some brands of beer specifically associated with Dublin, or Amsterdam, or Scotch whiskeys, Kentucky Bourbon have a distinct denomination associated with specific cities or metropolis. The 'designation of origin' is considered a synonym of quality and originality: thus identity. On the contrary, international fast food represents a loss of identity for the city. From the point of view of a foreigner who considers moving to a city, the gastronomic offering will have an important weight depending on his standards and tastes. Cities with awful, or expensive, or very artificial / unnatural food will have a drawback in attractiveness. The city usual food is also an indicator of health, since it affects such important diseases as obesity, diabetes, hypertension or cardio-vascular stroke. This association is very well studied in areas with a high incidence of these diseases.

How to measure it?

We will first study the overall quality of nutrition in a city. We will use the Oxfam indicator, The Food Index[471]. The global philanthropic organization Oxfam, dedicated to eradicating poverty and famine, publishes this index studying 125 countries. For each country, it analyzes the quantity of food, its affordability, its quality and healthy eating habits (to be precise, it studies them from their negative impacts, that is, it studies the impact of diseases most commonly associated with disorders derived from poor food quality like Diabetes and Obesity). The ranking is obtained by combining these four elements. It indicates the best and worst places in the world to eat and the challenges of living there in terms of access to quality and quantity of good food.

Ok, if we have food in sufficient quantity and quality, now let's try to turn it into dishes with excellent flavor, dishes and cuisines that mark the city identity, as a

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[470] KOWALCZYK, A. & DEREK, M. *Gastronomy and Urban Space. Changes and challenges in geographical perspective*. Spinger. Chamonix, Switzerland, 2020, p.108

[471] "The Food Index" *OXFAM*. https://www.oxfam.org.uk/what-we-do/good-enough-to-eat retrieved by Oct2018

cultural element and as a city attraction. To measure this ability to covert food raw materials into delicious dishes, some authentic artworks, we refer to the Michelin Guide. We will take how many restaurants are outlined in that guide (which means the restaurant scores 1 or more Michelin Stars, or The Plate Michelin, or Bib Gourmand categories, and therefore deserves its consideration)[472] per million inhabitants in that metropolitan area. This will give us a good approach to the city culinary level. If there are many restaurants of this type, we will understand that gastronomy is very important there, and this is because it is, in fact, a strong city hallmark. Indicator works as famous gastronomic areas like the Spanish Basque Country (Bilbao) or French traditional areas like Lyon or Nice are very well scored.
Main Source:

Class	Weight	Indicator	Subindicator	Entity
Gastronomy	50	RK Food Index		OXFAM
	50	Michelin Guide	#Rest/Minh	Michelin Guide

We should balance quality of raw food with prepared food, so we conclude on equally weigh both indicators.
(See class Gastronomy data at APPENDIX X)

- Identity: Reputation

Why is this proxy relevant?

Reputation is an emotional perception and assessment of a specific thing. It is based on admiration, esteem and respect. It also inspires confidence, and it is a fundamental driver when making a decision about an issue with many alternatives. Applied to a city, it has a strong relationship with the evaluation of success and prosperity and also about the applied ethics in that city. People's behavior and their preferences about which city may be best for them has a strong emotional component based on that city's reputation. City's reputation is built on long-built perception, and like personal reputation, it can easily be ruined in short time. As an example, the Institute that studies the reputation of cities and countries has

[472] Michelin Guide. https://guide.michelin.com/en/restaurants retrieved by Oct 2018

highlighted the decline in the reputation of Barcelona after the recent independence revolts. It is not easy to measure, as it is not measurable in specific parameters or data. The studies described are based on surveys, on evaluating that personal perception from a large group of people. [473]

How to measure it?

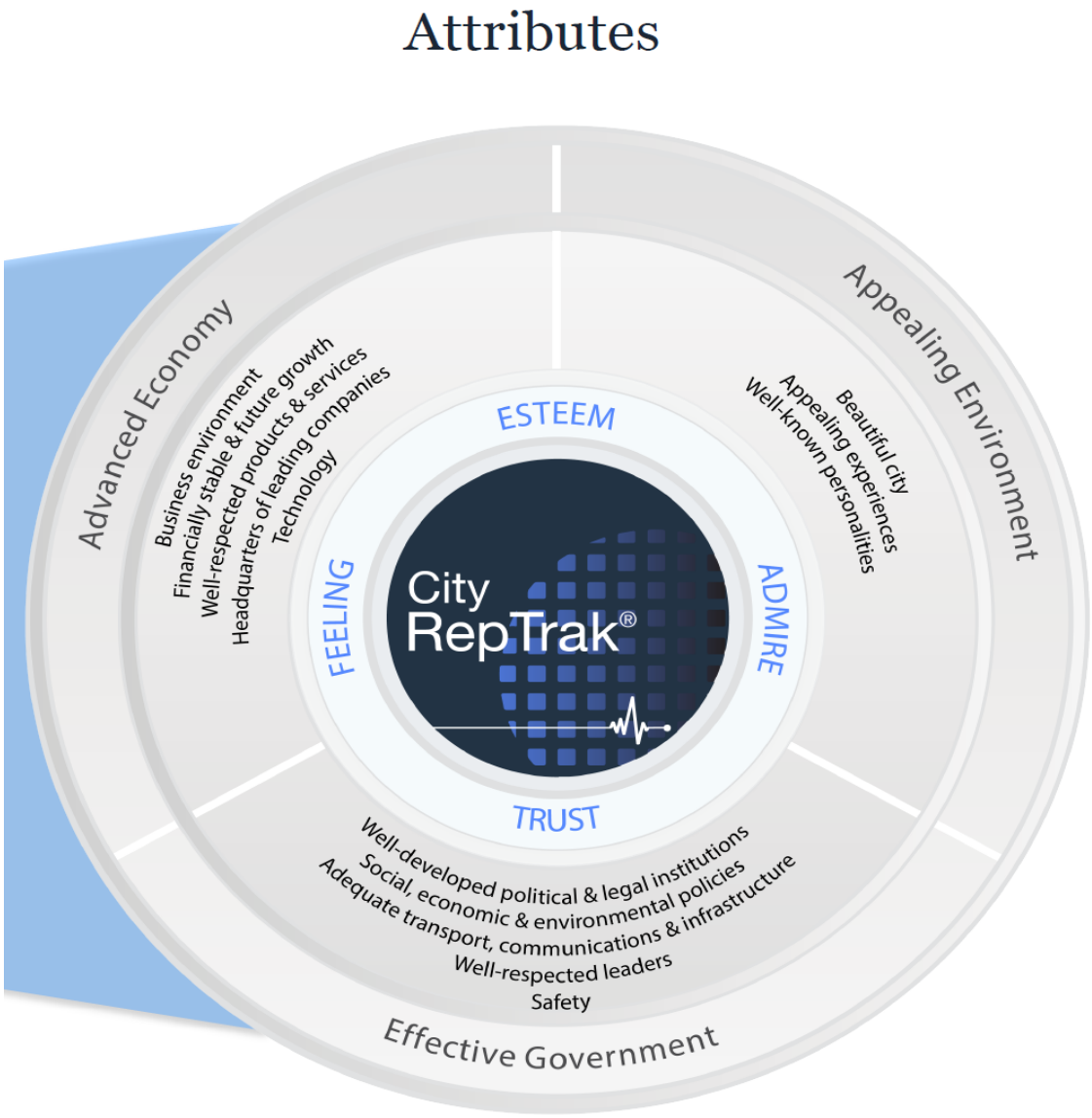

Figure 63. City Reputation "RepTrak Index" made of 13 indicators[474]

[473] "World's most reputable cities." *Reputation Institute*. https://insights.reputationinstitute.com/blog-ri/the-world-s-most-reputable-cities-explained retrieved by Oct 2018

[474]"Cities 2018". *Reputation Institute*. https://insights.reputationinstitute.com/north-america/city-reptrak-2018 retrieved by Oct 2019

City RepTrak is a survey based on more than 22,000 people in the G8. Thirteen attributes grouped into three dimensions are evaluated: "Effective administration", "Advanced economy" and "Attractive environment".

What drives city's reputation? Cities reputation is evaluated based on these three dimensions:

Governance: how much effective city organization is?

Environment: is it an aesthetically attractive city? Is it a safe place?

Economy: Does the city have a robust economy with a promising future?

For a city to achieve a higher score, it must hold a balanced profile among those three, but from the effective government perspective, since in the recent years surveys, the Governance has dominated the other two in determining the city's reputation. When we study Governance, we analyze: how developed are the legal institutions, the adequacy of the infrastructure, the social policies progressivity, how much respected are the leaders and the level of city safety. When we delve into the attributes that make up these three dimensions, the three most important in building a city's reputation are: being a beautiful, a safe place, and offering a wide range of engaging / attractive experiences. While safety and beauty have always been key attributes in determining a city's reputation score, it is interesting to see that beauty has recently declined in importance, surpassed by safety as the primary reputation attribute. Leadership is also a primary driver after these three.

Main Source:

Class	Weight	Indicator	Subindicator	Entity
Reputation	100	Reputation RepTrak	Cities // Countries	Reputation Institute

We take the city index when available. When not, we take the country index associated to that city, so we finally get good info for them all.

(See class Reputation data at APPENDIX XI)

- Identity: Branding (Projected Image)

Why is this proxy relevant?

We have seen how cities are engaged in a global competition to retain and attract talent. In this competition, we have seen how cities prepare themselves to become

more attractive from many points of view, in short, cities are offered in the global market as a product. Like any product, it needs a powerful branding, based on a strong, consolidated and attractive projected exterior image.

The City branding is based on three fundamental pillars, which are uniqueness, authenticity and image.[475] The uniqueness of a city is determined by its culture, its geographical position and its history, what makes it special, unique, different, what makes its hallmarks and what do not exist in any other city.

Authenticity speaks to us about truth, a city we can trust, with clear civic and ethical standards. An open and inclusive city, respectful, but without relativisms that blur its identity, which welcomes the outsider and integrates him, without modifying its authentic being, its character.

And finally, the image, the image projected outwards, its advertising claim in the minds of those who do not live there. Highly imageable (apparent, readable, visible). A city with a high chance to evoke a strong image in an external observer.[476] We saw in the exercise on the Brussels' identity those unique symbols associated with the city combined with elements made by images, with a clear appearance, legible, visible, visible elements that clearly identify the city towards the rest of the world. We are going to understand the city image not as a physical visual element, but as a mental process that analyzes and incorporates city components and how they are used by those who live there. It is a projection of the city physical and social urban environment, seen from the people who daily produce and live those images and experiences.[477]

The elements of singularity and uniqueness are impossible to quantify and were collected in the reputation (its aesthetic part), its history, museums, climate and other elements that we have previously discussed. We need to try to measure the impact on external image, as a fundamental component of your city marketing, of

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[475] RIZA, M.et al. "City Branding and Identity*". Procedia - Social and Behavioral Sciences* vol 35, Elsevier B.V. Universiti Teknologi MARA, Malaysia. 2012, p.294 doi:10.1016/j.sbspro.2012.02.091

[476] LYNCH, K. *The Image of the City*. The MIT Press, Cambridge (MA, USA) 1960, pp.9-10

[477] "The Identity of the City". *IEREK*. 2018 https://www.ierek.com/news/index.php/2018/10/29/the-identity-of-the-city/ retrieved by Dec 2019

your city branding. We must measure how many times the city is in the world press every week, due to events, events or activities that contribute and improve its branding, its attractive perception.

The main objective in the creation and development of a branding for the city is the presentation and articulation of the city in a globalized world. To be successful in this global competition, the city needs an appreciable good economy, wealth and an attractive image. Therefore, the "*city's branding will have to be seen as a set of elements (culture and history, infrastructure and architecture, economic growth and social development, landscape and environment, among other things), combined in a salable identity, acceptable and attractive to all people."*[478]

Quality of life also influences the city's promotion ability to attract capital and talent. Quality of life tries to create a distinctive image and an atmosphere, an environment, a distinction and recognition that acts as a magnet for both (capital and talent).

How to measure it?

To try to approximate a model of measurable variables that inform about city projected image, about main city's creations abroad, we will look at the different specialization areas that UNESCO attributes to a possible creative city: "*Crafts & Folk Art , Design, Film, Gastronomy, Literature, Music and Media Arts*"[479]. Measuring art that emanates from a city is very complex. I have seen some indexes that value the number of art galleries, but they do not seem adequate due to their mercantile nature. We have already measured the ability to be an UNESCO World Heritage city and to host important museums. We also measured gastronomy. I have tried to find how many songs or pieces of music with a particular city as part of the song title or as inspiration exist, but there is no such information. We will understand the city projected image from various approaches. On one hand, the number of films set in the city (it is obvious that these films sell the city and place it in the minds of all spectators). This is why Barcelona commissioned Woody Allen

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[478] ZHANG, L. & ZHAO S.X. "City branding and the Olympic effect: A case study of Beijing." *Cities*, Vol.25, 2009, pp.245-254

[479] "Creative Cities" *UNESCO*. http://www.unesco.org/culture/culture-sector-knowledge-management-tools/09_Info%20Sheet_Creative%20Cities%20Network.pdf p.1. Retrieved by Oct 2019

to make a film with Barcelona in its title. The famous director decided to mainly film it in Oviedo (Spain), because of his love for that city that awarded him the Prince of Asturias Award, and at the recording end, someone had to remind him of his commitment to branding, for which he called the film "*Vicky, Cristina, Barcelona*" [480]. Let's think about the enormous importance for city of Casablanca (Morocco) of the movie "*Casablanca*"[481], which was entirely filmed in the USA. On the other hand, we are going to measure the appearance of the city in the world press in a positive sense, not on the accidents or crimes reports. This is the consequence of the organization of main cultural or sporting events. To have a top-level sports event, you must have top-line sports teams / brands in some massive audience sport. Thus, we will analyze the number of cities with local teams in international competitions for soccer, basketball, other main sports, also large marathons. Also, those which have organized in the past unique worldwide events that have projected a permanent city image such as Olympics, Universal Exhibitions and other globally relevant periodic cultural events.

Movies: There is a lot of information about films and where they were set. A film based in a city is telling many things about it, and at least, it is projecting the city identity to all who watch it, so a movie is like a live large city ad. We found info about most of analyzed cities in a wonderful list from Wikipedia.[482] For those not in that list, we search the web using 'films set in City'. We always tried to find international available films, or films that are city ambassadors over local limited scope films.

Main Sports: Soccer: We add a point per team which plays international leagues like European Cup by 2018. There are cities like London which score 3 because of Chelsea, Tottenham Hotspur and Arsenal. We compare this with list of world top 50 football teams.[483] As an idea of the importance of this indicator, let's think about the image of Madrid (Spain) projected by the soccer teams Real Madrid and

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[480] ALLEN, W. *Vicky, Cristina, Barcelona*. 2008

[481] CURTIZ, M. *Casablanca*, 1943

[482] "List of films based on location". *Wikipedia*.
https://en.wikipedia.org/wiki/Lists_of_films_based_on_location retrieved by Oct 2018

[483] World Football / Soccer Clubs Ranking http://footballdatabase.com/ranking/world/1 retrieved by Oct 2018

Atlético de Madrid with their almost constant worldwide presence. Real Madrid has more than 700m online followers worldwide. His stars are more popular on social networks than the most important players in the NBA or the best tennis players.

Basketball: Same, international leagues + all NBA brandings[484].

Other Sports: Main Athletics, Formula I, Tennis, Cyclism, Golf, Horse races…there are many. To not forget those main, we take the top100 'must-see' Sports Events.[485]

Main Marathons also add a point. Marathons are events of a very rich sporting and cultural interest and are an excellent international city showcase.

We finally obtain a list of cities and scores ranging from 0 to 7 (again, London topping it). We are capturing those cities with a strong international presence on press / media because of these large sports events' organization.

There are another series of events that have marked the identity of the city and that have projected a very persistent image at the international level. We are talking about the organization of Olympic Games and Universal Exhibitions. These massive events involve preparation, urban planning and new developments, and permanent presence in the eyes of the whole world during its celebration. Therefore, they are coveted by many cities since they find in their organization not a business but an incalculable investment on branding. As an example, let us remember the impact in Barcelona of the 1992 Olympic Games organization or the Universal Exhibition of Paris in 1889 which marked the city forever with the Eiffel Tower. Official list of Olympic Games[486] and World Expositions[487] are used.

We should add cultural events with important international projection. There are many and it is difficult to select, but we will look only for those with significant relevance in the world press and which really mean a clear city promotion and identification, a city branding main component, such as the Rio Carnival or the New

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[484] NBA Teams. https://www.nba.com/teams retrieved by Oct2018

[485] "The 100 Sporting Events you must see live." *TOPENDSPORTS*. https://www.topendsports.com/world/lists/must-see-events/top100.htm retrieved by Oct2018

[486] Official List of Olympic Games. https://www.olympic.org/sports Also here: https://en.wikipedia.org/wiki/List_of_Olympic_Games_host_cities retrieved by Oct 2018

[487] "List of World Exhibitions."*Wikipedia* https://en.wikipedia.org/wiki/List_of_world_expositions also here: https://en.wikipedia.org/wiki/World%27s_fair retrieved by Oct 2018

Orleans' Mardi Gras. DayZero[488] offers us the complete list of the Top50 Festivals & Cultural Events.

How should we assign weights in this score to these different components?

The most appropriate way is an allocation proportional to its impact, or to the time consumed at international television along a year. We group this information in Movies set / referents in the city; International city-based sports teams; and the rest of past international Events (if they were so important and left a permanent mark such as an Olympics or a Universal Exhibition, or those traditional annual events such as cultural festivals). Of these three groups, Sports teams is the main, the one which provides the greatest presence and impact, so we give it 50% of weight, distributing the other 50% between 25% for movies and another 25% for important historical or cultural events.

Main Source:

Class	Weight	Indicator	Subindicator	Entity
Branding	25	Movies	List of movies	Wikipedia
	50	Sports	Soccer Basketball Other Sports Events, Marathons	Football Database NBA Topendsports
	25	Main Historical/ Cultural Events	Olympics	Olympic.org
			Universal Expo	Wikipedia
			Cultural Events / Festivals	Day Zero Project

So, calculation in Excel shows like this:

X_i= ROUND((140-RANK.EQ(NumMovies;MOVIES))/13,9;2)/4)+(SportsTeams)+Events*1,25

Movies are ranked 1..140, then assigned 0..2,5

SportTeams range from 0..5, and so score.

Cultural Events range 0..2, then score 0..2,5

(See class Branding data at APPENDIX XII)

[488] "Top50 Festivals & Cultural Events" *DayZero*. https://dayzeroproject.com/festivals/ retrieved by Oct2018

Identity: All data sources Integration.

To create a consolidated Magnetism.Identity indicator, we need to combine these explained 9 Indicators / groups.

Although it is not intended to develop another fixed City index, but rather that each citizen evaluates the cities and their attractiveness according to his scale of values and preferences, we cannot leave the model as open as possible, so assign a personal value to the more than 100 indicators used. We will allow the choice of these preferences from a third level, that is, the first will be City Attractiveness, which is made up of a second level: City Magnetism and City Profitability. City Magnetism is composed as we have seen by a third level: City Identity, City Dynamism and City Strategy. In our City Identity case, we must build a fixed model for this third level based on combining the indicators from the fourth one.

When we look at these nine groups, we can find that their influence is always very remarkable, but we can group them into five areas, each with a similar contribution to the concept of City Identity. Each area will take $1/5^{th}$ of total or 20% weight.

Area 1: Identity: History/Culture as Identity. It gets 20% weight

Area 2: Here we are grouping Identity: Government Type (Basics) and Identity: Reputation. We have seen that perceived Government efficiency is the main driver for Reputation, so we take this as Extended Reputation Group. We assign its 20% equally split among Government Basics/Security Basics and Reputation Index, 10% each.

Area 3: Geo Natural Conditions, and we split its 20% among 15% Climate and 5% GeoRisks, 10% each. Climate is more determining than GeoRisk, more avoidable and less permanently impacting, only occasionally.

Area 4: Geo Human Conditions, and we split its 20% among Green Spaces/Density and GeoEconomics, 10% each.

Area 5: Branding, assigning 5% to Gastronomy and 15% to Branding/External Image, because of the huge relevance of this projected external image / international events and massive audiences sports.

So, these is the schema for City Identity model:

Subarea	Weight	Class	Weight	Indicator	Subindicator	Entity
Identity	20	History. Culture	70	Age		Wikipedia
			20	UNESCO		UNESCO
			10	Top Museums		Wikipedia
	10	Government Basics	50	Democracy Index		The Economist
			50	Safe City Index		The Economist
	10	Reputation	100	Reputation		Reputation Institute
	10	Space. Density	50	% Natural Space		Wikipedia
			50	Density (inh/km2)		Demographia
	15	Climate	33,3	Avge. Temperature Desviation	Gradient	Climatemps
			33,3	Avge. Precipitation Desviation	Gradient	Climatemps
			33,3	Avge. Daily Sunshine		Climatemps
	5	Geo Risk	100	Natural Disaster Risk		WorldRiskReport
	10	GeoEconomics	100	GDP Proximity	%WW	Own Work
	5	Gastronomy	50	RK Food Index		OXFAM
			50	Michelin Guide	#Rest/Minh	Via Michelin
	15	Branding. External Image	25	Movies		Wikipedia
			50	Sports	Soccer Basketball Other Sports Events, Marathons	Football Database NBA Topendsports
			25	Main Events	Olympics	Olympics org
					Universal Expo	Wikipedia
					Cultural Events	Day Zero Project

(See Integrated City Identity Data at APPENDIX XIII)

4.2 City Dynamism (Present) People

"*To make the portrait of a city is a life work, and no one portrait suffices because the city is always changing. Everything in the city is properly part of its story-its physical body of brick, stone, steel, glass, wood, its lifeblood of living, breathing men and women. Streets, vistas, panoramas, bird's-eye views and women's-eye views, the noble and the shameful, high life and low life, tragedy, comedy, squalor, wealth, the mighty towers of skyscrapers, the ignoble facades of slums, people at work, people at home, people at play-these are but a small part of the city. Nothing is too humble for the camera portraitist*." — Berenice Abbott (American Photographer)[489]

The city lives, constantly changes, it is a dynamic ecosystem. There is a constant feedback between past and present, between the identity that marks its behavior and the present, which creates history and then, builds identity. This dynamism, or its lack, marks the rhythm and lifestyle of the city. We can choose vibrant cities, cities that do not stop, 'that never sleep', as Sinatra sang, that make us wake up every morning with the expectation that today, the city is going to suggest us activities that we had not planned, that will allow us to boost our social facet, perhaps too frantic for many, but purely human for others. Or just the opposite, it will be a boring place for many, or a place of rest, reflection and meditation for others. In the Internet age, the city tries, and sometimes fails, to keep up with the acceleration that technology sets for us. As we saw before, this is not good, the city must use technology for its development, we cannot put technology to lead, but people, using technology as a means, never as an end.

"*The city is not about houses, porticos, or public squares: it is men who form it*." - Eugenio Espejo (Ecuadorian doctor and writer)[490]

"*What is the City but the people?"* William Shakespeare.[491]

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[489] BERENICE A. *Documenting the City*, 1942, New York Public Library, pp.25-26

[490] ASTUTO, P. *Eugenio Espejo 1747-1795 : reformador ecuatoriano de la ilustración*. Campaña Nacional Eugenio Espejo por el Libro y la Lectura, Quito. 2003. p.102

[491] SHAKESPEARE, W. *The tragedy of Coriolanus* Act3 Scene1. England, 1609 www.literaturepage.com/read/shakespeare-coriolanus.html retrieved by Oct2019

Therefore, when we explore the present of the city, its dynamism, we must speak of people, of their competitiveness, of their behavior, of their ethics, of how they welcome the expatriate who has just arrived to stay, how much the city is warm welcoming, and of the social equity conditions the city holds.

"*He who is unable to live in society, or who has no need because he is sufficient for himself, must be either a beast or god*", Aristotle. [492]

It is, therefore, in the city, where man becomes social. The city creates the conditions for men to collaborate, build, create and advance in human and scientific disciplines. Isolation dehumanizes, pushes us toward the beast within us, mentally impoverishes us and limits us in all our performance and works. Living together, in society, brings the advantages, synergies that made the city possible from its origins. Life in society is a catalyst for human development, but living together implies observing standards of coexistence, respect, equality, an ethical platform that sets the way of living in that city. This lifestyle is a magnet or a repulsive, because it will attract talent that feels comfortable, free, stimulated in his creativity by that type of society, or it will be a blocker to talent that is not comfortable in that model of life, making the other considerations to be evaluated have to provide an important add-on to even consider that city as a possible destination for living.

These conditions and lifestyle can't be changed in short time, or by investing in a short-term plan: they are inherent and make up a city distinctive element. We have cities into various civilizations, marked in their ethics by their religious values. We have cities with a strong ethic and very consolidated human values and others with greater relativism and relaxation in ethical questions, demanding and strict cities in compliance with certain social behaviors due to a strong religious presence, and other non-denominational ones, without attaching any importance to the man religious dimension.

And we are observing a growing social deficit in the cities.[493] People who live more isolated from others, from their neighbors, from their family, even in massive cities. This makes them more distrustful of others and of institutions, they become 'lone wolves', which exacerbates their selfishness and lack of solidarity. This isolation is

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[492] ARISTOTLE. *Politics* Book 1 Section 1253ª. 350 BC

[493] MONTGOMERY, C. *Happy City*. Penguin Books, UK, 2013, p.53

accompanied by the rise of mental illness and sleep problems. There is also a correlation between the shape and size of cities and this social deficit. People with long commuting times are also more prone to anger, divorce, and gender violence. On the other hand, we have studied that there are very serious problems that require a collective social effort, such as security, climate change, pollution.

It is also necessary to consider, as a city magnetic component, the set of values and action guidelines that people adopt there and that they assume as their own, not as a result of a 'origin appellation', but as an awareness of belonging to that community. This sense of belonging is a great energizer of different forces in an open system that determine the city collective personality. The city is constantly moving.[494] It is an artwork in permanent production, in constant growth and destruction. A balance between construction and destruction must be maintained, respecting history and traditions, identity, but adding dynamism, constantly growing at a rate that consolidates identity without wrecking it.

The American urban planner Jane Jacobs always proposed the city as a dense mesh of intertwined social relations, where the diversity of forms and people mix in community. She criticized as early as the 1990s that cities were divided into a wealthy business center and endless, inhuman, remote suburbs, like ghost towns during the day. Cities cannot include these artificial boundaries. Cities are pure life in its most intense and complex form, its maximum social development. They cannot be a static artwork;[495] they are constantly changing.

The city evolves, becomes the sum of intelligences, a consolidated summary of the collective experiences of its past and present dwellers, with a constant dynamic flow of people. It is a platform for mixing and developing new cultures, for change. Many cities have, as a key element of their development, the agility to open up to talent (tolerance), to quickly adapt to a new wave of global change, to a new social or industrial revolution.

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[494] CHUECA GOITIA, F. *Breve Historia del Urbanismo*. Alianza Editorial, Madrid 1968 p.250

[495] JACOBS, J. *The Death and Life of Great American Cities*, Random House, 2002 (first published 1961) p.372, republished Entrelíneas, 2013

As we saw in chapter 2, to understand the city behavior and dynamism, we must understand its shape and its psychology.[496] This will be basic to try to anticipate how the city will receive us, how it treats the expatriate and how we must adapt to the city particular idiosyncrasy if we decide to live there.

Jan Gehl noted pointedly: "*It is ironic that we know more about the habitat of mountain gorillas than we do about the habitat of people*".[497] True. We have studies, academic research and programs for smart cities, sustainable, safer, green, healthy, resilience cities, and many more, but citizens are very rarely at the center of them. Too often, cities are seen as an artificial Meccano, with inanimate sets of buildings and technology, like elements of a construction game. This forgets its essentially human nature. We should not ignore that although infrastructure, architecture and technology are of fundamental importance, cities are substantially a lived emotional experience.[498]

Cities are the closest to the citizen administration link. The expected quantity and quality of municipal services is increasing, and on the contrary, the funds provided by the central government are more insufficient. Central governments are huge deficit monsters incapable of giving cities the budgets they need. Thus, cities must find creative ways to deliver more with less. To make this happen, this they must rely more on private initiative and give more power to residents. This requires greater trust on citizens and their ability to innovate, contribute and co-create. However, cities have lost contact with the citizen. They must recover it by creating strong social dynamism and community awareness.[499]

We are going to try to model the city dynamism as a magnetic force, based on its daily motion, on people relationships. We will group the various indicators of this

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[496] MURRAY, C. & LANDRY. C "Urban Psyche Assessment and City Personality Test." https://www.urbanpsyche.org/ retrieved by Dec 2019

[497] GEHL, J. "Year or Monkey" *GehlPeople* https://gehlpeople.com/announcement/year-of-the-monkey/ retrieved by Oct 2019

[498] MURRAY, C. & LANDRY, C. "How urban psychology could radically transform city living." *CitiesToday* 2017 https://cities-today.com/the-city-in-mind-how-urban-psychology-could-radically-transform-city-living/ retrieved by Jan2020

[499] BEACHLER, H. "The future of city innovation." *Bloomberg Cities. Medium*. 2019. https://medium.com/@BloombergCities/the-future-of-city-innovation-99a0950a76c3 retrieved by Jan2020

area into four. On the one hand, Competitiveness: those elements that measure the action, relationships, city creativity and motion, those which turns it into a social and economic hotbed, into a complex interrelations machine, of human development. On the other hand, we must measure how the city treats those who come, the expatriate, how easy or difficult city social integration is. We will also measure the city ethical values and its social equality. The city may be perfect from the point of view of development and offer an exquisite treatment to the newcomer, but additionally, we must consider its scale of values, its ethical principles and social equity, inclusiveness and justice.

- Dynamism: Competitiveness

Why is this proxy relevant?

What makes a city attractive from the perspective of dynamism, competitiveness? We must talk about creativity and competitiveness. Creativity as a generator of wealth, prosperity and as a talent attraction. It's about combining creative talent, what Prof. Florida called a 'creative class' with the right conditions and technologies. We return to the city prosperity recipe: to the 3 T's that we explained in Chapter 1.1, to Technology as a catalyst, as a disruptive trigger of new opportunities and innovation, to Tolerance with the foreigners that will approach the city attracted by that technology, and to the existing or attracted Talent. With these three T's, Prof Florida measures creativity applied to the prosperity generation, to the City magnetism regarding its present time, its dynamics. Prof. Florida's Creative Class definition includes the "*jobs spanning the fields of science, technology, and engineering; business, management and finance; design and architecture; arts, culture, entertainment, and media; law, healthcare, and education*." [500] I would say that it includes all jobs not replaceable (or not easily) by robotics or 4th Industrial revolution technologies.

[500] FLORIDA, R. "The World's Leading Creative Class Countries". *CityLab*. 2011. https://www.citylab.com/life/2011/10/worlds-leading-creative-class-countries/228/ retrieved by Oct 2019

Creative and cultural professionals change and transform the city. We live in a demanding time for new projects and they must demonstrate more than ever a clear concern to respond to that call for change. As Andy Warhol[501] once said: "*They always say time changes things, but you actually have* to *change them yourself*." The creative business activity leans on those entrepreneurs who have a project in the field of arts or technological innovation.

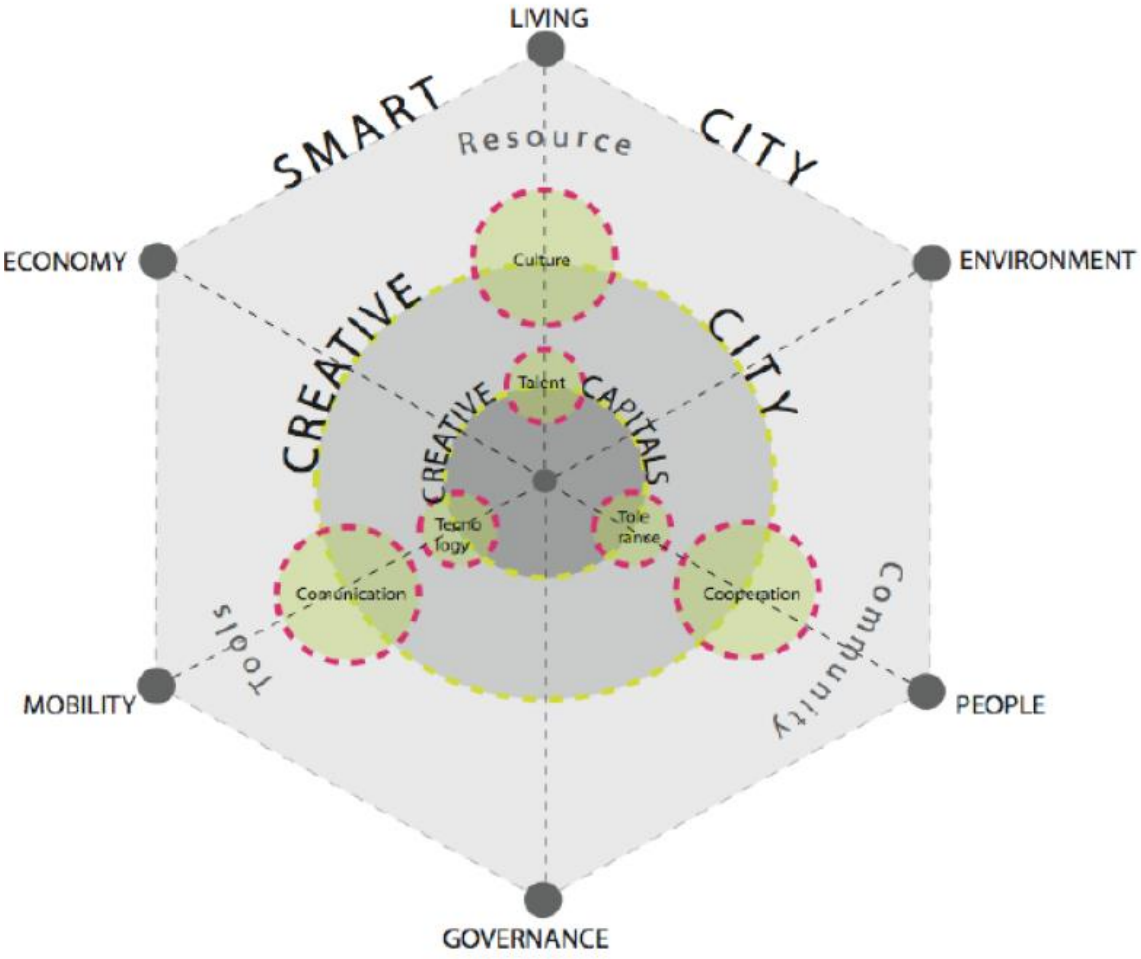

Figure 64. Six main pillars for SmartCity and three C's of a Creative City[502]

[501] WARHOL, A. *The Philosophy of Andy Warhol (From A to B & Back Again).* New York: Harcourt Brace Jovanovich. 1975. Chapter 7

[502] CARTA, M. *Città Creativa 3.0. Rigenerazione urbana e politiche di valorizzazione delle armature culturali.* Citymorphosis. Politiche culturali per città che cambiano, Giunti, Firenze. 2011, pp.213–221.

On and around this basis of City prosperity provided by the 3 T's (Technology, Talent, Tolerance), Prof. Carta develops the concept of Creative City (see figure 64) by adding 3 C's (Culture, Cooperation, Communication) as an evolution of those basic 3 T's. Culture as development and consolidation of creative talent. Cooperation as an expression of tolerance, cooperation between people in the city, advancing in the creation of a sense of community, between companies, and even between cities. Communication uses technology to reach all citizens with advances and new city services, as an expression of creativity.

The Cities competitiveness performs as a key informative element about their liveability, their citizens happiness, or their ability to become a phenomenal place to do business.[503] Another indicator to compare will be the progress capacity, movement and dynamism, for human growth, and how the city is associated with these characteristics.

Considered as worldwide symbol of success, New York City is the Paramount of Competitiveness / Motion / Progress. Let's read one of the many city's icons, its main song, very much famous because of Sinatra's amazing performances.

"*Start spreadin' the news, I'm leavin' today // I want to be a part of it // New York, New York.*

These vagabond shoes are longing to stray // Right through the very heart of it // New York, New York.

I wanna to wake up, in a city that doesn't sleep. // And find I'm king of the hill // Top of the heap.

These little town blues // Are melting away // I'll make a brand-new start of it // In old New York.

If I can make it there, I'll make it anywhere // It's up to you, New York, New York // I want to wake up in a city that never sleeps // And find I'm a number one, top of the list // King of the hill, a number one.

These little town blues, are melting away // I'm gonna make a brand-new start of it In old New York // And // If I can make it there

I'm gonna make it anywhere // It's up to you, New York

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[503] *Analysing the potential for wide scale roll out of integrated Smart Cities and Communities solutions. Report D7*. European Commission, Directorate-General for Energy.2016 p.5

(alternative end):

If I can make it there, I'll make it anywhere, // Come on come through, New York, New York. // New York // New York"[504]

This song is associated with the image of New York City. It is a song that expresses enthusiasm, leadership, success, superiority, initiative, entrepreneurship. Also, joy, fun, compensation after having done a good job. A great symbol that describes very well the concept of competitiveness, creativity, incessant movement, growth, progress, and prosperity associated with New York City. Let's remember how NYC has been a benchmark in talent attraction, innovation and multicultural tolerance. (Clear demonstration of 3 T's in execution)

We must as well analyze the cities' Economic Competitiveness linked to productivity. Finding a balance between technology adoption and human capital investments will be critical to improving productivity.

And finally, the competitiveness associated not only to economic growth, but with the competition for Talent attraction, its development, and retention.

How to measure it?

Creativity. To measure City Creativity, we will use the Martin Prosperity's Global Creativity Index[505]. This indicator makes an assessment for 139 countries around the City Creativity approached from the 3 T's. Technology adoption is evaluated by R&D Investment, Number of researchers and patents per Capita). Important to notice that it doesn't include technology adoption, because that technology could have been created in another city/country. It tries to understand the city/country capacity for creating new technologies that will attract talent. Talent presence in the city is approached by Educational Attainment (internal talent generation) and the net Creative Class present at the city. Finally, Tolerance is measured by Gallup

[504] EBB, F. & KANDER, J. *Theme From New York, New York* Martin Scorsese film New York, New York. 1977. Sony/ATV Music Publishing. First Singer: Liza Minnelli. Most famous: Frank Sinatra.

[505] FLORIDA, R., MELLANDER, C. and KING, K. "Global Creativity Index". *Martin Prosperity*. 2015. http://www.martinprosperity.org/media/Global-Creativity-Index-2015.pdf retrieved by Oct2018.

surveys[506] studying immigrants, diversity (racial or ethnic minorities, gays and lesbians) presence, rights and given treatment. Each country is raked for Technology, Talent and Tolerance, then aggregated at the Global Creativity Index. Economic Competitiveness.

The World Economic Forum's Global Competitiveness Index GCI 4.0[507] provides a detailed map of the factors and characteristics that promote growth, productivity, and human development. 2019 edition studies 141 countries, which include 99% of world GDP. The index is mainly focused on measuring long-term growth expectations, over the immediate production factors growth. GCI 4.0 aggregates data from 103 indicators developed by international forums and organizations. They are organized into 12 thematic pillars: "*Institutions; Infrastructure; ICT Adoption; Macroeconomic stability; Health; Skills; Product market; Labor market; Financial system; Market size; Business dynamism; and Capacity for innovation*". Measuring this economic competitiveness is extremely relevant because finding a city attractiveness improvement will mean to balance between technology integration and human capital nurturing. As conclusion, the analysis points to Competitiveness, Sustainability and Equality as the way forward a brilliant attractive city for the 4th Industrial revolution challenges.

To help achieving the objective of creating a global Attractive city, IESE proposes the Cities in Motion Index.[508] Cities in Motion model is based on four main factors: "*sustainable ecosystem, creative activities, equality among citizens, and connected territory*". CIMI studies the performance of ten fundamental dimensions for a city: "*human capital, social cohesion, the economy, public management, governance, the environment, mobility and transportation, urban planning, international outreach, and technology*". Study covers in the 2019 edition, 174 cities and 96 subindicators. The plan is to analyze these ten main drivers for city prosperity and compare with others, so a prioritization plan can be defined. The leading CIMI cities

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[506] Gallup Advanced Analytics. https://www.gallup.com/analytics/213617/gallup-analytics.aspx retrieved by Oct 2019

[507] "Global Competitive Index". *World Economic Forum*, 2019. http://reports.weforum.org/global-competitiveness-report-2019/ Retrieved by Jan 2020.

[508] BERRONE, P. & RICART, J.E. "Cities in Motion". *IESE*. 2019. https://media.iese.edu/research/pdfs/ST-0509-E.pdf Retrieved by Jan2020

will show a vibrant economy combined with the human potential and respect for environment that will project the city towards the highest achievements and obviously, turn the city into a lighthouse for talent.

But if we want to measure how much competitive a city is to attract talent, we must include in our research the INSEAD Global Talent Competitiveness Index.[509] This index measures the capacity of a city to produce, grow, retain and attract talent. Based on 70 indicators, the GTCI studies 132 countries and 155 cities with the aim of helping cities develop a talent development strategy to become more competitive in the global context. These 70 indicators are grouped into six pillars or areas of study: Four analyze the flow and generation of talent (Enable, Attract, Grow and Retain) and two additional ones observe the external output: the city global position in technical / vocational skills and the capacity to generate knowledge and global innovation.

So, we have finally 4 indexes, 2 country-based, 2 cities-based to help us understand the city as a global lighthouse for talent, rampant creativity, paramount of thriving and people activity.

It is the magnetism of prosperity.

Main Source:

Class	Weight	Indicator	Subindicator	Entity
Competitiveness	25	Creativity Index	Economic	Martin Prosperity
	25	Global Competitivenes		World Economic Forum
	25	Cities In Motion		IESE
	25	Global Talent Competitiveness	Talent	INSEAD

We should balance these four areas measuring human activity, development and prosperity, so we conclude on equally weighting them all.

(See class Competitiveness data at APPENDIX XIV)

- Dynamism: Expat Social Experience

[509] LANVIN, B & MONTEIRO, F. "Global City Talent Competitiveness Index". *INSEAD*. 2020. https://gtcistudy.com/ and https://gtcistudy.com/special-section-gctci/ retrieved by Jan2020

Why is this proxy relevant?

We have studied what the city is like in its dynamism and activity, especially economic, as an attractive magnet for talent. We will now see the expatriate experience from the social point of view when he arrives in the city. We want to understand the city psychology applied to the stranger. Is it an attractive lifestyle or not, the ability to establish social relationships and friendships, and if those relationships are trustworthy, inclusive and respectful with foreigners? In short, we are going to see how welcoming a city is, how open and inclusive it is. This is the main characteristic that the city of Madrid wanted to highlight with its 'Madrid hugs you'[510] campaign. When we arrive in an unknown city to settle ourselves, we can say that it is a friendly city or a closed, complicated, hard city, where relations are few, unreliable and where it is really difficult to get ahead and simply know where basic necessary to live things are.

How to measure it?

To analyze the social experience that the city offers to expatriates, we will use the HSBC Expat Explorer study. It is a global study, which has been going on for more than 10 years and with some 100,000 participants, all of them expats who explain their experience. The study that we will use is the 2017 version because it contains a series of highly interesting indicators that are not reflected in the 2019 version. Expat Explorer[511] studies the financial and social aspects of integrating an outsider into a city. This latest report includes information obtained from about 28,000 expatriates in 159 countries.

Expat Explorer final score is made up of three fundamental areas: the economy, the social experience and the family experience, and is obtained from combining 27 subtopics.

The economic area is covered with the impact on personal finances, the local economy style and the expat's working life. We will not use these indicators because the economic component has been collected extensively in the Competitiveness that we studied in the previous indicator.

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[510] "Madrid te abraza". *Madrid* https://www.esmadrid.com/madrid-te-abraza retrieved by May 2019

[511] "Expat Explorer". *HSBC* Holdings plc London 2017 https://expatexplorer.hsbc.com/global-report/ retrieved by Oct2018.

The social experience area covers lifestyle (quality of life in general); Social integration with people around you; and ease of set up (finding accommodation, Housing, papers, permits,..etc). We will use lifestyle and social integration with people because they explain very well what we are looking for.

The Family area covers the expatriate's social relations (it measures if their social life is more active); the education and care of children; and the capacities to raise them. From these three we will only use the first, since it measures social relations. Education will be studied as a city service in the next chapter. Therefore, we will use these three indicators to measure the city sociability or how much open, friendly, welcoming and inclusive the city is with newcomers who are trying to settle themselves. Thus, we will use:

- Lifestyle: local culture, healthy customs, perceived quality of life.
- People around: ease of making friends, integrating into the local environment, trust in relationships.
- Social relations: how welcoming is that place, inclusive, and diversity respectful.

Main Source:

Class	Weight	Indicator	Subindicator	Entity
Expat Social Experience	33,3	Life Style - Quality		HSBC Expat Explorer
	33,3	People Around		HSBC Expat Explorer
	33,3	Relationship - Social Life		HSBC Expat Explorer

We should balance these three areas measuring City's Expat social experience, so we conclude on equally weighting them all.

(See class Expat Experience data at APPENDIX XV)

- Dynamism: Ethics. Well-being.

Why is this proxy relevant?

The city is in itself a project of and for happiness. We studied that its essence is to serve as a place and time for humans to encounter each other, but the meaning, the

'what for' these citizens meet is to develop their social sense, their freedom, to collaborate and progress, in short, to be happy. Therefore, the objective of the city is to make us happy. Thus, if we can measure how much happy the city inhabitants are and how well they live, we can also qualify its magnetism, its attractiveness. As much as we have a good job and economic conditions, nobody will want to go live in a city where they are not happy or have questionable well-being. It is not a question of money.[512] Mayor Peñalosa greatly improved the happiness of his city, Bogotá, by basing his leadership on listening to citizens and responding to what they needed to be happy, without large financial investments. It is not about having more than one bathroom per person or more than one car, 1 / 10th of US citizens suffer from depression.

Thus, the ethics of the city are very clear to us: doing what leads us to be happy and avoiding what is not, understanding happiness as a city collective objective, not individual or selfish.

"*Whatever creates or increases happiness or some part of happiness, we ought to do; whatever destroys or hampers happiness, or gives rise to its opposite, we ought not to do*." Aristotle, Rhetoric, [513]

What's making a happy city?

Labor division created efficient specialization and brought to cities the advantages of density / agglomeration and increased productivity, fostering innovation, and achieving tremendous improvements in living standards. In our current city, for many, the concept of a happy city would be associated with the necessary resources proximity, with human and material density, that is, reaching in less than 15 minutes walking 95% or almost everything necessary, including job. In this approach, the distance and the time that we lose in commuting, the urban mobility efficiency, prevails, although we must try to define what we consider as necessary.

For many others, happiness is correlated with being healthy, connected with friends and family, and in good financial situation. Furthermore, happiness also depends on daily variables that are intrinsically dependent on our SmartCity plan, [514]such as

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[512] MONTGOMERY, C. *Happy City*. Penguin Books, UK, 2013, pp.7-9

[513] ARISTOTLE, *Rhetoric*, 350 BC, Book1, Part 5

[514] "How SmartCities can make you happier". *CitiesToday*. Nov2018, https://cities-today.com/industry/how-smart-cities-can-make-you-happier/ retrieved by Aug2019

stressless efficient mobility, security, sustainability, reliable and transparent governance, or basic topics such as cleaned city, the natural environments and a comfortable and easy life.

At the same time, however, cities generate negative issues in their development and operation such as disorderly urban sprawl, insecurity and crime, pollution, noise, stress, social isolation, etc.

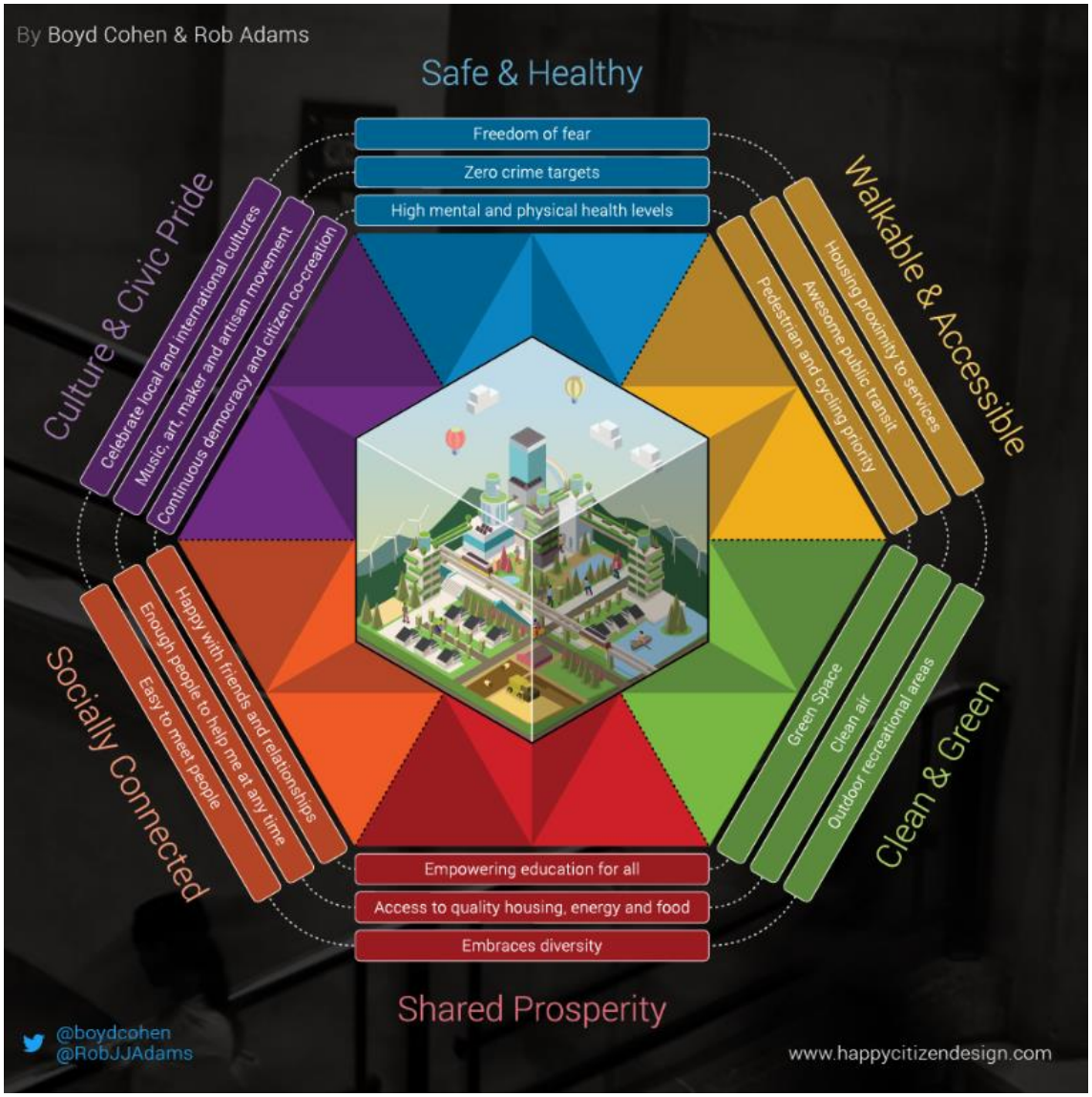

Figure 65. Boyd Cohen and Rob Adams' HAPPY CITIES HEXAGON[515]

The Happy City model by Boyd Cohen and Rob Adams: "*HAPPY CITIES HEXAGON*" frames in six areas the elements that contribute to happiness from the

[515] BOYD C. & ADAMS, R. "HAPPY CITIES HEXAGON" *HAPPY CITIZENS*, http://www.happycitizendesign.com/ retrieved by Jan2020

point of view of the city offered services and activities. It is a humanistic and urbanistic approach, where technology is intrinsically enabling each of these areas. As we will see when studying the set of services that the city offers in the next chapter, all of them are considered positive or even essential because they precisely contribute to that state of citizens happiness. There are elements derived from the city urban planning and from city psychology or the way citizens think, act and over all, relate to others, which are also fundamental components of this 'Happy City'. These elements are the ones that most influence its magnetism, since they have a strong persistence over time, shape the city lifestyle and differentiate it.

From a technological point of view, a smart city aims to improve the citizens well-being by making each dimension of their lives work in a more efficient, sustainable, safe, healthy and transparent way: governance, health, environmental sustainability, urban mobility, connectivity, planning / infrastructure, education, employability, security and culture. In each city, the chief technology officer / SmartCity Manager will develop a comprehensive plan, using all available data and technologies to maximize the citizens happiness and well-being.

What is the recipe for happiness, what does a city have to achieve to become a happy city? Apart from the basic elements such as food guarantee, shelter and security, a city must develop the policies, activities, and investments that promote that state of happiness. City must foster joy and minimize problems and difficulties. Promote health and help prevent disease. Create the environment and conditions so that citizens enjoy real freedom to live, move, relate and develop their lives as they wish. It should build resilience against the threats of economic crisis, or human or environmental disasters. It must be fair in the distribution of space, aid / grants, services, mobility, and its associated costs (taxes) depending on the possibilities and conditions of accessibility and inclusiveness. It must establish the conditions that allow citizens to build and strengthen the bonds of relationship between family, friends and strangers that give meaning to the city in its role as a platform for social relations.[516]

Same as we found medical practices Ethics, we could talk about City Ethics principles as:

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[516] MONTGOMERY, C. *Happy City*. Penguin Books, UK, 2013, p.42

Three basic: Do good (Citizen benefits, efficiency, quality of services, quality of life improvement), Avoid hardship/Do not harm (safety, privacy), Equity (equality, fairness, justice, social cohesion, solidarity);

Six about how city work / deliver services: Respect (diversity, accessibility, inclusiveness), Empowerment (community development, cocreation, cooperation), Social responsibility (solidarity, sense of belonging, citizenship), Sustainability (carbon neutral, clean energy, circular city), Participation (listening, democratic, citizen engagement) and Openness (transparency, trustable).

And as mandatory for any public sector organization, the expected Accountability (resources, costs, investments on time, amount, efficiency, avoid corruption) in the used resources and achieved targets.[517]

A happy city is also one where citizens are generous and altruistic, with high level of Giving. Citizens do not contribute only with their taxes, but with their time, donations, ideas, proposals. A city where the foreigner is helped and those who need it for humanitarian reasons; a caring city, as we said before, a welcoming, close and friendly city. A city where citizens help maintain it, repair[518] what they can, and make it more beautiful, as we saw in the example of Los Angeles and the beautification movement (see chapter 2.4), a city where citizens treat the outdoors, the street with same care they treat their house, because they consider it as their own, as part of their life.

An attractive city must be fundamentally democratic. The city has the responsibility to promote and generate a democratic organizational culture. Only within a democratic society, people learn the civic and ethical values of a democracy, such as Participation in conditions of equity; open dialogue without censorship, coercion or retaliation; tolerance with all diversity, attitudes and all different conceptions of good.[519] Trust in government is fundamental for well-being and social cohesion.

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[517] TANNAHILL, A. "Beyond evidence—to ethics: a decision-making framework for health promotion, public health and health improvement" *Health Promotion International*, Volume 23, Issue 4, December 2008, pp.380–390, also at https://doi.org/10.1093/heapro/dan032 retrieved by Oct2018

[518] MONTGOMERY, C. *Happy City*. Penguin Books, UK, 2013, p.317

[519] SOLARTE RODRIGUEZ, M.R. *Moral y ética de lo público*. Facultad de Teología. Pontificia Universidad Javeriana. Bogotá, 2003, p.29

Excellence in transparency is not only key to maintaining integrity in the public sector, it also consolidates a better governance, avoiding corruption, fraud, and public funds mismanagement.

Finally, there is a strong association between well-being, satisfaction and quality of life that is indicated by the Work-life balance. The balance between professional life in a fairly paid job and social, personal, family life, the amount of hours dedicated to leisure and personal care, the loved ones and those activities that fill us with satisfaction and realization.[520] Governments can help tackle the problem by promoting time flexible and family caring work practices.

How to measure it?

It is not easy to measure or evaluate the city ethics and well-being by objective indicators that meet the established criteria. We are going to model the concept with an evaluation of city happiness, the level of giving, civic engagement and work-life balance.

Happiness:

The World Happiness Report[521] offers a ranking of city happiness based on both objective indicators and subjective well-being perception surveys, provided by the global Gallup survey. At the same time, the current life situation and the expected future expectation are observed. They are also weighted with experiences-based elements, according to how positively or negatively citizens evaluate their lives in the city. The best-ranked countries and cities obtain high values in indicators as fundamental to a happy city as income, clean environment, mobility, life expectancy, infrastructure, and transparency and efficiency in governance.

This way, the World Happiness Report uses objective indicators such as GDP per capita, life expectancy at birth. It adds subjective elements such as social support

[520] MONTGOMERY, C. *Happy City*. Penguin Books, UK, 2013, p.33

[521] "World Happiness Report 2020". *University of British Columbia*. Vancouver. The World Happiness Report is a publication of the Sustainable Development Solutions Network, powered by data from the Gallup World Poll, and supported by the Ernesto Illy Foundation, illycaffè, Davines Group, Blue Chip Foundation, the William, Jeff, and Jennifer Gross Family Foundation, and Unilever's largest ice cream brand Wall's. https://worldhappiness.report/ed/2020/ retrieved by Feb2020

or help you can count on from friends or family, freedom of choice in your life, generosity (charity), perception of corruption and elements of positive affect such as laughter or joy that you remember from yesterday and on the contrary, negative elements such as fear, sadness or anger also from the previous day.[522]

Giving: CAF has been producing its World Giving Index[523] for the past 10 years. It is the result of the largest Giving survey ever produced, with around 1.3 million people interviewed in 128 countries. The report fundamental questions focus on evaluating the citizens altruistic and charitable behavior based on three possible actions taken in the last month: Have you helped a stranger or unknown who needed help?, Have you made donations to any charitable organization?, Have you dedicated time to any non-for profit organization?, all again made by Gallup World Poll.

Civic Engagement:

We will use the OECD Better Life Index[524] to measure citizen participation and involvement in public life. Within this comprehensive study, we take the Civic Engagement indicator. It is made up of two fundamental areas: Electoral participation. Voter turnout is measured as the percentage of the population (census) that voted during the last elections. High participation indicates trust, involvement in public action, and commitment to the city progress. It also indicates the sense of belonging, cooperation and contribution to the common good. Participation in the development of norms and laws. The extent to which a country executive power involves citizens in the development of laws and regulations is measured. Listening public petitions and proposals and turning them into laws is another way of participating in public life and co-creating the government.

Work life balance:

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[522] "World Happiness Report 2020" *WHR*. p.22. https://happiness-report.s3.amazonaws.com/2020/WHR20.pdf or https://worldhappiness.report/ed/2020/cities-and-happiness-a-global-ranking-and-analysis/ retrieved by Feb2020

[523] "World Giving Index." *CAF (Charities Aid Foundation).* Oct2019. London https://www.cafonline.org/docs/default-source/about-us-publications/caf_wgi_10th_edition_report_2712a_web_101019.pdf retrieved by Feb2020

[524] "Better Life Index. Civic Engagement" *OECD*. http://www.oecdbetterlifeindex.org/topics/civic-engagement/ , also https://stats.oecd.org/Index.aspx?DataSetCode=BLI retrieved by Jan2020

We will use again the OECD Better Life Index[525], but now we take the Work-Life Balance. Two parallel concepts that contribute to improving this balance are evaluated. On one hand, % of employees who work large number of hours, that is, how much time do citizens spend at work. An excess of worked hours negatively impacts physical and mental health, mood and happiness, increases stress and can even jeopardize safety while using machinery or vehicles. On the other hand, personal quality time is measured, that is, time given to leisure and personal care. Contrary to the other, this measure is positive since free time quantity and quality contribute to the people general well-being, their happiness, joy and hope, and provides additional benefits for mental and physical health.

Main Source:

Class	Weight	Indicator	Subindicator	Entity
Ethics. Well-being	40	Happiness		Happiness Report
	20	World Giving Score		Charities Aid Foundation (CAF)
	20	Civic Engagement		OECD-Better Life Index
	20	Work-Life Balance		OECD-Better Life Index

Happiness indicator is more comprehensive and relevant, and it's based on a combination of facts and direct citizens perceptions, so we assign it a 40%, completing the model with the other three equally weighted as there is not a clear evidence which could lead us to assign a larger weight to any.
(See class Ethics. Well-Being data at APPENDIX XVI)

- Dynamism: Equality

Why is this proxy relevant?

[525] "Better Life Index. Work-Life Balance" *OECD*.
http://www.oecdbetterlifeindex.org/topics/work-life-balance/ retrieved by Jan2020

"*We get used to getting up every day as if it couldn't be any other way, we get used to violence as something inevitable in the news, we get used to the usual landscape of poverty and misery walking through the streets of our city*" Pope Francis[526]

Equality is a fundamental indicator about the city social life. It marks the moral height of its inhabitants and determines the way in which the city will develop, from respect and collaboration or from inequality and inequity, unbalanced and disordered. The European Union, in its Manifesto for a new urbanity, stresses that equality is essential for local authorities to ensure the rights of citizens, regardless of their characteristics and diversity (sex, age, belief, origin, economic, political or social position or physical or mental disabilities). It also sets out some basic principles that cities must ensure for people with any type of disability, such as access to any place, integration and not over-protection and adaptation of homes, work places and means of transportation to their possibilities.[527]

The city life dynamism, its ability to progress and attract talent is also marked by the equality with which social life develops there. Local talent needs development opportunities regardless of its diversity. As we said in the 3 T's recipe, external talent needs tolerance conditions that allow it to settle and generate wealth in the city. If the city is not egalitarian, inclusive, its own talent will migrate as soon as it can, and the outsider will not even consider that city as a possibility. Talent does not know about race or social conditions; it just needs the right environment to nurture. Equality in wealth distribution and opportunities, especially gender equality, are fundamental elements to build a vibrant, attractive city or, on the contrary, an intolerant, aggressive and hard city with diversity.

However, despite the recent year's economic development and the notable reduction of poverty worldwide, our cities are not improving on equality. Just the opposite, the gap between rich and poor has widened from 1990 till nowadays. If

[526] BERGOGLIO, Cardinal J.M. *Pilares de un pontificado*, Mensaje Cuaresma 2012, Ed.San Pablo 2013 Madrid, p.39

[527] "Manifesto for new urbanity", *EU Urban Chapter* https://rm.coe.int/urban-charter-ii-manifesto-for-a-new-urbanity-publication-a5-58-pages-/168095e1d5 retrieved by Jan2020. pp.39-53

we compare these differences, we see that the richest 10% own 50% of the wealth, while the poorest 50% only own 5%.[528]

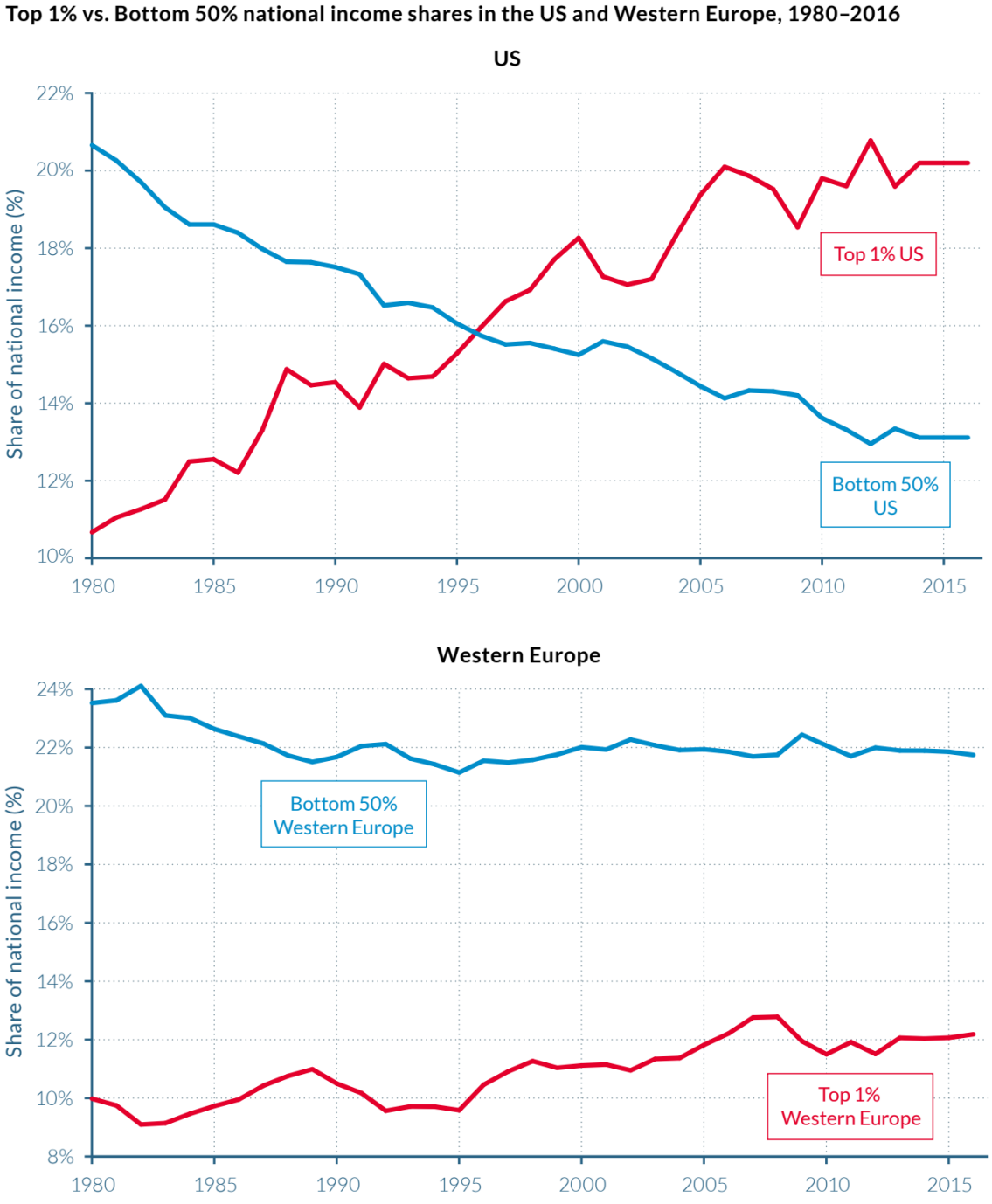

Figure 66. Income Inequality evolution. US vs Western Europe.[529]

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[528] CATHELAT, B. *SMARTCITIES SHAPING THE SOCIETY OF 2030*, UNESCO and NETEXPLO, Paris, 2019 p.35

[529] ALVAREDO, F. et al. "World Inequality Report", *World Inequality Lab*, Paris School of Economics, 2018 https://wir2018.wid.world/files/download/wir2018-full-report-english.pdf p.70

Economic inequality has increased in almost every city in the world in the last thirty years, but at different speeds. We can see in the figure 66 how in the US top 1% of the richest had 11% of wealth by 1980, reaching 20% by 2015, while in Western Europe this segment barely rose from 10 to 12% in the same period. This suggests the very important role that national and local governments and policies play in this inequality consolidation or acceleration.

Within the most innovative cities, a growing division is taking place between the center and the periphery / suburbs. If exquisite care is not taken when developing the city, paying attention to all areas, we find that when most advanced creative class grows and lands, it takes over the center and the most modern neighborhoods. Due to its greater purchasing power, it causes property prices to rise in that area and displaces lower-income creative layers and service sector workers to peripheral areas and suburbs, fostering social division.[530]

The Prof. Florida's creative class model we studied before, in his own words becomes a 'time bomb' if the city's investment in modernization benefits and SmartCity projects only reach an elite who live downtown. If that happens, that elite enjoys even greater benefits and a better quality of life, while the others make it worse. Toronto did this innovation process with that consideration, but this has not happened in many other cities. At the national level, some see this separation as the origin of populism, where a broad social base that does not access to those innovation social benefits revolts and votes for change by change, even if it leads to the consequences that we have observed in the UK, US and other countries. It is important to consider that this social division begins in the city with the neighborhood's separation, so that inequality has in the city its origin and its maximum expression.

We already studied in Chapter 1.0 the importance of counting with a city balanced class stratum. We mentioned Plato, who stressed that the best model for a city is one with the largest middle class. Middle class does not fight for power or survival, but is the real great city builder, with creativity and social relationship. Other

[530] BARNÉS, H. "Así serán nuestras ciudades: 'Una bomba de relojería'". Alma, Corazón y Vida. *El Confidencial*. 2017. https://www.elconfidencial.com/alma-corazon-vida/2017-04-15/clases-ciudades-richard-florida_1365496/ retrieved by Oct2019

authors such as Kant, position the middle class as peace guarantor, against the aristocracy. In *Perpetual Peace*, Kant explains how a strong middle class makes possible the end of wars and establishes constitutional republics.[531]

Globally, inequality is declining as developing countries like China and India and middle countries like Indonesia and Mexico have declining inequality rates and grow faster than wealthy countries, taking larger share of global economy. However, inequality in rich countries continues to grow, as we have already seen. Some experts explain that economic inequalities seriously harm economic growth in the medium and long term by blocking skills improvements and talent development, intergenerational mobility and human capital generation. Furthermore, when incomes go primarily to the wealthiest, some suggest that little is left to motivate those with lower incomes. If we add the pressure that robotics and the 4th industrial revolution bring, the lower income classes see their development as almost impossible, then radicalize their political options (populism). Continuous skill improvements, harnessing social creativity, inclusiveness, and facilitating greater prosperity for younger generations are ways to improve outcomes.[532]

The current district model is outdated. Based on the zip code we can group citizens by income, and we can even know the predominant race, age, religion and class in each district. According to Hannah Beacher, designer at Black Panther, [533]this also means that each district receives different services in quantity and quality (health care, type of education, public transport, access to employment and opportunities for entrepreneurship, etc.). Residents have little choice but to be heard. The city should restructure and reinvent current urban spaces and offer services in a more

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[531] KANT, I. *Perpetual Peace. A Philosophical Essay. Zum ewigen Frieden. Ein philosophischer Entwur*. Published by F.Nicolovius. 1795. Germany. Translated by Smith, Mary C. Project Gutenberg. 2016. pp.120-137

[532] FINA, D. et al. "Inequality: A persisting challenge and its implications". *McKinsey*, 2019 https://www.mckinsey.com/industries/public-sector/our-insights/inequality-a-persisting-challenge-and-its-implications retrieved by Jan2020

[533] BEACHLER, H. "A whole city is a more equitable city. The future of city innovation". *Bloomberg Cities. MEDIUM Future*. 2019. https://medium.com/@BloombergCities/the-future-of-city-innovation-99a0950a76c3 retrieved by Jan2020

equitable way. It is not a matter of building futuristic buildings or flying cars, but rather reorganizing the city and the distribution of services.

It is also very well known that inequality inside cities leads to higher rates of crime and violence.[534]

The SmartCity model that started in 2010 as a cutting-edge social development led to gentrified cities only accessible to an elite of high-income people. The evolution thru 2020 leads us to more of the same in private cities or districts built from scratch. We have seen cities with smart zones in exclusive districts creating more inequality, designed to attract large, high-income multinationals rather than using those resources to serve permanent residents. Only in traditionally innovative cities such as Barcelona, Copenhagen or Helsinki, have we seen a positive impact of SmartCities investments for the entire city. While the Dirigiste models and those where a large company chooses a city as a technology lighthouse continue to promote this neighborhoods inequality, we see that the slower but more inclusive model applied in traditional cities is spreading to many others in Europe, America and Asia, making that the SmartCity plan technology and innovations really make a positive impact on generating attractiveness and wealth, but in a balanced way, for the whole city, with special attention to those less integrated neighborhoods, not only to downtown or to the wealthy elite neighborhoods. Only developments based on equitable distribution of services and innovations lead to a smart modernization accessible to all districts, without creating divisions. Although it seems like a utopia, there is a growing awareness of the Inclusive City concept, where investment is being made in progress and modernization, but offering new services and facilities to all and at affordable costs for all.[535] These new models apply creativity and imagination to create a friendly city for everyone, especially for women. However, these objectives are not always the priorities for private investment.

We must therefore think of a SmartCity to attract strangers or for residents ?, for men or for women ?, a SmartCity that also cares for the vulnerable and the disabled. The super-advanced, hyper-connected city, run by and for technology and with

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[534] MONTGOMERY, C. *Happy City*. Penguin Books, UK, 2013, p.244

[535] CATHELAT, B. *SMARTCITIES SHAPING THE SOCIETY OF 2030*, UNESCO and NETEXPLO, Paris, 2019 p.174

huge sums of private capital invested, seeks to achieve a prestige that appeals to business elites. It is about creating a kind of Eden for an elite of globalized nomads, but it falls into an exclusive model, in gentrification, in inequality. According to Seoul Mayor Park Won-Soon, the SmartCity should be citizen-centered, with the overall goal of improving the quality of life and helping the most deprived, an exclusive but equitable city. Mayor Won-Soon talks about 'a people and welfare-oriented' city, with special peculiarities such as "*Seoul-style social security program, worry-free hospital beds, and free school lunches*".[536]

We have already discussed the example of social transformation in Medellín. The city received the "*Lee Kuan Yew*" award at the World Cities Summit in 2016 for its "*Citizen Community Inclusive City*" program that made the city, considered one of the most dangerous on the planet and dominated by drug cartels, reduce the crime by 90% and extreme poverty from 8% to 3%. Therefore, a good SmartCity plan is not a question of constructing many modern and futuristic buildings, but an improved quality of life in a safer and more inclusive city.

Regarding gender inequality, many sociologists explain that our cities are places designed by and for men, even recreational places have 75% of the budget oriented to boys' activities. In addition, there are certain places known as dangerous for women, especially at times when there are few people around. Should we think about the concept of a Women-friendly city? Corrective measures rather than innovative solutions have begun to be taken in some cities in the USA. Once again, cities with greater gender equality like Stockholm have taken the initiative by identifying places where women do not feel safe and adapting or replacing them in what has been called a feminist urban planning. Also in Sweden, in city of Umeå, one can enjoy the 'Gendered Landscape Tour' where the city is shown, specially progress made in gender equality urban planning, with such important achievements as a park specially designed by and for women, priority in the use of the football stadium, priority given to cultural events with parity of actors on stage, etc.[537] In many places there is public transportation, mainly taxis specially prepared for women, where they can feel safer. It is the idea of the 'pink taxi' or 'taxi rosa'

[536] Ibid, p.177

[537] Ibid, p.188

in Milano, where apart from additional security guarantees, unaccompanied women enjoy discounts, or in Rome, where they are painted in pink and are driven by women.

We must advance to a city with equity, with a fair and equal distribution of opportunities, public services, even about spaces split between humans and vehicles. The opposite is segregation, a divided city not at all attractive to anyone, neither the inhabitants themselves nor the visitors or foreigners.[538]

It is relatively easy to look at our cities and find racial, ethnic, and economic class segregation. We can clearly distinguish the neighborhoods occupied by each of those segments. On the contrary, it will be difficult for us to find spaces where we cannot differentiate this segregation, or places that contribute to the cohabitation of a wide range of social groups, places that allow and foster integration. This physical segregation also happens on the virtual plane, with social isolation of some and the triumph and social notoriety of others, all within the same city.[539]

If we add the equity component to our SmartCity definition, then we can start talking about 'SENSEable' city, as a SmartCity which encourages an open dialogue between all city actors and players to make better informed decisions and an equitable use of available resources. So, equity completes the SmartCity concept creating a SENSEable city, a smart and fair city.[540]

Cities are the center of the new digital economy brought by the 4th industrial revolution, attracting the best talent by means of a high level of wages and excellent lifestyles with greater spending capacity or purchase power. A greater desire to live in certain areas arises, which leads to an increase in rents and a greater amount of homeless, which increases the gap with the most vulnerable citizens. In King

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[538] MONTGOMERY, C. *Happy City*. Penguin Books, UK, 2013 p.237

[539] XU, Y, and RATTI, C. "A la conquista de las ciudades divididas". Hacia una nueva ilustración. Una década trascendente. *BBVA-Openmind*. Madrid 2018 also at https://www.bbvaopenmind.com/wp-content/uploads/2019/02/BBVA-OpenMind-libro-2019-Hacia-una-nueva-Ilustracion-una-decada-trascendente.pdf retrieved by Jan2020 pp.375-379

[540] GRECO, I. and BENARDINO, M "The Paradigm of the Modern City: SMART and SENSEable Cities for Smart, Inclusive and Sustainable Growth" *Universities of Sannio and Salerno*, Italy p.587

County (Seattle area, USA), a correlation has been clearly established between increased income and homelessness.[541]

City equity should aim to ensure an equitable distribution of the benefits that prosperity brings. These benefits should provide high standards of living to some, but also reduce poverty and the amount of slums, protect the rights of vulnerable groups and minorities, improve gender equality and guarantee the equitable participation of all in the whole social, political, economic, and cultural areas.[542]

How to measure it?

We will model the City Equality with four main sets of indicators:

Economic classes and equality in the wealth distribution: GINI Index; Gener Equality thru different components, Tolerance with minorities and immigrants and Poverty. We would have liked to include some indicators to measure city accessibility (for elder or people with disabilities), but although there are some associations an group of interest on that topic, there isn't yet any formal wide study and analysis.

GINI Index. The GINI Index owes its name to the Italian statistician and sociologist Corrado Gini who first proposed it in 1912. This index measures the wealth distribution in a country. If that distribution were perfect, a percentage of the population x% would have wealth also x%. As we have seen previously, our modern countries have a very uneven distribution, which will lead to lower GINI index scores. To measure this, when comparing wealth, we talk about all the annual disposable income that a family gets, including all its members, after deducting direct taxes and social contributions. When comparing % of population with % of accumulative income we obtain a curve, called Lorenz' curve. If this curve were linear and so, same % of population had the same % of income, we would have an index of 1 or perfect. The greater the inequality, the closer to zero. Mathematically,

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[541] STRINGFELLOW, M. & WAGLE D. "Booming cities, unintended consequences." *McKinsey*, 2018, https://www.mckinsey.com/featured-insights/future-of-cities/booming-cities-unintended-consequences retrieved by Nov2019

[542] "The Six Dimensions of Urban Prosperity". *UNHabitat*. http://urbandata.unhabitat.org/six-dimensions-urban-prosperity retrieved by Nov2019

Gini index is calculated as the area A (in figure 67) between perfect line and real distribution divided by whole area under perfect line or A+B, i.e. $G = A/(A + B)$. As A+B = ½, then G = 2A.

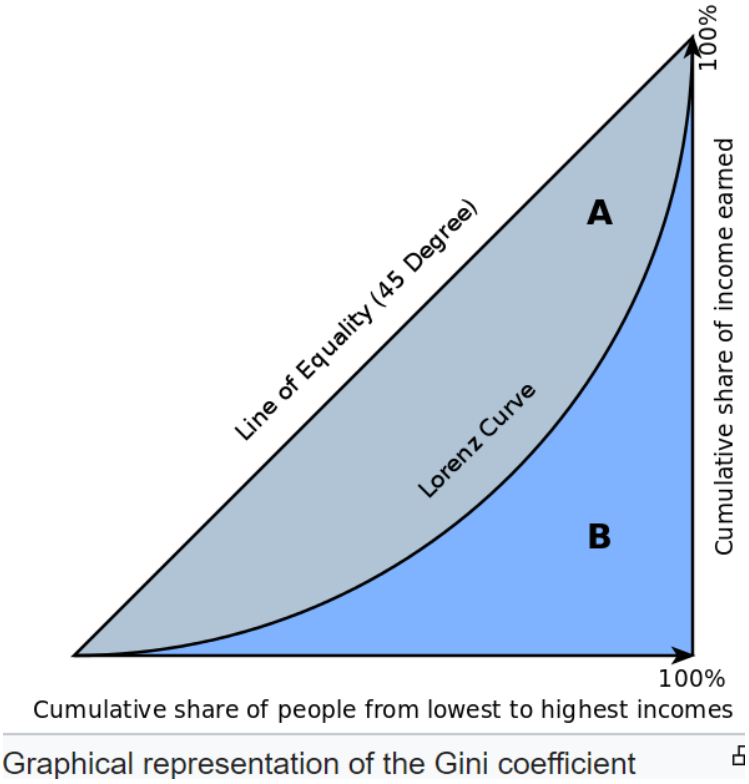

Figure 67. Lorenz Curve and GINI Index Calculation. Source: Wikipedia.[543]

For our purpose, we take the official data by WorldBank for 264 countries and dated 2019 or before.[544]

Gender Equality. To measure this, we go to INSEAD Global Talent Competitiveness Index. This index tries to evaluate the whole talent nurturing in a country or city. In this way, same as any corporation has a complete HHRR management program, the intention is to see how cities manage talent as large HHRR departments. Purpose is to assess how they implement policies and generate the conditions for Enabling (legal and labor conditions), Attracting (openness to immigrants and internal inclusion), Growing (education and training) and Retaining (sustainability of work and lifestyle) talent. The study has 6 years of experience and

[543] "Lorenz Curve" *Wikipedia*. https://en.wikipedia.org/wiki/Lorenz_curve retrieved by Jan2020

[544] "GINI Index" *World Bank*. https://data.worldbank.org/indicator/si.pov.gini retrieved by Jan2020.

knowledge and includes 132 countries and 155 cities. For our analysis of equality in the Gender and Tolerance part, we will use the analytics available in the Attract area (internal inclusion).[545] Gender equality will be measured by three main indicators:

- Graduated women (updated data for 2018): refers to the percentage of women who reached tertiary education level (level 5-8 according to the International Standard Classification of Education (ISCED)). Source: UNESCO Institute for Statistics[546]
- Gender development gap (updated data for 2017). Based on the Gender Development Index (GDI), it measures the differences and disparities between the level of human development achieved by men and women in three basic dimensions: knowledge, health and living standards. It is based on the Human Development Index (HDI) and is expressed as the female HDI as a percentage of male one. Source: United Nations Development Program (UNDP),[547] Gender Development Index.
- Leadership opportunities for women. (data from 2018). It is based on The Executive Opinion Survey (EOS) from the World Economic Forum survey on the question: In your country, to what extent do companies offer women the same opportunities as men to achieve management / leadership positions? Source: World Economic Forum, Executive Opinion Survey[548]

(See class Gender Equality data at APPENDIX XVII)

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[545] LANVIN, B. and MONTEIRO, F. "INSEAD Global Talent Competitiveness index (GTCI)", *Global Talent in the Age of Artificial Intelligence*, Fontainebleau, France, 2020 https://www.insead.edu/sites/default/files/assets/dept/globalindices/docs/GTCI-2020-report.pdf p.354, retrieved by Feb2020

[546] "UNESCO Institute for Statistics", *UIS.Stat* http://data.uis.unesco.org/ retrieved by Jan2020

[547] "Human Development Index. Gender development index". *United Nations Development Program (UNDP)*, http://hdr.undp.org/en/content/table-4-gender-development-index Retrieved by Jan2020

[548] "Executive Opinion Survey" *World Economic Forum*, https://reports.weforum.org/global-competitiveness-report-2018/appendix-b-the-executive-opinion-survey-the-voice-of-the-business-community/ retrieved by Jan2020

To address tolerance, we have added two reports: one on Tolerance for minorities and one on Tolerance for immigrants.

- Minority tolerance. (data updated for 2019). Discrimination and violence against minorities analysis is based on the indicator of group complaints within the Fragile States Index published by The Fund for Peace. The group complaint focuses on pressures based on social or political characteristics, and the subsequent response to conflict, divisions, inequality and community violence. Source: The Fund for Peace, Fragile States Index 2019[549] C3: Group Grievance.
- Immigrant tolerance. (updated data in 2018) It is based on the famous Gallup survey and specifically on a question related to the indicator associated to tolerance with immigrants: Is the city or area where you live a good place or not to live for immigrants from other countries? Source: The Gallup World Poll[550]

(See class Tolerance Equality data at APPENDIX XVIII)

Finally, we are analyzing Poverty. Poverty studies show the % of population living under the poverty line for any given country. We are taking this data from IndexMundi,[551] which is taking it as well from different sources, mainly from CIA World Factbook[552]. This is probably one of this thesis used data sources that I consider very relevant, but honestly, with poor data quality. Definitions of poverty line vary very widely from different groups of countries. All want to show good numbers, so rich countries use ample standards and poor use narrower definitions, so I have found surprisingly large numbers for some modern countries and some

[549] "Fragile States Index 2019" *The Fund for Peace,* https://fragilestatesindex.org/indicators/c3/ retrieved by Jan2020

[550] Gallup World Poll. 2018. https://www.gallup.com/analytics/232838/world-poll.aspx retrieved by Jan2020

[551] "Population below poverty line". *IndexMundi* https://www.indexmundi.com/g/r.aspx?v=69 retrieved by Jan2020

[552] "Population under poverty line." *CIA World Factbook.* 2019 and before. https://www.cia.gov/library/publications/resources/the-world-factbook/fields/221.html retrieved by Jan2020

unbelievable small numbers for some under developed ones. Anyway, if cluster of similar countries are hopefully using same criteria, then the study is not so biased, and information makes sense.

Finally, I want to indicate that I would have liked to add a city or country indicator that measures how much the city is more inclusive of people with disabilities / elder through the use of technologies. It is obvious the fundamental role that information technologies are playing in removing barriers of social isolation, communication, any person integration, eliminating distances and physical barriers, by allowing the same tasks to be done online or teleworking. Each city has a greater or lesser degree of investment in new technologies to improve the quality of life of its citizens with disabilities / elder. But there is no such information. The G3ICT[553] entity works in this regard and publishes aggregated information on this adoption of new technologies. Also, a SmartCities4All Playbook[554] shows guidelines and good practices in this regard.

Main Source:

Class	Weight	Indicator	Subindicator	Entity
Equality	25	GINI Index		World Bank
	25	Gender	Female Graduates	INSEAD
			Gender Development Gap	INSEAD
			Leadership opportunities for women	INSEAD
	25	Tolerance	Tolerance Minorities	INSEAD
			Tolerance Immigrants	INSEAD
	25	Poverty		IndexMundi

We should balance these four areas measuring City's Equality, so we conclude on equally weighting them all, as all are very relevant and no evidence points us to give extra weight to any of them.

(See class Equality data at APPENDIX XIX)

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[553] "Global Initiative for Inclusive ICTs", *G3ICT*. 2013. https://g3ict.org/publication/convention-on-the-rights-of-persons-with-disabilities-g3icts-2013-ict-accessibility-progress-report-survey-conducted-in-cooperation-with-dpi retrieved by Oct2018

[554] "SmartCities4All" *G3ICT*. 2019 https://smartcities4all.org/wp-content/uploads/2019/05/I2-Playbook-XT.pdf retrieved by Oct2019.

Dynamism: All data sources Integration.

To create a consolidated Magnetism.Dynamism indicator, we need to combine these explained four Indicators / groups.

When we look at these four groups, we can find that their influence is always very remarkable, and again, there is no evidence to lead us to specially differentiate any of them from the City Attractiveness point of view, so we equally weight them all.

So, this is the schema for City Dynamism model:

Subarea	Weight	Class	Weight	Indicator	Subindicator	Entity
Dynamism	25	Competitiveness	25	Creativity Index		Martin Prosperity
			25	Global Competitivenes	Economic	World Economic Forum
			25	Cities In Motion		IESE
			25	Global Talent Competitiveness	Talent	INSEAD
	25	Expat Social Experience	33,3	Life Style - Quality		HSBC Expat Explorer
			33,3	People Around		HSBC Expat Explorer
			33,3	Relationship - Social Life		HSBC Expat Explorer
	25	Ethics. Well-being	40	Happiness		Happiness Report
			20	World Giving Score		Charities Aid Foundation
			20	Civic Engagement		OECD-Better Life Index
			20	Work-Life Balance		OECD-Better Life Index
	25	Equality	25	GINI Index		WorldBank
			25	Gender	Female Graduates	INSEAD
					Gender Development Gap	INSEAD
					Leadership opportunities for women	INSEAD
			25	Tolerance	Tolerance Minorities	INSEAD

					Tolerance Immigrants	INSEAD
			25	Poverty		IndexMundi

(See Integrated City Dynamism Data at APPENDIX XX)

4.3 City Strategy (Future)

"*A city is not gauged by its length and width, but by the broadness of its vision and the height of its dreams*" Herb Caen[555]

Herb Caen was a famous journalist and reporter. He loved San Francisco, and it was one of his works core topics. City, dream, vision…let's combine these three words, let's think about what's making a city attractive from its future, potential, readiness, planning, promising development points of view.

Many cities take advantage of their future plans announcement to promote themselves, that's fair. They are selling a future, hope in a better city and society. They are selling their project, what they want and aspire to be for years to come. A city, like any dynamic human ecosystem, must have a sense, a direction to move to, a strategy. And if it has not, then it is very difficult to evolve in a correct direction, simply by chance, serendipity is not acceptable. Cities developed without a plan are complete chaos, just as cities that are just and only a plan are absolutely inhumane. A compromise is therefore necessary between what I want to do and how I am going to make it, as we saw in the conception and development of the SmartCity plan.

Cities must be bold and take risks, always using what they know about their citizens, taking advantage of technology and urban planning, always putting the citizen in the spotlight, at the very center, as a participant and as a recipient of city services. When I search for a city's smartcity plan and can't find it, or simply see a lot of headlines on a website, without significant actions, I think that city is at risk, what's more, I think it's wasting precious time, missing the train of innovation and that will pay for it in loss of attractiveness and talent. It's a city without a dream or a vision, is still alive? Or sure it is its managers who are dead or dormant.

[555] CAEN, H *San Francisco, City on Golden Hills* Garden City, N.Y., Doubleday, 1967 p.5

As the thinker born in my homeland, Baltasar Gracián[556] once said: Courage or wisdom is not enough, we must combine both. You have to know your city and its citizens past and present, to fully understand it, analyze its parameters, indicators and customs. You have to take its pulse and decide the direction to work, run fast, rethink, restart, but never stop, your citizens want to see action, modernity, they want to feel proud of their city and that will retain them and make them co-creators of the new city. It is a collective effort, where everyone must have an awareness of the future, where everyone has the ability to contribute or invent something, and that sum of intelligences will allow us to build the city of tomorrow from the foundations of the past and the actions of the present. It is a permanent dynamic of innovation, construction combined with some destruction / correction of errors, but with excellent net positive progress. The opposite is to languish, it is a static, generic city, dead in life, inert, numb ... better to close it and found another one, for the good and happiness of its inhabitants.

McKinsey[557] recommends that city governments consider several key issues as they look to the future:

They play in the global competition for talent. The net talent balance is the measure for city's success or failure.

The technology has in my opinion two speeds: one of permanent innovation that cities must incorporate into their SmartCity plan and another made of disruptive advances that are giving acceleration in various areas. A perfect plan means to permanently incorporate current and proven technology while looking at the following possible disruptions that we are about to trigger and change it all. For example, you have to invest on IoT knowing that 5G will be a disruption in the capabilities and possibilities that it will bring us.

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[556] GRACIAN, B. *El Arte de la Prudencia*, 1647 textos.info. Menorca. Aforismo 4, p.8 also at https://www.textos.info/baltasar-gracian/el-arte-de-la-prudencia/descargar-pdf retrieved by Oct2019

[557] FREM, J., RAJADHYAKSHA, V. and WOETZEL, J. "Thriving amid turbulence: Imagining the cities of the future". *McKinsey*. Oct2018 https://www.mckinsey.com/industries/public-sector/our-insights/thriving-amid-turbulence-imagining-the-cities-of-the-future retrieved by Oct2019

Important attention to sustainability and the environment. The city plays a fundamental role in the global task of coping with climate change. It is a possible component of future stress for the city (main potential stresses are: resources, climate, social) (most forgot the possible pandemic due to a virus ...). On the sustainability subject and future, let us remember that the very famous Greta Thunberg's activity is named "*Friday for the future*".[558]

We live in an increasingly globalized and open world, a superconnected world of cities. The city must be prepared and understand that constant flow of people, who are simple tourists, who are exploring to stay, who are leaving to other places looking for new opportunities.

Citizen well-being will be the fundamental key for city's success. Linked to talent attractiveness and as a precondition, our citizens well-being and happiness should be our goal, the net lost / won talent balance our metric.

And finally, all this must be done by placing the citizen at the center, collaborating in the initiatives and co-creating the future of the city.

Figure 68. City of Talavera de la Reina (Spain) fighting for its future[559]

Every city has a future, so how can we imagine a city without one? Not thinking about cities with serious economic or social development problems, at war or with recent natural catastrophes, what would a modern but with no future city be like? When I think about this, the Spanish city of Talavera de la Reina (Toledo) always comes to mind. Located just 115 km from Madrid, and with some 90,000 inhabitants, this city has observed a permanent economic and social decline in the

[558] Fridays for Future. https://www.fridaysforfuture.org/ retrieved by Jan2020

[559] "Más de 30.000 personas en la 'histórica' manifestación del 11-N 'Talavera por su futuro'". *Europa-Press*, 11 Nov 2017. https://m.europapress.es/castilla-lamancha/noticia-mas-30000-personas-participan-historica-manifestacion-11-lema-talavera-futuro-20171111150531.html retrieved by Oct2018

last 30 years, to become a distant Madrid bedroom. Talavera de la Reina is too close to Madrid to stop his talent from migrating and too far / poorly connected to become a Madrid smart suburb. Talavera was losing its thriving service economy, commerce in a large region, national cattle market, and strong industries in artistic tiles and textiles because the administrative center of its region was established in another city: Toledo; nearby regions such as Extremadura and Madrid were competing hard in the trade area with best markets and outlets. The dream of a high-speed train to 'bring' the city closer to Madrid was cut short by the economic crisis and because the final destination of such a journey: Lisbon, could not commit the funds to build the Portuguese part. Without good communications, without industry, Talavera was languishing to what it is today: a dormitory city for workers who must spend 90' to reach work in Madrid and therefore, leaving a good share of salary in transportation. Another indicator is that it is the city with the cheapest real-state cost in Spain, which shows the city degradation and the loss of talent.

Lack of history, monumental touristic attractions, the arrival of a large department store killing the local small supermarkets and stores, wrong policies like not taking advantage of its huge riverbank as a natural attraction, inadequate investments like building one of the highest bridges in Europe to cross the river but with nowhere to go to the other side, letting the ceramic art industry die, completed the disaster and unstoppable decline. On the social level, terrible high unemployment, the high percentage of minority social classes and unskilled emigrants raised inequality, and security problems making the city even less attractive to locals. On March 11, 2017, (see figure 68) a demonstration of more than 30,000 people simply asked for FUTURE, future for their city, for their children, connectivity (high-speed train), to develop the few assets they still left. I did not understand that demonstration as a particular political demand, they just asked for an opportunity. When more than 1/3rd of a city spontaneously asks for help, asks to have a place, a space in the future, it is because clearly the city is about to die, about to stop having a meaning, a differentiation, to become an elder people bedroom whose children (all of them living in Madrid) are going to visit then every weekend. I loved how they used the figure of Delacroix "*Liberty leading people*"[560] who champion the French

[560] DELACROIX, E. "*Liberty leading the people*". 1830. Oil on canvas. Romantic. Louvre-Paris

revolution. They dressed her in the Talavera's traditional costume and flag and used her as a symbol of that fight, not for freedom, but for a future.
To measure how much attractive a city is from its Future, its potential or strategy, we'll measure the Human Capital as potential to activate, the Strategy shown in a powerful SmartCity Plan and the investment on innovation to activate that human capital and implement that SmartCity Plan.

- Strategy: Human Capital

Why is this proxy relevant?

The prosperity of the most competitive cities in the world, such as New York, Singapore, Amsterdam or San Francisco, is not by chance, but by constant investment and policies that have long focused on human capital. This, together with attracting investments from large corporations and developing a future based on technology, have turned these cities into 'global' cities with enormous attractiveness for individuals and companies.
The ATKearny Global Cities Report[561] measures human capital as a combination of factors related to the kind of population: people been born abroad, number of international students; and the city ability to build talent in the educational system: first-rate universities, population with a tertiary degree, and number of international business schools.
Therefore, human capital is the base on which to build the future of our city, it is the engine that will move our city along the complex paths that destiny and the future will bring us and that will successfully or unsuccessfully manage the city prosperity from social, economic and environmental facets.

How to measure it?

[561] "A question of talent: how human capital will determine the next global leaders. 2019 Global Cities Report" *ATKearny* https://www.atkearney.com/global-cities/2019 retrieved by Jan2020

We are going to analyze human capital from its creation to its maximum splendor. Human capital is born and is distributed homogeneously throughout the world, by DNA, we could say that it is a divine gift. To measure how much raw human capital we have in a city, we must consider the average age of its citizens. Obviously, a city with a young population has more opportunities to generate its own talent than an aging city, which must strive to import it from outside. To measure this, we will simply use the population average age. We are taking the data city by city from Wikipedia.

This raw human capital must be cultivated through education from its earliest stages to university, fostering international experience and exchange to generate the greatest human capital capacity, ready to develop the city in the near future. To measure this finished human capital, ready to contribute, we turn to a consolidated index. As we have no Human Capital detail from the last we have just mentioned, Global Cities, so we use another well-known and highly prestigious one such as IESE Cities in Motion 2019.[562]

IESE Cities in Motion studies human capital from a great wealth of angles, including: Education: Higher education %; Business schools; Student international movements; Top 500 Universities; Schools; Expenditure on education; and Culture: Museums and art galleries; Theaters, Spending on leisure and recreation.

Main Source:

Class	Weight	Indicator	Subindicator	Entity
Human Capital	20	Population Age Average		Wikipedia
	80	Ranking Human Capital		IESE Cities Motion

Given the richness of IESE Cities in Motion Capital and the fact that Population Age is only referring to raw human capital, then we assign a higher weight (80%) to IESE Indicator, and 20% to city average people age.

(See class Human Capital data at APPENDIX XXI)

[562] BERRONE, P. & RICART, J.E. "IESE Cities in Motion 2019", *IESE*. https://media.iese.edu/research/pdfs/ST-0509.pdf retrieved by Jan2020

- Strategy: SmartCity Plan

Why is this proxy relevant?

City's strategy and future plan are described in its SmartCity plan. This is so because nobody conceives a strategy where technology is not present as the enabler, as the essential means for all plan components to be put into operation, taking advantage of and maximizing the assets of the city and developing and remediating those areas where the city needs improvement. New problems, complex and unknown to those responsible for the city today, constantly arise and need to be addressed with a short-term plan. In parallel, it is time to design a long-term plan, an ambitious plan to transform the city. Cities are going to be the most important scenario of economic transformation known to date.

When I ask myself about the future of a city, I look at its potential and its capabilities, but that is not enough, we must put it into action, we must have a strategy and plan for urban transformation in the medium / long term. This change process was detailed in chapter 2.3.

On the contrary, I have very serious doubts about the city success capacity without a short-term plan in SmartCity, or without a strategy for 5, and 10 years. I have seen 30-year plans in the most advanced and innovative cities. And we have already seen that these plans are there to be changed, modified and adapted as new disruptive technologies appear. I know it’s a trial-error, often a restart, but without a plan, the only thing that is guaranteed is the loss of opportunities and the failure of the city to attract / retain talent.

How to measure it?

Current city challenges were described in chapter 1, the SmartCity plan areas were detailed in chapter 2, the city performance indicators will be described in chapter 5. In this section, we are evaluating the city future by means of its SmartCity plan. The first approach to that model is to verify that such a plan exists. If it is not published, and therefore the citizens do not know it, we will assume that it does not exist. Sometimes, there are cities that do not have a plan as an integrated document, but rather have different smart actions within the services it offers to citizens. It is a bad indicator not to have a complete comprehensive plan because it shows a lack

of strategy, investment, agreement of all parties/stakeholders, lack of coordination and lack of leadership, however, we are going to study the main city website to try to find these smart actions.

Ready?, we are going to study the city's SmartCity plan or actions looking for those specific actions in two places: On the one hand, the website and its services offering, and on the other hand, the specific SmartCity plan or best approach to.

(See at Appendix XXII the Webs / SmartCity Plans for the 140 studied cities)

On the analysis from those websites/documents, we try to find evidence around the plan / real implementation of these 15 different SmartCity Concepts:

- Traffic. Traffic management, Analytics, Urban Mobility. Mobility as a Service
- Energy Efficiency. Savings. Fossil energies reduction. Renewables.
- Water. Avoid leakages. Water Quality.
- Tourism. Destiny. Info for tourists while at destiny. Post-Social sharing.
- SmartBuildings. Efficiency. Energy, Water, Safety, Spaces, Productivity
- CO2 RED-Carbon Neutral. Carbon Neutral target, Plan.
- Safety-Resilience. First Responders. Emergency Plan.
- Social Services. Remote/Home Care. Vulnerable population.
- Transparency. Governance.
- Citizen Engagement. Participation. Cocreation.
- Civil Servants tools. Modern Workplace. Teleworking.
- Cloud enablement. Technology adoption. Transformational Capacities.
- Mobile enablement. Mobile ready. Citizen Communication links. 5G Deployment.
- Opendata. City Data Management. Datalakes. Digital Twin models
- Social Analytics. AI for City modelling, Citizen Sentiment Analytics

It’s very wide and diverse number of topics to analyze and every city is prioritizing some areas or others dedicating different budgets. To enable comparisons and have an overall view, we are assigning for each concept:

0: If no mentions, no found

1: If mentions, scattered actions, light investment / dedication

2: If clear evidence for investment, solid actions are found

Then we are adding the 15 scores, so we are measuring the depth and real implementation SmartCity actions from 0 to 30.

(See at Appendix XXIII the SmartCity Assessment for the 140 studied cities)

Main Source:

Class	Weight	Indicator	Subindicator	Entity
SmartCity Plan		Cities Websites, Cities Smart Cities Plans	15 Areas	Own Work

Finally, we are normalizing all cities scores from 0 to 10, as usual.

(See at Appendix XXIV for SmartCity Plan)

- Strategy: Innovation

Why is this proxy relevant?

Investment in innovation makes talent flourish and develop its creativity to generate wealth and property for the city. It is the gasoline that makes the engine of human capital work. SmartCity's strategy is the road, the direction and the priority we want to set in our city development.

As Jaime Lerner, Mayor of Curitiba, Brazil, once said, "*cities are not the problem, they are the solution"*.[563] They are the solution for global warming, for aging people, for all the challenges we studied in Chapter 1. Cities are the solution because they exchange knowledge, intelligence, creativity and innovative ideas, they set the place, the time and the conditions where innovation can easily thrive.

Cities are the demonstration of how human societies are articulated within the continuous process of searching for new opportunities. For this, humans meet in the city, to seek and develop progress and wealth. It is the essence of the city, as we saw. As cities are the largest production centers, they are also the places where new opportunities are searched and found, and greater wealth is generated.[564] Main

[563] SIM, D. *Soft City: Building Density for Everyday Life*, Island Press, Washington, 2019, p.6

[564] XU, Y, and RATTI, C. "A la conquista de las ciudades divididas". Hacia una nueva ilustración. Una década trascendente. *BBVA-Openmind*. Madrid 2018 also at

engine for long-term economic growth is innovation. Cities facilitate the interaction between humans and the exchange of ideas that trigger the generation of social, economic and technological advances and new opportunities.

I think we are at the beginning of the greatest acceleration in innovation applied to cities in its entire history. This is justified, according to Prof. Florida,[565] in the central governments ineffectiveness, partisanship, populism and immobility, incapable of articulating changes in society, in contrast with closer, pragmatic, effective and much more depoliticized local governments. On the other hand, even the largest cities are still creative and alive, with enormous dynamism and innovation. In parallel, there is a global decentralization process that encourages innovation at the local level to solve the problems and challenges that arise, most just transferred or delegated by central governments. Finally, we see the emergence of a new cities specific technology sector (Prof. Florida names it "*urban tech*") with huge investment in technological development, capital contribution, social and institutional funds, and the creation of urban innovation platforms, combining local agents, technology local companies, universities and multinationals. The great innovations that we are envisioning, are focused and will be developed in and for cities (autonomous car, 5G, electric vehicles, IoT, Artificial Intelligence, etc.)

How to measure it?

First step will be to measure the country R&D investment as % or Gross Expenditure. This data is available by country, generic, but gives us a first approach on how much relevant innovation is for a country. We'll take this data from the very well known

INSEAD Global Talent Competitiveness index (GTCI). (2017)[566]

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https://www.bbvaopenmind.com/wp-content/uploads/2019/02/BBVA-OpenMind-libro-2019-Hacia-una-nueva-Ilustracion-una-decada-trascendente.pdf retrieved by Jan2020 p.92

[565] FLORIDA, R. "Cities will become platforms for innovation and creative destruction. The future of city innovation." *Bloomberg Cities*. MEDIUM Future. 2019. https://medium.com/@BloombergCities/the-future-of-city-innovation-99a0950a76c3 retrieved by Jan2020

[566] LANVIN, B. and MONTEIRO, F. "INSEAD Global Talent Competitiveness index (GTCI)", *Global Talent in the Age of Artificial Intelligence*, Fontainebleau, France, 2020

Then, we'll go deeper on innovation radiography by country. The Global Innovation Index[567] study provides an in-depth analysis of the capacity and investment on innovation for 129 countries, which bring together 92% of the world population and 97% of world GDP. It uses a total of 80 indicators and groups the innovation inputs into 5 fundamental pillars: institutions, infrastructure, human capital and sophistication in the local market and companies/businesses.

But if we are looking for specific information on each city around innovation, we should look at the Innovative Cities Program,[568] from the consultant 2ThinkNow. The Innovation Cities Framework studies more than 1,500 cities grouped in 31 market segments. It uses a set of 162 city indicators. This framework provides a comprehensive and structured way of measuring and comparing the innovation status of cities and provides suggestions and guidance on how to prepare a city for innovation attraction and development. The report evaluates the performance of cities in 3 major areas that foster innovation: Cultural assets, human infrastructure and network markets. Cities are grouped into 31 segments for better comparison.

Main Source:

Class	Weight	Indicator	Subindicator	Entity
Innovation	25	R&D (% GEX)		INSEAD-GTCI
	25	Global Innovation Index		Cornell INSEAD WIPO
	50	Innovation Cities		2ThinkNow

We are assigning a larger weight (50%) to Innovation Cities Program as it is much more city specific and rich in details. R&D Investment and Country Innovation are very relevant but less informative for this indicator.

(See at Appendix XXV for Strategy. Innovation data)

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https://www.insead.edu/sites/default/files/assets/dept/globalindices/docs/GTCI-2020-report.pdf p.274, retrieved by Feb2020

[567] DUTTA, S., LANVIN, B. and WUNSCH-VINCENT, S. "The Global Innovation Index 2019", *Cornell University, INSEAD, and WIPO* p.35 https://www.globalinnovationindex.org/ retrieved by Jan2020

[568] "Innovation Cities Program." *2ThinkNow*. 2019. https://www.innovation-cities.com/index-2019-global-city-rankings/18842/ and also at https://report.innovation-cities.com/about-the-innovation-cities-framework/758 retrieved by Jan2020

Strategy: All data sources Integration.

Finally, we consolidate in City Strategy (Future) these three areas that constitute the future of the city and its attractiveness as potential. Human Capital, SmartCity Plan and Innovation intertwined complement, reinforce and develop, as all need each other for their implementation, activation and creation of wealth and city prosperity.

So, this is the schema for City Strategy model:

Subarea	Weight	Class	Weight	Indicator	Subindicator	Entity
Strategy	20	Human Capital	20	Population Age Average Per Country		Wikipedia
			80	Ranking Human Capital		IESE Cities Motion
	50	Smart Cities Plan	100	Plan Smart Cities	15 Areas	Own Work
	30	Innovation	25	R&D (% GDP)		INSEAD - GTCI
			25	Global Innovation Index		Cornell INSEAD WIPO
			50	Innovation Cities		2ThinkNow

When evaluating these three areas, we must bear in mind that the most important is the SmartCity Plan, since without a solid Plan or an structured, integrated or well-planned way of guiding innovation, we will not achieve the achievements that the city and most importantly, its citizens, aspire. For this reason, we give the Plan a greater weight (50%). Innovation is essential, but it is more generic than the city plan and fits more in the capacities than in practice, that's why we give it a lower weight (30%). And finally we give the lowest weight (20%) to Human Capital as it is the raw material we need and although very important it is less indicative of the city's strategy and its ability to achieve excellent goals in the future.

(See at Appendix XXVI for Strategy. Summary)

4.4 Methodology to combine/rationalize City Magnetism

All variables are rationalized to 0..10 interval (direct classic standardization)

Then, the following standardization approach is used:

Score $x_i = \left(10 \times \frac{a_i - a_{min}}{a_{MAX} - a_{min}}\right)$

When we consolidate into the main 3 City Magnetism areas: City Identity, City Dynamism and City Strategy, we are rationalizing 1..10, as we don't want to multiply by less than 1 any of these 3 areas inputs, so the standardization approach is slightly different:

Score $x_i = \left(9 \times \frac{a_i - a_{min}}{a_{MAX} - a_{min}}\right) + 1$

Very important to notice that we are not assigning any weight to these 3 main areas. Users of the app will do. They will provide their inputs. In other words, we are giving the users (citizens, cities) the freedom to tune the tool to match their preferences.

Thus, we will ask the user to assign some weights (which will be normalized to total 100) for each of those three areas. The questions to ask would be:

Evaluate and assign your preferences on which characteristic of the city attracts you the most as a magnet (without evaluating city services or cost of living).

- If you value the most a city with a Past, with a strong Identity (history, culture, invariable elements derived from its geographical position such as climate, its gastronomy, its image or branding or its international projection) then you should especially value the City Identity indicator.
- If what you value most is the Present, the dynamism of the city reflected in its creativity, competitiveness and the way it treats expatriates, its lifestyle and its ethical values, equity and equality, then assign greater value to the City Dynamism indicator.
- And finally, if what you value most is the Future, a city with a strategy and a promising future based on rich human capital, strong investment in innovation and a solid and comprehensive SmartCities Plan, then assign bigger value to the City Strategy indicator.

Then, we can draw the complete City Magnetism Area with these indicators / descriptors:

Area	Weight	Subarea	Weight	Class	Weight	Indicator	Sub indicator	Entity
Magnetism	User Input	Identity	20	History. Culture	70	Age		Wikipedia
					20	UNESCO		UNESCO
					10	Top Museums		Wikipedia
			10	Government Basics	50	Democracy Index		The Economist
					50	Safe City Index		The Economist
			10	Reputation	100	Reputation		Reputation Institute
			10	Space. Density	50	% Natural Space		Wikipedia
					50	Density (inh/km2)		Demographia
			15	Climate	33,3	Avge. Temperature Desviation	Gradient	Climatemps
					33,3	Avge. Precipitation Desviation	Gradient	Climatemps
					33,3	Avge. Daily Sunshine		Climatemps
			5	Geo Risk	100	Natural Disaster Risk		WorldRiskReport
			10	Geo Economics	100	GDP Proximity	%WW	Own Work
			5	Gastronomy	50	RK Food Index		OXFAM
					50	Michelin Guide	#Rest/Minh	Via Michelin
			15	Branding. External Image	25	Movies		Wikipedia
					50	Sports	Soccer Basketball Other Sports Events, Marathons	Football Database NBA Topendsports
					25	Main Events	Olympics	Olympics org
							Universal Expo	Wikipedia
							Cultural Events	Day Zero Project
	User Input	Dynamism	25	Compe titiveness	25	Creativity Index		Martin Prosperity
					25	Global Competi tiveness	Economic	World Economic Forum
					25	Cities In Motion		IESE-CiMI
					25	Global Talent Competi tiveness	Talent	INSEAD-GTCI
			25	Expat Social Experience	33,3	Life Style - Quality		HSBC Expat Explorer
					33,3	People Around		HSBC Expat Explorer

					33,3	Relationship - Social Life		HSBC Expat Explorer
			25	Ethics. Well-being	40	Happiness		Happiness Report
					20	World Giving Score		Charities Aid Foundation
					20	Civic Engagement		OECD-Better Life Index
					20	Work-Life Balance		OECD-Better Life Index
			25	Equality	25	GINI Index		WorldBank
					25	Gender	Female Graduates	INSEAD-GTCI
							Gender Develo pment Gap	INSEAD-GTCI
							Leadership oppor tunities for women	INSEAD-GTCI
					25	Tolerance	Tolerance Minorities	INSEAD-GTCI
							Tolerance Immigrants	INSEAD-GTCI
					25	Poverty		IndexMundi
	User Input	Strategy	20	Human Capital	20	Population Age Average Per Country		Wikipedia
					80	Ranking Human Capital		IESE Cities in Motion
			50	Smart Cities Plan	100	Plan Smart Cities	15 Areas	Own Work
			30	Innovation	25	R&D (% GEx)		INSEAD - GTCI
					25	Global Innovation Index		Cornell INSEAD WIPO
					50	Innovation Cities		2ThinkNow

(See at Appendix XXVII for Magnetism. Summary). Note that used weights for the three main areas come from a large survey. To be explained at Chapter 6.

Model so far includes 27 Indicators for Identity, 18 for Dynamism and 22 for Strategy, for a total of 67 for Magnetism. The number of subindicators inside them is very large, as some include more than 100 components.

5. City Profitability (yield)

5.0 Intro. The Citizenship Contract.

Cities were born as meeting places where living together provided people with an indisputable series of advantages and synergies. As soon as we live together, we develop a society. In every society each member contributes and obtains in return a benefit from the whole. This basically works by the principle of union; the union of individuals is stronger and achieves many more goals in every subject than the sum of individualities. From the beginning of the cities, a series of norms of coexistence were established, an ethic.

It is the so-called social contract, where individuals give up part of their individual freedom to the power of the state, in exchange for protection, generation of opportunities and well-being. This concept began in ancient Greece. The social contract is not a static concept, like tables of the law, but has evolved. There was talk of a kind of legal system between individual and state from the first Greek city-states. Plato mentions this kind of contract in Crito[569] and Republic[570] around 375 BC.

Since then, cities have ceased to be states to evolve as places for life and commerce, and the social contract has evolved in parallel to become an agreement between the State and individuals. The evolution of the state as absolute Monarchies reinforced that sense of vassalage where citizens basically contributed taxes in exchange for basically protection. The entire dark middle ages ran through this forced relationship.

As a remnant of light over a relationship between State and citizen forced by coercion and violence, voices appeared demanding a relationship more focused on human values: Saint Augustine[571] and Saint Thomas Aquinas[572] studied from Christian ethics what it means be a good citizen and explored individual autonomy

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[569] PLATO. *Crito.* pp.51b

[570] PLATO. *Rep*. 2.358e

[571] Cfr. AUGUSTINE, *La ciudad de Dios*, BAC, Madrid, 1958. Salvador Cuesta, *De la teoría Del Estado según San Agustín*, "Pensamiento", 1945 pp.63-70.

[572] Cfr. MIRETE, J. L. "Pacto social en Santo Tomás de Aquino*"*. Anales de Derecho, 16, Univ. Murcia, 1998, pp.155-160.

as an exercise in human dignity, which emanates from and reflects the divine dimension of our existence. This was the only question, the sphere of the divine, which could not be under the monarch's absolute control and the only loophole through which to argue and defend certain inalienable human rights. With the decline of monarchies power, the relationship between individuals and the state resumed by the XVII century. A more powerful civil society based on the emerging mercantile economy and the Christian Church humanistic support opened the debate on the terms of this relationship. Thomas Hobbes and John Locke studied and debated it notably in England by the mid XVIIth century and later, Jean-Jacques Rousseau in France in his 1762 book, "*On the social contract"*[573], a whole rethinking of the individual-state relationship when the French revolution was brewing. Thomas Hobbes, wondered how a serious, predictable, reliable and stable social order could emerge from the contributions of an enormous number of isolated individuals, who do not even know each other and among whom only some skilled elites are able to agree and coordinate through tacit or explicit agreements. Hobbes's proposal, known as the social contract and "*a mutual transferring of right*",[574] says that order is produced by the laws and authority of an almighty ruler, whose power lies in the use of coercion and the force with which he punishes lawbreakers, or to those who oppose its infallible judgment.[575] This force is nothing more than the capacity to exercise violence, expressed in the reduction of freedom, that each individual has ceded to the ruler.[576]

The fundamental problem, in my opinion, of this social contract was to consider other human beings as enemies, as competitors for survival or wealth, and to consider that the only remedy to impose a social order was a strong state that allows us to regulate life in common thanks to the fact that it has all the power to exercise with us the violence that we as individuals renounce. It is a repressive but desired state to establish and guarantee compliance with our society norms.

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[573] ROUSSEAU, J-J. *On the social contract*, published in Amsterdam, 1762

[574] HOBBES, T., *Leviathan*, XVIII. Andrew Crooke, 1651, London, England

[575] SOLARTE, R. "Ciudadanía, contrato social y proyecto alternativo", *THEOLOGICA XAVERIANA* 158, 2006, p.325

[576] HABERMAS, J., *The splintered West*, Trotta, Madrid, 2006. pp.128-129

From there, the concept of social contract has been associated with workers' demands, to determine the terms of the labor relations between citizen and company and the rights of workers, all of them highly influenced by the XIXth century social revolutions. The end of empires at the end of the WWI by 1919, the definition of our world as made of countries after the WWII, associated with the United Nations, opens the discussion on workers civil rights to the broad concept of human rights, and the social contract incorporates not only the rights of workers but also their civil rights, all of this under a constant struggle for equity and equality demands. The debate continues today, as there are still inequalities to tackle such as gender equality, poverty, ethnicity, sexuality, emigrants' rights, etc. In "*A Theory of Justice*", John Rawls[577] studies the principle of social justice as equity, as cooperation between citizens, whatever their characteristics of wealth, ethnicity, religion, etc are, to achieve the common good of development, peace and welfare.[578]

As states become decentralized and cities take over from power in terms of economic and social development, we return to the starting point, to the old city-state model. In a context of world peace and economic stability, it is the cities that direct the fate of humanity, and specifically the destiny, opportunities and aspirations of its citizens. The social contract with the state is marked by human rights and the sustainable development goals developed by the United Nations.

It is time to redefine our relationship with the city. Modern cities increasingly resemble Greek city-states, overcoming the distances that social achievements have brought to our society during these 25 centuries, cities want and must redefine the terms of their contract with citizens: the citizenship contract.

The citizenship contract is a virtual contract that we all implicitly hold with our city. It is the value proposition that the city makes to us and to the possible talent that wants to establish in our city. It is the list of give's and get's that our city offers, like a billboard of city's menu. It is a contract because the city offers us a series of services, benefits, development opportunities, in competition and in differentiation with other cities in the world. And for our part, we make our contribution to the

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[577] Cfr. RAWLS, J. "*A Theory of Justice*", Belknap Press, USA, 1971

[578] MANYIKA, J. "The social contract in the 21st century". *McKinsey*. Feb2020, p.36, also at https://www.mckinsey.com/industries/social-sector/our-insights/the-social-contract-in-the-21st-century retrieved by Feb2020

common project of that city. This contribution has many facets, not only our taxes, but our contribution to the generation of wealth, ideas, creativity, competitiveness, values, experience, co-creation, development of a new city and impulse to achieve the goals set for the future.

It is this citizenship contract that millions of millennials are evaluating now, and what local talented citizens weigh before deciding to emigrate looking for better opportunities.

In summary, the Citizenship contract sets the Get's: the long list of Services the city offers to you, all with different performance and possibilities to improve your life, realization and wellbeing. But also there are Give's: when you decide to live in that city, you will get a wage for your job according to that city salary standards (different from same job wage in other cities), you will have to pay direct taxes and social contributions. With the final money in your pocket you use it to buy your preferred things, some basic, some very personal. At that purchase moment, you pay indirect taxes and depending on which city you live in, you have different net purchase power, ie, you can buy different things because of different prices. Net, depending on your city choice, at the month end, you can obtain different things in quality and quantity: that's the price you pay for living in that city. You pay also the cost of opportunity because of the different cities' potential, but that's part of city services.

This is the question all those talented millennials and not just millennials are making themselves today: Would it be a good deal for me to move to that city? That's the short evaluation of the proposed citizenship contract. For locals, same evaluation but better informed, comparing that list of Give's and Get's with the known propositions from other cities. A good deal matters, but as we explained in the previous chapter, this decision is also emotional, and Magnetism component matters too.

City Profitability Definition

As I already explained in chapter 0.0, my friend Pablo decided to emigrate for 2-3 years to Singapore from Madrid. In that decision, Pablo evaluated his citizenship contract with Madrid on one hand and Singapore's proposal on the other. At that

moment in his life and with his personal and family circumstances he decided that the best deal for his professional career was to emigrate. He explained to me in detail the conditions and lifestyle we were expecting from Singapore. '*It rains a lot, but it is a very safe city, with excellent public transport, open to Westerners and where I will be able to learn how the Asian market works and add to my CV some very valuable and differentiating characteristics. The work is very good, for a very prestigious American multinational company, high salary, and low taxes. Apart from developing my employability, I am going to make a lot of money to buy a house when I return. I do not like the political local regime or how they treat those who make mistakes, but I do not plan to commit any, so I'm not worried about that. There are no problems with language, I can use my English and be understood. The food is different, but I'll get my guts used to. And the Real Madrid games can also be watched there.'* Pablo was unknowingly explaining to me the details of the citizenship contract.

Therefore, to define the citizenship contract, we must detail the series of benefits and services the city offers us, which must be evaluable, measurable, comparable, benchmarkable and that we can consider city merits. We are not talking about aesthetic topics, customs or emotional components, (we have already addressed them by means of City Magnetism), we are talking about quantifiable rational benefits. We are not talking about emotions, but about a contract. This will be the list of performance indicators to evaluate and where we group in 10 areas all the quantifiable services that the city delivers us. We are measuring the areas of a complete SmartCity Plan as we saw in its different definitions/proposed areas in chapter 2.1. These 10 areas will be:

- DIGITAL GOVERNMENT: Democratic efficient transparent participatory digitalized city Government. Digital government as a Service.
- EDUCATION. Lifelong Training: Quality Business Schools, Training and Development on the job.
- EMPLOYABILITY: Talent Demand
- CONNECTIVITY: Internet infrastructure. 4G / 5G Deployment
- HEALTHCARE / SOCIAL SERVICES
- ENVIRONMENTAL SUSTAINABILITY: Water, Energy efficiency. Air quality. Carbon emissions reduction, Carbon Neutral Plans. Circular City.

- CULTURE-TOURISM: Culture as a City Service, not as customs/traditions, again, not emotions, but valuable services.
- URBAN MOBILITY: Traffic. Public Transportation. Mobility as a Service.
- URBAN PLANNING: Urbanism as a City Service. Design and functionality
- SAFETY: Physical and Virtual Safety

These are the Services that I obtain from City. Then, I have to balance or weight them with the Cost of Living in that city, or in other words, the final net purchase power (amount of things that I could buy with my final after taxes money) that I will get because of doing my job / work or professional activity and after deducting the local taxes and affording the cost of life. Then City Profitability (Yield) will take both concepts: City Services compared to Cost of Living, in other words:
SERVICES to obtain from City / COST OF LIVING in that City.
It is not a simple division, it is not exactly the amount or quality of services I receive divided by the price I pay for them, as if it were a transaction. As we have seen, the 'price' I pay is what I could buy at the end of the month due to my salary, after taxes and according to the cost of living in that city. Therefore, it is about comparing what I get from the city with what I get for my professional activity because I develop it in that city. It is, accordingly, more a multiplication of two positive quantities. The higher the result, the more profitable the option will be for me to move to live in that city. We speak, I repeat, of an objective assessment, the same one that so many talented citizens are considering nowadays when deciding to move or stay. In fact, one of this thesis objectives is to help them make that decision well informed and with the appropriate data.
Ok, Nordic countries are traditionally offering the highest quality of city services ... ummm, true, but also cost of living there is among the highest.
It is easy to drink a very good wine if we pay a lot of money for it. The difficult thing is to drink an excellent wine for an affordable price. You have to know a little about the world of wine, the producers, the market and access authentic unknown jewels, which have not yet been exaggeratedly valued by experts and which keep a low winery original price.

Translated to the cities, it is about offering the best possible set of services at smallest citizen burden. All Cities want to offer the best set of Services, right, BUT at what cost for Citizens? Best Services most times mean biggest contributions from Citizens, so City Director should try to wisely invest the resources to maximize this efficiency. All cities are different, and start from different baselines, so prioritization, comparison with others, deciding where, from the wide list of potential areas, next invested dollar will make biggest impact.

Therefore, creating the most effective plan, with the lowest cost, prioritizing the preferences of citizens and always putting them at the center is a true work/art of financial and social engineering. And all this, with a future plan, with a strategy, fulfilling the promises and explaining the investments and objectives achieved with transparency.

For this reason, this study also aims to help our mayors and city directors to assess where they are in their city, where the cities in their same cluster are, which areas they enjoy an advanced position to take advantage of, and which they are lagging behind and urgently need investment.

We are not talking about basic infrastructure services or basic problems to access utilities such as water or energy, or cities with serious security problems. As we defined in Chapter 3, we have ruled out cities where living poses a risk to our health and physical integrity. Those cities must first fix the basics, in order to compete in the global landscape of attractive cities. We are talking about advanced, modern services always with a strong technological component.

The city must also balance investments towards its citizens with investments to create an attractive city for potential new outsiders. Just as a company must balance its marketing investments between maintaining and retaining its current customers (loyalty programs) while attracting new ones.

It is also very important to balance the services offered by the city with the tax burden. In some cities we are reaching a point of ‘capitalist-communism’, where the sum of total taxes is close to 100%. It is okay to give the citizen all the services that we can, but it comes to a point where the citizen asks to pay less, to have more money in his pocket and to allow to decide himself, not always the city, in which services he will use his resources. We already studied it in Chapter 1, but simply add here that when direct taxes are greater than 50%, then citizen begin to think

about their excessive contribution and their lack of freedom when deciding what they use their salary for. It's about valuing 'my' things, the things I can buy with what I have left after paying all my taxes: my car, my house, my leisure, my hobbies, my cultural services, etc.

We are not talking, therefore, about forced migrations due to human calamities, wars or natural disasters, but of voluntary movements with the noble purpose to simply seek the best place for their personal and professional development.

As an example of these talent migrations, let's look at figure 69, which shows the internal migrations within the European Union from the last economic crisis in 2012 to 2017. Thousands of citizens, especially qualified young people, took advantage of the single unified labor market to assess and decide their vital destiny within Europe. The ease of getting around, cheap mobility, to 'go home for Christmas', but also to be able to develop their profession, their talent and access a decent, well-paid job and a new life in a new city made this decision easier.

It is important to note the strong impact in many small and medium-sized, non-capital cities, which have been losing population in recent decades in what is called urban contraction. This is also a consequence of global competition for being attractive to talent. These cities, if they are not located close to other large ones, have great disadvantages in the quality and quantity of services they can offer, simply because of their size, so they poorly compete. As examples, to have a well-connected airport you must hold several million people in the metropolitan area, same for supporting an Opera house.

This phenomenon generally impacts the entire European Union and, in particular, eastern and southern European countries.

The Eastern countries turned towards their natural entry door in the heart of Europe, Vienna, from the South. From the North, the Nordic countries received a strong arrival of talent, especially from the Baltic countries. Spain and Portugal observed heavy talent losses to the Center/North Europe. France and Italy experienced a concentration from small cities into few large cities, with enormous attractiveness and rich metropolitan areas.

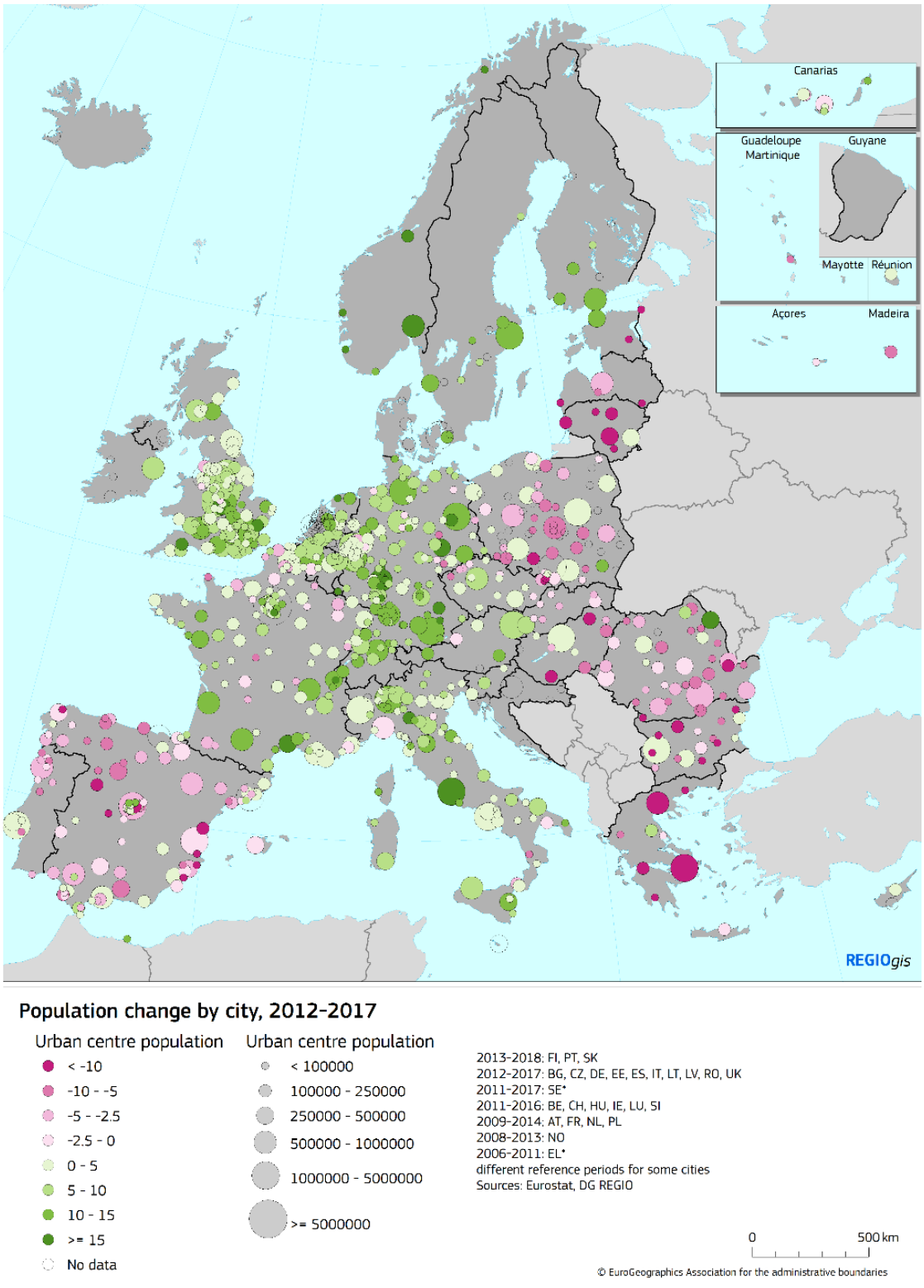

Figure 69. EUROSTAT. Impact of recent 2012 economic crisis in EU migrations[579]

[579] "Iniciativa de Acciones Innovadoras Urbanas. 16/09/2019 – 12/12/2019" *UIA. Urban Innovative Actions.* EU. pp.20-21. Also https://www.uia-initiative.eu/sites/default/files/2019-09/ToR_Call%205_UIA_16_09_2019_ES.pdf retrieved by Jan2020

5.1 City Services Performance.

We are going to describe our 140 cities according to their performance in this group of 10 city service areas to evaluate their performance. It is very important to highlight that we will leave the weight assigned to each group to the info/tool user, so we are not creating another absolute ranking. Why? Because each citizen, depending on his personal situation, age, dependencies of children or the elderly, will assign greater or lesser importance to each of them. For example, the same single person preparing to explore the world will give much importance to Employability and Education, while that same person at retirement will give more importance to Health / Social Services. We are going to study what the city offers us in each of these areas.

Why these 10 areas and no others?

For any citizen, the city attractiveness will be made of all the elements that bring well-being to him and all the people of his family or that are important to him.[580] According to Braun[581], it is about evaluating things related to the city, such as its services, but also its educational facilities, leisure or other services such as cultural ones, and also the quality of jobs. According to Berg[582], an attractive city for its citizens should focus on providing a good, pleasant, accessible, clean and safe living environment; quality employment; good educational services; high quality healthcare services; also high quality Cultural services; excellent security; and pay attention to religion and arts.

As we saw in chapter 2.1, there are many different models, definitions and components of a perfect SmartCity. We can say that there is one model for each author, but we can also say that most of them share 80-90% of the components.

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[580] SINKIENE, J. & KROMALCAS, S. "Concept, Direction and Practice of City Attractiveness Improvement". *Kaunas University of Technology*, Kaunas, 2010. p.151

[581] BRAUN, E. "City Marketing: Towards to an Integrated Approach". *Erasmus School of Economics*, Erasmus University Rotterdam, 2008. pp.55-60

[582] BERG, L. VAN DEN MEER, J. VAN DER OTGAR, A. H. J. "The attractive city: Catalyst of Sustainable Urban Development". *European Institute for Comparative Urban Research (EURICUR)*, Erasmus Universiteit Rotterdam, 1999. p.489

We have chosen these 10 because they include all and because when testing the model with many cities it seems that we have not forgotten anything relevant.

- City Services Performance: Digital Goverment

Why is this proxy relevant?

One of the services that we must demand from the city government is citizen participation, that is, collaborating, giving opinions and co-deciding the city's destiny between elections. To do this, to communicate and learn what citizens think or wish, we must use the language and the media they use today: digital media, we talk to digital citizens and even more if we are thinking about attracting talent, which will surely use these communication technologies by default. We are considering a Digital government as a Service, that is, how effective is this participation mechanism.

Digital participation can achieve all kinds of interaction, often in the form of ideas, opinions, points of view, proposals or simply votes, which allow citizens to influence the city decisions. That is why the success of digital participation requires a wide, permanent, open and well-oriented approach to what can be done in the city, taking into account the citizens knowledge and skills (we cannot consult technical questions, as only a minority would be qualified enough to answer, or naive basic issues, as we cannot treat citizens as idiots). If we ask too much they can think we don't know how to make decisions, if we ask too few, then we are not counting on them, so again, a balance is advisable.

The great contribution and the basement for digital democracy in a city through a participation platform is based on the principle of collective intelligence.[583] That is, it is assumed that the sum of ideas and arguments from all (or from a strong participation) citizens will always be more important and appropriate to the city's destiny than the ideas from a very limited number of directors or decision makers, always, I repeat, that we ensure a series of guarantees, good mechanisms and a very wide participation, avoiding the concept of 'same 10 activists shouting all day at the social networks'. It is a permanent democracy, not a single connection every

[583] Citizenlab, *The beginners guide to Digital Participation* - CitizenLab 2019, Toronto, p.10

four years. It can be adapted to a general city theme, or a particular to a neighborhood one or to a specific moment or just to value an interesting idea.

Benefits:

We can listen to a wider and more diverse audience, at a much lower cost than other methods and in a short time. Some forms of participation can be recurring and permanent.

Using participation will give more public support for our decisions. Building consensus will justify complicated decisions and citizens will accept these difficult issues as their own.

Greater efficiency and responsiveness. We can pulse the citizenship feeling in a very short time, obtaining very valuable information and reducing the error risk or receiving a strong pushback.

Obviously, we improve the quality of decision-making and administrative services in general. It is a boost for administrative innovation.

Avoid the worst scenario of confrontation, [584]We can anticipate and avoid it, saving us many annoyances, the citizens disconnection and loss of prestige. Thus, we will make controversial decisions measuring risk and impact before.

Maintain credibility and legitimacy. Promote the feeling of closeness, of empathy.

Development of civil society by empowering citizens. Promote a sense of belonging and co-creation.

Anticipation of citizens' concerns. If we analyze what they tell us and the data we already have, then we can predict reactions and future demands for services, offering a proactive administration.

Apart from citizens' digital participation, the city government itself must be digital and offer online its services to citizens. It is the other way, from the administration to the citizen, offering the services in an easy, intuitive, personalized digital format, using the same communication mechanisms that citizens daily use (social networks, instant messaging, chats, etc.). We must therefore measure to what extent city management uses technology internally, and how accessible the services it offers are online.

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[584] CREIGHTON, J. L. *La participación ciudadana en la era digital*, CIVICITI, OpenSeneca, Barcelona, 2017 p.23

How to measure it?

To measure online administration services, we will take the Online Service Index (OSI) developed by UNITED NATIONS E-GOVERNMENT SURVEY 2018. [585]

The study is carried out in 193 UN member states and evaluates a series of benefits offered as online services, including multichannel services, mobile services, and opendata. Electronic participation, online applications use, the digital divide, and others related to the use of ICTs in public services are also measured. The Online Service Index is a component for the very well-known E-Government Development Index (EGDI).

Even more important than offering public services online is to get citizens use them. To measure the actual and effective use that citizens make of these services, we will use the Electronic Participation Index. The Electronic Participation Index (EPI) is an addendum to the United Nations Electronic eGovernment Survey. Citizen participation is the key for a socially inclusive government because it allows all citizens to be co-participants in management, without differences and without barriers. Participation improves social and individual well-being by fostering teambuilding, collaboration and community awareness. To help in this participation, the online service feature makes these electronic services especially suitable, because of their ease of use and their all-included reach.

This index evaluates all the ways of electronic interaction: on the one hand, communication from the government to citizens in electronic format ('electronic information exchange'), proactively providing public information without prior request; on the other hand, interaction with citizens ('electronic consultation'), involving citizens in deliberations or matters of their concern; and finally the direct participation of citizens in decision-making processes ('electronic decision-making') with the appropriate tools.[586]

We have already studied the provision of online services and the use that citizens make of them, but do we really enjoy an electronic administration? We must study

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[585] "UNITED NATIONS E-GOVERNMENT SURVEY 2018", *Department of Economic and Social Affairs, UN*, NewYork, p96, also at https://publicadministration.un.org/en/research/un-e-government-surveys retrieved by Jan2020

[586] Ibid, p.211

the use of digital technologies within the city administration. To face this, we will use the indicator 'Digitalization of Government', within the "EasyParkGroup SmartCity Index 2019"[587]. This index is one of the most comprehensive at the time of studying benefits of SmartCities and gives us information about cities, not only at country level like the previous ones. This index is based on the Digital City Rank[588] and on measuring the use and traffic generated by the cities websites as % of their total population.

Main Source:

Class	Weight	Indicator	Subindicator	Entity
Digital Goverment	25	Online Service Index		United Nations eGov Survey
	50	eParticipation Index		United Nations eGov Survey
	25	DIGITALIZATION OF GOVERNMENT		Easy Park Group SmartCity Index

When evaluating these three areas, we consider that e-Participation is the most relevant as a Service to attract & retain talent because this measures the level of civil engagement and government co-participation in that city. It is bottom-up and observes the citizen involvement in the city management. Because of that, we assign it half of relevance or 50% weight. How much digital the city government is and the availability of online services are also very important but measure the other way (top-down), then we split the remaining other half or 50% weight among them. (25% each)
(See at Appendix XXVIII for City Profitability. Services. Digital Government)

- City Services Performance: Education. Lifelong Training

Why is this proxy relevant?

[587] "EasyPark Group SmartCity Index 2019", *EasyPark Group*, https://www.easyparkgroup.com/smart-cities-index/ retrieved by Jan2020.

[588] "Digital City Rank". *Bloom Consulting*, 2017, https://www.digitalcityindex.com/city-index-results retrieved by Jan2020

With this indicator we cover the area of Education services. It is not about evaluating the basic education services available in the city or the status of the educational system. We talk about the attractiveness for talent, and therefore, we assume that talented citizens do not need basic educational services, but rather advanced, complementary, postgraduate services and opportunities for development and continuous training on the job, offered and facilitated by the company itself. This will be an important attraction for talent, keep updating and training in new disciplines and technologies as they become available.

How to measure it?

To measure these items, we go back to INSEAD Global Talent Competitiveness index (GTCI). (2017)[589]where we can find the appropriate info named Lifelong Learning. This concept exactly measure the postgraduate on the job training available for talented citizens in the form of attending additional training from business or management schools or training on the job facilitated by the company, helping the employee development.

We will use three available indicators for Lifelong Learning.

Quality of management / Business schools.

This indicator is based on the World Economic Forum Executive Opinion Survey (EOS) as a complementary work to reinforce The Global Competitiveness Report.

Source: World Economic Forum, Executive Opinion Survey[590]

It measures the quantity and perceived quality of the available business and management schools. It is an important fact to attract talent, especially those looking for a first job and want to improve their skills with an additional master or other postgraduate training.

Prevalence of training in companies.

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[589] LANVIN, B. and MONTEIRO, F. "INSEAD Global Talent Competitiveness index (GTCI)", *Global Talent in the Age of Artificial Intelligence*, Fontainebleau, France, 2020 https://www.insead.edu/sites/default/files/assets/dept/globalindices/docs/GTCI-2020-report.pdf p.355, retrieved by Feb2020

[590] "Executive Opinion Survey". *World Economic Forum* https://reports.weforum.org/global-competitiveness-report-2018/appendix-b-the-executive-opinion-survey-the-voice-of-the-business-community/ retrieved by Feb2020

Proportion of companies that offer formal training to their employees, either directly, co-financed or at least, facilitated. We measured (%) of total companies by 2019. It is based on the Enterprise Survey that is carried out at the company level by the World Bank Business Analysis Unit. Over 135,000 interviews in 139 countries are analyzed. Source: World Bank, Business Surveys[591]

Employee development

Once again, within the World Economic Forum's Executive Opinion Survey (EOS), it asks about how much and how companies invest on employee training and development. Although it is something that every HR department should do, there are different degrees and levels of investment. For a young talent, this is an important indicator when developing a promising career.

Source: World Economic Forum, Executive Opinion Survey[592]

Main Source:

Class	Weight	Indicator	Subindicator	Entity
Education. LifeLong Training	33,3	Quality of Management Schools		INSEAD - GTCI
	33,3	Prevalence of Training in firms		INSEAD - GTCI
	33,3	Employee Development		INSEAD - GTCI

Same as INSEAD Global Talent Competitiveness Index does for calculating the Lifelong Training indicators, we assume same weight to all those three reports.

(See at Appendix XXIX for City Profitability. Services. Education. Lifelong Training)

- City Services Performance: Employability

Why is this proxy relevant?

Employability is one of the fundamental elements to make a city attractive to talent. Many times, we think that it is the only one and that people move mainly due to

[591]"Business Surveys" *World Bank*. www.enterprisesurveys.org retrieved by Jan2020

[592]"Executive Opinion Survey" *World Economic Forum* https://reports.weforum.org/global-competitiveness-report-2018/appendix-b-the-executive-opinion-survey-the-voice-of-the-business-community/ retrieved by Feb2020

labor issues. This main motivator decreases as the new generations consider work as an important, but not definitive driver, and the other components gain weight. On the other hand, companies no longer decide where to set up or open new offices without considering the availability of abundant local talent as a critical decision-making criterion. That is, companies are looking for talent, a few years ago it was just the other way around.

In any case, the question of employability remains a fundamental attractive component for any city. Citizens will stay or think twice about emigrating if it is good and abundant and the potential new citizens need their target cities to have good employability to develop their potential, their professional career and maximize their possibilities.

How to measure it?

With hundreds of millions of CVs and companies' jobs offering, the LinkedIN platform is the largest employability tool in the world.

Within this platform, we use the LinkedIN Talent insights application, Talent Pool Report[593] to analyze the employability of each of our studied 140 cities (metropolitan areas). In this way, we will investigate if they have a low, medium, high or very high hiring demand during the last year. This data comes from each area actual count of published job offers compared to its population. We will add as an additional reference whether the number of qualified professionals has grown during this past year. This data indicates the gain or loss of talent that this metropolitan area is experiencing.

With these two parameters, we will assign a score according to the following table.

Hiring Demand	**Growth in Talent-Professionals / y**	**Score**
Low	Negative	0
Low	Positive	1
Moderated	Negative	2

[593] "Talent Pool Report" *LinkedIN*. https://www.linkedin.com/insights/report/create Live tool last consulted by 8 April 2020

Moderated	Positive	3
High	Negative	4
High	Positive	5
Very High	Negative	6
Very High	Positive	7

We see how the base parameter is the Hiring Demand and the Growth in Talent has been added as an additional +1, with which we obtain a range from 0 to 7 for our cities.

We are going to make two queries varying the job function / matching professionals:

Query 1: We use all types of functions for any professionals. We are analyzing 122.310.193 professionals in our 140 metropolitan areas.

All available Functions:

Operations, Business Development, Sales, Education, Engineering, Information Technology, Administrative, Healthcare Services, Arts and Design, Finance, Support, Media and Communication, Accounting, Marketing, Community and Social Services, and Human Resources.

Query 2: We restrict the type of jobs / matching professionals and eliminate those functions that the approaching robotization could impact / eliminate (4th Industrial Revolution). We take only the eight types more associated to creativity or creative jobs as defined by Prof. Florida. (see previous multiple references).

Only top 8 very creative functions: Business Development, Sales, Engineering, Information Technology, Healthcare Services, Arts and Design, Media and Communication, and Marketing.

We have eliminated almost half of the professionals and now we have 68.412.947 analyzed professionals.

We do not want to take only Query 2 as it is clear that the effects of robotization won't be as dramatic as some predict. My perspective is that all humans are creative by DNA, what are not creative are many of our jobs, therefore, it is expected that many jobs will be replaced by others with a higher creativity component and that cannot be easily done by robots, and job losses won't be so high if any. Therefore,

we sum (we value both queries with 50%) and we will have a ranking of cities scoring from 0 to 14. (See Appendix XXX for full detail)

If we look at the available studies on employability, then we find that the most complete is INSEAD Global Talent Competitiveness index (GTCI). (2017)[594]. After analyzing the job offer in cities or cities employability, we will study the employability of citizens as a consequence of living in that city. The GTCI, within its Output section, Vocational & Technical Skills studies the employability of the city from the perspective of its citizens. It studies how the city has developed talent and how that talent is associated with the job opportunity.

To address this topic, the GTCI uses 4 concepts:

All four are based on data obtained from the Executive Opinion Survey (EOS) of the World Economic Forum conducted as a supplement to The Global Competitiveness Report.[595]

- Ease of finding qualified employees. To what extent do companies easily find people with the skills they need?
- Adequacy of the educational system for the economy. Is the education system adequate for the needs of a competitive economy?
- Compatibility of skills and abilities developed with secondary education. Are graduate students at this level prepared to respond to the needs that companies require?
- Compatibility of skills and abilities developed with tertiary education. Are graduate students at this level prepared to respond to the needs that companies require?

With these four indicators, GTCI calculates the average and reports it as Employability. We are taking that data.

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[594] LANVIN, B. and MONTEIRO, F. "INSEAD Global Talent Competitiveness index (GTCI)", *Global Talent in the Age of Artificial Intelligence*, Fontainebleau, France, 2020 https://www.insead.edu/sites/default/files/assets/dept/globalindices/docs/GTCI-2020-report.pdf pp.326-329, retrieved by Feb2020

[595] "Executive Opinion Survey", *World Economic Forum*, https://reports.weforum.org/global-competitiveness-report-2018/appendix-b-the-executive-opinion-survey-the-voice-of-the-business-community/ retrieved by Feb2020

So, Employability shows as balance between Hiring Demand and Citizen qualification to match that demand.

Main Source:

Class	Weight	Indicator	Subindicator	Entity
Employability	50	LinkedIn Talent Hiring Demand		LinkedIN
	50	Employability		INSEAD GTCI

For that reason, we equally weight both sources of information (50%)
(See at Appendix XXX for City Profitability. Services. Employability)

- City Services Performance: Connected City

Why is this proxy relevant?

The connectivity possibilities from communication networks are an essential technological component in the city development. In the same way that the construction of streets and highways facilitated the development of transport and commerce, as well as the mobility of people and then, their ideas, creations and inventions, turning urban mobility into the circulatory system of the city, now, in the digital age, those digital highways are our digital communication networks. We could compare that network of cables, fiber optics and wireless connections as the city's nervous system, through which signals are sent, the city's data, what the city feels, thinks, what happens. And the citizens are also digital and are permanently connected to that network with multiple devices, especially with their smartphones, as the fundamental doors / switches that turn the digital world into analog realities, bits into sounds, images, ideas, emotions, feelings and vice versa.

This network quality conditions the city development, creativity and competitiveness, attractiveness for people and for companies. Without a good connection, there are no possibilities to communicate with the world, to compete, to make yourself known.

Speaking with political leaders in rural areas, we came to the conclusion that without good Internet bandwidth there is no future for these areas. And this is a radical question. Without good bandwidth they have no chance of development, so this question is posed as a sine qua non.

It is clear that a talented citizen will evaluate the communication and connectivity possibilities of a city before deciding on it. We are going to model them.

How to measure it?

First, let's evaluate Connectivity Services from a user point of view, from the individual received performance.

So, first, let's evaluate the mobile connection performance. We are assessing 4G LTE knowing that 5G is here and we'll soon replace this term when 5G deployments can be quantified. We'll use the "EasyParkGroup SmartCity Index 2019"[596] taking the 4G LTE Indicator. It measures the 'average 4G download speed (in Mbps)', adjusted to each city internet speed. Data obtained from speed test.

Next relevant data will be the average City Internet speed (wired). To obtain it, we'll use the INSEAD Global Talent Competitiveness index (GTCI). (2017)[597] applied to cities, or the Global Cities Talent Competitiveness Index (GCTCI), taking the Internet Speed indicator, which measures it in Mbps, using data from Nomad List.

One of most appreciated city services by citizens and visitors is the availability and connectivity from city Wi-Fi Hostspots. These connectivity points foster communication, business, trading and continuous Internet access at better speed than 4G network. In the near future, 5G deployment will make them irrelevant because of its speed, or not, if they provide improved bandwidth for free. Today, a city with a large network of high quality Wi-Fi hotspots is a good indicator of a modern advanced city taking care of its citizens and visitors and providing good connectivity to help them be successful in their lives wherever they are. To measure this, we'll use again "EasyParkGroup SmartCity Index 2019" taking the Wi-Fi Hotspots indicator (it measures free Wi-Fi hotspots using data from Online Wi-Fi databases and adjusting in every case to city area.

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[596] "EasyPark Group SmartCity Index 2019", *EasyPark Group,* https://www.easyparkgroup.com/smart-cities-index/ retrieved by Jan2020.

[597] LANVIN, B. and MONTEIRO, F. "INSEAD Global Talent Competitiveness index (GTCI)", *Global Talent in the Age of Artificial Intelligence*, Fontainebleau, France, 2020 https://www.insead.edu/sites/default/files/assets/dept/globalindices/docs/GTCI-2020-report.pdf p.113, retrieved by Feb2020

So far, we have measured the user experience, using his smartphone, Computer connected wireless or directly wired, a home or office or at public space.
To evaluate the overall city Connectivity infrastructure, we reinforce this analysis with the whole city ICT (Internet / Information Communication Technologies) infrastructure info. We come back to INSEAD Global Talent Competitiveness index (GTCI). (2017)[598] to take this ICT Infrastructure indicator. The ICT access index (2017) measures the actual use and penetration of new communication technologies in a city. It is a composite indicator that adds five equally weighted ICT components: 1.- fixed telephone lines / 100 inh, 2.- mobile phone lines / 100 inh, 3.- International Internet bandwidth (bit/s) per user, 4.- % of households with an available personal computer and 5.-% of households with cable internet access. The information comes from the ITU ICT Development Index (IDI) report.[599]
So, all used indicators show this way:

Main Source:

Class	Weight	Indicator	Subindicator	Entity
Connected City	20	4G LTE		Easy Park Group
	20	Internet Speed		INSEAD-GCTCI
	20	Wifi Hotspots		Easy Park Group
	40	ICT Infrastructure		INSEAD-GTCI

First three measure the individual user experience, and the last one evaluates the collective use of these resources, so we give it double weight or 40%.
(See at Appendix XXXI for City Profitability. Services. Connectivity)

- City Services Performance: Health / Social Services

Why is this proxy relevant?

[598] Ibid p.352

[599] "ICT Development Index" 2017. *International Telecommunication Union, Measuring the Information Society Report* 2017, also at http://www.itu.int/en/ITU-D/Statistics/Pages/publications/mis2017.aspx retrieved by Jan2020

It is an obvious question for anyone to think about the healthcare / social services that are available in a city before considering it as a permanent destination. Health and associated services are obviously a fundamental question to decide even on few days' tourist trips. Depending on our family situation, and dependence on children and / or elder adults, this issue becomes more or less fundamental.

But the concept of Healthy city is wider, not just limited to healthcare services available, but the creation of city conditions that allow healthier human conditions. This may include the build of a park for citizens to do some exercise or connecting existing parks in a longer circuit (I saw that in Barcelona's future planning). Also fostering healthier habits and helping others (city is social by essence) to stay or improve healthy conditions.

In words from UN-World Health Organization, WHO):

"*A healthy city is one that is continually creating and improving those physical and social environments and expanding those community resources which enable people to mutually support each other in performing all the functions of life and developing to their maximum potential*."[600]

So, we should think about physical, social and phycological conditions to allow humans to improve health.

To go deeper, the WHO also suggests a checklist for City managers to analyze in their City plans to improve City healthiness. [601]

Thus, a healthy city must provide:

Environment and ecosystem issues:

• a safe and clean (and healthy?) physical environment, with high quality infrastructure (including housing), within a sustainable ecosystem.

Socioeconomic issues:

• a strong, inclusive and supportive community. Intense social contact, interaction and communication.

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[600] "Health Promotion Glossary", *World Health Organization*, 1998, Geneva, p.13 https://www.who.int/healthpromotion/about/HPR%20Glossary%201998.pdf?ua=1 retrieved by Oct2018

[601] "Healthy city checklist." *World Health Organization*. Regional Office for Europe. http://www.euro.who.int/en/health-topics/environment-and-health/urban-health/who-european-healthy-cities-network/what-is-a-healthy-city/healthy-city-checklist retrieved by Jan2020

• a high degree of participation and control of public decisions, and especially those that impact their health and well-being.

• have basic needs (such as food, water, energy, housing, security and work) satisfied for all citizens.

• a powerful, balanced and innovative economy.

• respect for cultural heritage, and for the city's inhabitants' culture and other groups.

Health issues per se:

• an excellent level of health services accessible and affordable to all.

• and a high status of health in general with low levels of disease.

The EU Urban Manifesto for New urbanity [602] also explains the principles for Health in tows, highlighting that city must ensure good health for all citizens, as well as a reliable supply of goods that ensure basic needs, encourage healthy community initiatives and participation, and collaborate internationally in programs dedicated to it.

We have already studied and covered in the City Magnetism (chapter 4) area, all the social, economic and psychological conditions that the city offers, within the multiple factors that impact physical and mental health. We are going to get concentrated in this city services section on those that are properly healthcare / Social services.

Social services and grants are very popular and wide concepts. They are provided by all governments (central, regional and local), even sometimes with overlaps and duplications between them. We can say that a social service is any monetary or assistance aid that a citizen receives due to an existing particular condition of need, vulnerability, inequity or inequality and that is not provided within a healthcare building or institution (dispensary, clinic, hospital, ambulatory, etc.). When you receive this assistance in one of these buildings then you are a healthcare system patient, while if you receive any help at home then it is a social service. There are many, from unemployment and social security benefits, which are usually provided by the state, any kind of help for dependency situations, which may be given by the

[602] "Manifesto for a New Urbanity" *European Urban Charter II*. Council of Europe Publishing. 2008 p.55. Also at : https://rm.coe.int/urban-charter-ii-manifesto-for-a-new-urbanity-publication-a5-58-pages-/168095e1d5 retrieved by Nov2019

regions or others, to receiving a caregiver at home to monitor situations of mild dementia or simply unwanted loneliness, usually provided by the city.
In this study, for simplicity, and honestly, in the absence of better detailed data, we will study the whole set of social benefits.

How to measure it?

We are measuring Social spending as total expenditure in Social Services as % of GDP/capita. This OECD indicator[603] includes all benefits including cash, direct provision in kind of goods and services, and tax exemptions for social purposes. Benefits may be directed at the unemployed, low-income households, the sick, the elderly, the disabled, or youth and must meet certain conditions and circumstances. To be considered social, programs must include the redistribution of resources and the search for social equity. Total net social spending includes both public and private spending.
As an indicator in between Social services and Healthcare, Life expectancy offers us a good approach about city quality of life, and also shows the aging population problem described in chapter 1.
We will use UN Data measuring Life expectancy at age 60 (years) both sexes, from 2012.[604]
To measure pure Healthcare services, we'll use two indicators.
First, we take the INSEAD Global Talent Competitiveness index (GTCI). (2017)[605] measuring the number of doctors per 1000 inhabitants or 'Physician Density'. Thus, this 2016 updated indicator reports the number of doctors, including generalists and specialists. Data comes from these different sources: World Bank, World

[603]"Social spending (indicator)" *OECD* (2020). doi: 10.1787/7497563b-en https://data.oecd.org/socialexp/social-spending.htm retrieved by April 2020

[604] "World Health Organization" *UN DATA*. 2012 http://data.un.org/Data.aspx?q=life+expectancy&d=WHO&f=MEASURE_CODE%3AWHOSIS_000015 retrieved by Oct 2018

[605] LANVIN, B. and MONTEIRO, F. "INSEAD Global Talent Competitiveness index (GTCI)", *Global Talent in the Age of Artificial Intelligence*, Fontainebleau, France, 2020 https://www.insead.edu/sites/default/files/assets/dept/globalindices/docs/GTCI-2020-report.pdf p.357, retrieved by Feb2020

Development Indicators[606] based on World Health Organization, OECD; Global Atlas of the Health Workforce and country data.

Second, we will measure the total public health expenditure to understand the quality of services provided as % of GDP. Best source for this will be the World Health Organization - Global Health Expenditure Database[607], providing 2017 information for 190 countries. We take (GGHED or Domestic Public Health Expenditure as % of GDP) 2017

Main Source:

Class	Weight	Indicator	Subindicator	Entity
Health/Social SVS	40	Social Expenditure		OECD
	20	Life Expectancy at age 60		United Nations
	20	Physicians (per 1k)		INSEAD
	20	Public Health Expenditure (%GDP)		World Health Organization

To assign weights, we consider two main areas: Social Services and Healthcare, with a bridge topic in between: Life Expectancy.

So, we assign 40% to Social Expenditure, 40% to Healthcare (split in 20% each topic: Number of physicians and Public health Expenditure) and another 20% to Life Expectancy as generic all connected indocator.

(See at Appendix XXXII for City Profitability. Services. Health/Social Services)

- City Services Performance: Environmental Sustainability

Why is this proxy relevant?

The concept of sustainable city includes three facets: Social, economic and environmental sustainability.[608]

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[606] "World Development indicators" *World Bank*. https://datacatalog.worldbank.org/dataset/world-development-indicators retrieved by Jan2020

[607] "Global Health Expenditure Database" *World Health Organization*, 2017 https://apps.who.int/nha/database/Select/Indicators/en retrieved by Jan2020

[608] AKANDE A. et al. "The Lisbon ranking for smart sustainable cities in Europe" *Sustainable Cities and Society* 44, 2019, p.476

The United Nations defines an intelligent and sustainable city as one that uses new technologies and other means to achieve the highest levels of well-being, quality of life, efficiency in city operations and economic competitiveness, thinking about the present but especially about the future, in the sense of guaranteeing these optimal conditions from the economy, social development and the environment.[609]

The city social and economic sustainability was studied in previous chapter into the concept of City Magnetism as part of the City Dynamism, its competitiveness, and its equity and equality. They are city components that result from a long process of investment and correct development and mark the city from the point of view of its attractiveness. In this chapter we talk about city performance and we will focus on the services it offers from the point of view of environmental sustainability.

The concept of environmental sustainability was first introduced into urban development and planning in the early 1990s. It emerged from an understanding of the risks that uncontrolled urban development poses to the environment and that can lead to a future full of dangers and threats.[610]

We can also find this concept from the first UN definition[611] about the sustainable city development as one that meets the needs of the present without compromising the capacity of future generations when they must face the same challenges. Regarding this development, and specifically in environmental sustainability, factors such as anti-pollution policies, support for the green buildings construction and adaptation, alternatives for the use of renewable energy, efficient management of water and energy consumption, the adequate treatment of waste and actions that generally combat the climate change worsening and potential impacts are essential to this long-term objective of sustainability for cities.

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[609] "Key performance indicators for sustainable smart cities to assess achievement of sustainable development goals", *CEPE*, 2015. 1603 ITU-T L.1603. INTERNATIONAL TELECOMMUNICATION UNION (ITU) p.4

[610] BIBRI, S. E., & KROGSTIE, J. "Smart sustainable cities of the future: An extensive interdisciplinary literature review." *Sustainable Cities and Society*, 31, 183–212. 2017. p.185. https://www.sciencedirect.com/science/article/abs/pii/S2210670716304073?via%3Dihub retrieved by Jan2020

[611] "UN's World Commission on Environment and Development", *UN*, 1987. p.4 https://sustainabledevelopment.un.org/content/documents/5987our-common-future.pdf retrieved by Jan2020

Figure 70. UN Sustainable Development Goals. Goal 11.[612]

The United Nations, within its famous 17 Sustainable Development Goals, dedicates a special one to cities and communities (see figure 70). It is about cities fulfilling their mission as human spaces that facilitate prosperity by creating professional and economic opportunities, in a resilient society environment, but ensuring access to decent housing, effective public transportation, respectful management of green public spaces and fostering a participatory and inclusive urban planning and management.

Although we already explained in detail the Environmental Sustainability challenge at chapter 1.5, we should add that in the global context of awareness about climate change and respect for the environment, cities face the challenge of finding the right

[612] "Goal 11: Sustainable cities and communities" *UNDP (United Nations Development Programme)* https://www.undp.org/content/undp/en/home/sustainable-development-goals/goal-11-sustainable-cities-and-communities.html retrieved by Jan2020

balance between economic development and environmental sustainability. Today, nothing can be thought, built or developed anymore without taking into account its present and future impact on the ecosystem. There are many dimensions to consider when designing an environmental sustainable urban planning, such as preserving heritage, using non-polluting or aggressive technologies, ensuring the social impact of these plans, promoting urban mobility without impacting the environment and the environmental relationship with the exterior and other communities.[613]

CO2	Energy	Buildings	Transport
• CO2 intensity • CO2 emissions • CO2 reduction strategy	• Energy consumption • Energy intensity • Renewable energy consumption • Clean and efficient energy policies	• Energy consumption of residential buildings • Energy-efficient buildings standards • Energy-efficient buildings initiatives	• Use of non-car transport • Size of non-car transport network • Green transport promotion • Congestion reduction policies
Waste and land use	Water	Air quality	Environmental governance
• Municipal waste production • Waste recycling • Waste reduction policies • Green land use policies	• Water consumption • System leakages • Wastewater system treatment • Water efficiency and treatment policies	• Nitrogen dioxide • Sulphur dioxide • Ozone • Particulate matter • Clean air policies	• Green action plan • Green management • Public participation in green policy

Figure 71. EUI's Green City Index[614]

We can see in figure 71, the study made by The Economist Intelligence Unit (EIU) by 2012, and named "The Green City Index", the multiple components that we must consider when analyzing how sustainable a city is for the environment.

The EU stresses this topic into its principles for a city that respects the environment and nature. Those principles set that city authorities should have the responsibility to manage energy resources in a coherent and rational way, prevent pollution, protect nature and green spaces and understand that the respect for nature is a determining factor in the community sense and pride development.[615]

And a final reflection: the concept of ecology and environmental sustainability becomes one of the three fundamental pillars in the discourse on SmartCities with

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[613] GOI, C. "The impact of technological innovation on building a sustainable city." *Int J Qual Innov* 3, 6. 2017, p.1. Also at https://doi.org/10.1186/s40887-017-0014-9 retrieved by Jan2020

[614] "The Green City Index—a summary of the Green City Index research series." *The Economist Intelligence Unit (EIU) and SIEMENS*, 2012. https://www.siemens.com/entry/cc/features/greencityindex_international/all/en/pdf/gci_report_summary.pdf retrieved by Oct2018

[615] "Manifesto for new urbanity", *EU Urban Chapter* p.51. https://rm.coe.int/urban-charter-ii-manifesto-for-a-new-urbanity-publication-a5-58-pages-/168095e1d5 retrieved by Jan2020.

the horizon set out in the 2030 goals. The ideas presented cover all possibilities from both ends. On the one hand, an absolutely 'organic' city where everything that is not natural, sustainable, circular, with zero environmental impact is despised as dirty and bad. A strictly ecological city where economic development takes a back seat, thus compromising financing for the main objective?...

At the other extreme we find a 'survival' city, where achieving a minimum quality of life overcomes thinking about the future of the environmental impact that is being caused. It is thought that ecology is a rich-people thing without realizing that neglecting the city environment will make it uninhabitable, unhealthy and will drive away talent and investment, turning it into a huge and uncontrolled dump. It's like shooting yourself in the foot…

As in most things in life, virtue is in the middle ground, in setting a goal of a liveable city, which combines the objectives of environmental sustainability with those already discussed of social and economic sustainability.

How to measure it?

There are many indicators on the cities use of energy, water, green spaces, clean transport, etc. As we saw, the EUI Green Cities Index includes a fairly complete study of the components of environmental sustainability, but the detail by city is only available for some European cities, and has not been updated since 2012, so we cannot use it.

We will base the analysis on two important, comprehensive and highly regarded studies: the IESE Cities in Motion and the ARCADIS Sustainable Cities Index.

The IESE Cities in Motion, into its chapter Environmental Indicators, analyzes this area by using these 11 aggregated indicators:

Indicator	Description / Unit of measurement	Source
CO_2 emissions	CO_2 emissions from the burning of fossil fuels and the manufacture of cement. Measured in kilotons (kt).	World Bank
CO_2 emission index	CO_2 emission index.	Numbeo
Methane emissions	Methane emissions that arise from human activities such as agriculture and the industrial production of methane. Measured in kt of CO_2 equivalent.	World Bank
Access to the water supply	Percentage of the population with reasonable access to an appropriate quantity of water resulting from an improvement in the supply.	World Bank
PM2.5	The indicator PM2.5 measures the number of particles in the air whose diameter is less than 2.5 micrometers (µm). Annual mean.	World Health Organization (WHO)
PM10	The indicator PM10 measures the amount of particles in the air whose diameter is less than 10 µm. Annual mean.	WHO
Pollution	Pollution index.	Numbeo
Environmental Performance Index (EPI)	This measures environmental health and ecosystem vitality. Scale from 1 (poor) to 100 (good).	Yale University
Renewable water resources	Total renewable water sources per capita.	Food and Agriculture Organization of the United Nations (FAO)
Future climate	Percentage of the rise in temperature in the city during the summer forecast for 2100 if pollution caused by carbon emissions continues to increase.	Climate Central
Solid waste	Average amount of municipal solid waste (garbage) generated annually per person (kg/year).	Waste Management for Everyone

Figure 72. IESE CiM. Environmental Indicators[616]

I want to highlight this study (see figure 72) because apart from the necessary technical measurements it addresses the current city's ecosystem status with the Yale University Environmental Performance Index study. It is relevant because we may be taking important measures, but if our ecosystem is already very degraded, we must also regenerate it. It is not just about buying electric buses, cleaning the city and hiding all what we do not want anyone to see in the surroundings, we must evaluate how we have our complete ecosystem. It is also important to add the future impact that climate change will make in the city.

The 2018 Arcadis Sustainable Cities Index studies the sustainability in its three dimensions (social, they say people; economic, they say profit, and environmental, they say planet). We will take this latest, Environmental or 'Planet' Sustainability as another comprehensive approach to our topic.

[616] BERRONE, P. & RICART, J.E. "IESE Cities in Motion 2019", *IESE*. p.18 https://media.iese.edu/research/pdfs/ST-0509.pdf retrieved by Jan2020

Indicator name	Indicator description	Main Source(s)	Weighting	Rationale
Environmental Exposure	Natural catastrophe exposure, including drought, earthquake and extreme temperature	International Disasters Database	5%	This has been given a slightly lower weighting because many cities in the index are not affected significantly by natural hazards.
Green spaces	Green space as % of city area	Siemens Green City Index	11%	While this indicator is an important determinant of quality of life, it is less fundamental than the higher weighted indicators.
Energy	Energy use	Energy Information Administration	12%	These 5 indicators all measure central aspects of a city's environmental sustainability today, so have been allocated the highest weightings.
	Renewables share	Enerdata		
	Energy consumption per $ GDP	Energy Information Administration, World Bank		
Air pollution	Mean level of pollutants (particulate matter)	World Health Organization	12%	
Greenhouse gas emissions	Emissions of CO_2e metric tons (per capita)	CDP Cities	12%	
Waste management	Solid waste management (landfill vs recycling)	Siemens Green City Index, World Bank	12%	
	Share of wastewater treated	OECD, Food and Agricultural Organization (UN)		
Drinking water and sanitation	Access to drinking water (% of households)	UN, World Health Organization	12%	
	Access to improved sanitation (% of households with inside toilet)	UN, OECD, American Housing Survey		
	Risk to water supply	World Resources Institute, The Nature Conservancy		
Bicycle infrastructure	Bicycles per capita and bicycle sharing schemes (Cebr score)	MetroBike	8%	While promoting the use of bicycles is important for cleaning up the air in cities, its environmental significance is somewhat lower than other indicators.
Electric vehicle incentives	National and local government incentives for electric vehicles (Cebr score)	City government websites, International Council on Clean Transportation	8%	Promoting the switch towards electric vehicles will be crucial in improving air quality in the future. This indicator has been given a slightly lower weighting because electric vehicle take-up remains fairly low in a majority of cities.
Negative emissions technologies - carbon capture and storage	Carbon capture and storage facilities/projects	Global Carbon Capture and Storage Institute	4%	A majority of carbon capture and storage schemes are situated outside of city boundaries, so this is less of a direct measure of a city's environmental sustainability.
Natural disaster monitoring	Number of early warning systems, availability of digital alerts (Cebr score)	UN Office for Disaster Risk Reduction	4%	Since many cities in the index face a limited risk from natural disasters, this indicator only impacts a subset of the 100 cities.

Figure 73. Arcadis 2018 Sustainable Cities Index Planet Pillar.[617]

[617] "Sustainable Cities Index. Planet Pillar". *Arcadis*. 2018, Chamber of Commerce Amsterdam, the Netherlands p.29 https://www.arcadis.com/media/1/D/5/%7B1D5AE7E2-A348-4B6E-B1D7-6D94FA7D7567%7DSustainable_Cities_Index_2018_Arcadis.pdf and https://www.arcadis.com/en/global/our-perspectives/sustainable-cities-index-2018/citizen-centric-cities/#ranking retrieved by Jan2020

The Arcadis index (see figure 73) incorporates 11 areas giving greater weight to the 5 fundamental ones (energy, air pollution, greenhouse gas emissions, waste and water management). It is relevant to highlight the analysis made of the use of electric vehicles and bicycles, very appropriate in this term. The actions and facilities for carbon capture and storage are also studied, something very novel when most cities are still considering how to reduce emissions, in other words, they look at the objective of carbon negative when most look at the objective of carbon neutral. The characteristics of exposure to natural disasters and their monitoring are also added, although with little weight. I believe that this characteristic is inherent to the city due to its location, although its monitoring, prevention and resilience are also important public environmental services.

Main Source:

Class	Weight	Indicator	Subindicator	Entity
Environmental Sustainability	50	Sustainable City Index	Planet	Arcadis
	50	Ranking Environment		IESE Cities Motion

Both studies are very relevant and comprehensive. I am surprised by finding some main differences in some cities from both approaches, so, to avoid biases and to aggregate all available knowledge, best approach is to give them same weight.
(See at Appendix XXXIII for City Profitability. Services. Environmental Sustainability)

- City Services Performance: Culture/Tourism

Why is this proxy relevant?

The concept of Culture is very present in all this analysis because it is included in many facets and is intimately linked with the city human activity. We already studied in Chapter 4 the contribution of Culture to City Magnetism from its history, cultural events, museums, etc. We also studied the education services that the city provides to generate, retain and attract talent. We are now going to study culture as a semi-permanent service that the city offers its citizens. It is not a static offer derived from the existence of important cultural elements like UNESCO heritage places (we have already studied this in the City Identity), but from the city's

dedication to arts, entertainment and recreation. These activities have, in many cities, a strong association to service tourism. Furthermore, the tourism received by the studied major cities is fundamentally cultural tourism, that is, they are not cities to rest on the beach in a hotel resort, but cities to discover, walk and find cultural attractions. Therefore, the organization of the cultural proposal for the city inhabitants is also a touristic attraction for its visitors. So, we merge both concepts in this section.

We need to understand that creative talent is also artistic and all those artists should ask themselves whether that city is a good destination to help them to fully develop their genius because city recognizes, appreciates and invests in culture. It's easy to find in the biography from most well-known artists many city movements just because they were looking for the best city to work and express their creativity. Many artistic and cultural movements are associated to the city which held them like Bolognese School, Paris Academia, Athens, Florence, Venice schools, Amsterdam Impressionism, Düsseldorf School, Hague School, Heidelberg School, Lyon School, Norwich School, Vienna Secession, Berliner Sezession, Camden Town Group, Gothenburg Colourists, Neue Künstlervereinigung München, Ecole de Paris, Scuola Romana, Chicago Imagists and many more.

I sincerely believe that the robotization brought about by the 4th industrial revolution will mean a special appreciation for everything that is intrinsically human, such as artistic creations, so I believe that we will experience a cultural renaissance again. I must be a dreamer because data on employment in this arts, entertainment and recreation sector is falling in Europe. The 2008 economic crisis brought bad consequences for professionals in the cultural area, where unemployment increased to 22.4%.[618]

We should also say that the cultural proposal has neither the appropriate digital format nor the speed of exposure that the digital age has accustomed us to. No millennial will gladly face the reading of Homer's Iliad, studying certain concepts of Greek to understand its musicality and beauty, it is simply too much effort in time for the expected aesthetic emotion. However, many would like to watch a

[618] Startup Europe Awards https://startupeuropeawards.eu/project-view/creative/ retrieved by Jan2020

summary of no more than an hour or a movie (that is, something like Troy[619] movie, but this time true to the original text). Therefore, we are not insensitive to beauty, passion, feeling, love or human suffering, only problem is that we have become accustomed to a different format, the digital one.

The EU Urban Manifesto for New urbanity [620] again explains the principles for Culture in tows, highlighting that city must ensure all citizens right to access culture. Culture is a strong economic and social development contributor. Culture also promotes exchange and respect for all different communities inside our city and foreign people. Culture diversity encourages innovation. And finally, cultural tourism has a positive impact on local economy.

How to measure it?

To measure cultural services, we could find a long list of indicators such as the number of theaters, museums, festivals, exhibition halls, art shops, activities of all kinds, etc. We have found one that serves to unify and value the city's appreciation for culture and its offer of cultural services. The study from the World Cities Cultural Forum, Global leadership on culture in cities provides us with more than 70 cultural city indicators. We will use the % of professionals dedicated to cultural activities in the categories of arts, entertainment and recreation.[621] That way, the more professionals in % dedicated to culture, the higher appreciation and official attention it deserves, making the city more attractive from the Cultural Services and cultural jobs points of view.

To analyze the city tourist services or the cultural tourism attraction, we must understand how many tourists it attracts. It is not easy to distinguish which visitors are tourists and which are simply business travelers. A good approach will be the

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[619] PETERSEN, W. *Troy*, 2004

[620] "Manifesto for a New Urbanity" *European Urban Charter II*. Council of Europe Publishing. 2008 p.54. Also at : https://rm.coe.int/urban-charter-ii-manifesto-for-a-new-urbanity-publication-a5-58-pages-/168095e1d5 retrieved by Nov2019

[621]"Global leadership on culture in cities." *World Cities Cultural Forum* 2020. BOP. http://www.worldcitiesculturefforum.com/data/creative-industries-employment retrieved by Jan2020.

number of international visitors. Thus, we use the Top 100 City Destinations 2019 Edition by Euromonitor. This study includes some 400 cities and evaluates arrivals in thousands 000s / y. [622]

We want to evaluate only cultural tourism, then the excess in the data because of international business travelers could be compensated by internal cultural tourism not captured. Anyway, intention is more to compare than to achieve 100% data accuracy, so error if any will be same for all.

Main Source:

Class	Weight	Indicator	Subindicator	Entity
Culture-Tourism	50	Culture Creative Jobs %.		World Cities Culture Forum
	50	City Destination 000s International visitors /y		Euromonitor International

No evidence on which should be more relevant, so we equally weight them.
(See at Appendix XXXIV for City Profitability. Services. Culture-Tourism)

- City Services Performance: Urban Mobility

Why is this proxy relevant?

We dedicated the full chapter 1.4 to explain the superior relevance of urban mobility as a city service, for many the most relevant city service for their daily life's.

Let me add here the EU Urban Manifesto for New urbanity [623] principles for Urban mobility, highlighting that city must provide an affordable and efficient way to move across the city, but trying to reduce the amount of vehicles, especially private cars, allowing the coexistence of different forms of transportation, public, private, shared, rented, with or without driver or even autonomous, paying special preference to the no-pollution ones as the electric vehicles and bicycles. Street must

[622] YASMEEN, R. "Top 100 City Destinations 2019 Edition". *Euromonitor International*. https://go.euromonitor.com/white-paper-travel-2019-100-cities.html retrieved by Jan2020

[623] "Manifesto for a New Urbanity" *European Urban Charter II*. Council of Europe Publishing. 2008 p.51. Also at : https://rm.coe.int/urban-charter-ii-manifesto-for-a-new-urbanity-publication-a5-58-pages-/168095e1d5 retrieved by Nov2019

be recovered as a public social space, like the former Greek agora or market. And finally, special training must be conducted to make the citizens aware of the new alternatives and its benefits for them and for the city.

How to measure it?

In order to evaluate urban mobility, we are going to tackle the three fundamental axes of the problem: on the one hand, traffic, with its negative consequences in loss of time, risk in accidents and pollution; on the other hand, we will comprehensively study mobility including all means of transport and vehicles; and finally we will dedicate two special analytics to new technologies that provide us with effective parking spaces management and car sharing alternatives as the most outstanding innovative trend nowadays.

We will start with these new technologies.

To study smart parkings at SmartCities we turned to the "EasyParkGroup SmartCity Index 2019"[624] study. This Smart Parking indicator includes two components: Availability of parking apps in the city and real usage (Source: Apps stores like Google-Android, Apple IOS); and availability and amount of parking slots downtown (/ km^2) (Source: OpenStreetMaps).

To analyze Car Sharing new market impact, EasyPark study reports two components as well: one is just the number of car sharing services available in the city and then size of car sharing total fleets / inh (Sources: some local reports plus all available car sharing companies sites like Autolib, Bluemove, car2Go, Communauto, DriveNow, Enjoy, Flinkster, GoCar, GoGet, GreenMobility, LetsGo, Mobility Carsharing, Moia, Sunfleet, XXImo, Zipcar. City population data from web.)

After these two small, but relevant reports because of the use of advance technologies services, let's study the main urban mobility problem: traffic. There are different studies, but best is INRIX 2019 Global Traffic Scorecard. INRIX[625] platform is permanently monitoring traffic in around 1000 cities in the world, from

[624] "EasyPark Group SmartCity Index 2019", *EasyPark Group* https://www.easyparkgroup.com/smart-cities-index/ retrieved by Jan2020.

[625] "INRIX 2019 Global Traffic Scorecard." *INRIX* https://inrix.com/scorecard/ retrieved by Jan2020

around 45 countries. Best indicator about traffic conditions quality is sizing congestion. INRIX measures in every city the amount of lost hours during rush times. This index takes on one hand the estimated 240 working days per year, then applies the average number of hours spent in congestion during peak hours. Peak hours are traditionally 6-9am and 4-7pm, although this varies and should be adapted to every city local culture and commuting patterns / business hours. I very much like this indicator because is based on real data, avoiding surveys or estimations, and clearly spots on the main issue around traffic in cities.

Indicator	Description / Unit of measurement	Source
Traffic index	Consideration of the time spent in traffic, the dissatisfaction this generates, CO_2 consumption and other inefficiencies of the traffic system.	Numbeo
Inefficiency index	Estimation of traffic inefficiencies (such as long journey times). High values represent high rates of inefficiency in driving.	Numbeo
Index of traffic for commuting to work	Index of time that takes into account how many minutes it takes to commute to work.	Numbeo
Bike sharing	This system shows the automated services for the public use of shared bicycles that provide transport from one location to another within a city. The indicator varies between 0 and 8 according to how developed the system is.	Bike-Sharing World Map
Length of the metro system	Length of the metro system per city.	Metrobits
Metro stations	Number of metro stations per city.	Metrobits
Flights	Number of arrival flights (air routes) in a city.	OpenFlights
High-speed train	Binary variable that shows whether the city has a high-speed train or not.	OpenRailwayMap
Vehicles	Number of commercial vehicles in the city (in thousands).	Euromonitor
Bicycles per household	Percentage of bicycles per household.	Euromonitor

Figure 74. IESE Cities in Motion. Urban Mobility.[626]

And finally, to study the whole city transportation system including traffic, bikes, metro, flights, train, etc and the overall multimodal commuting, we'll take IESE 2019 Cities in Motion report, using the urban Mobility set of indicators as shown in figure 74.

Main Source:

Class	Weight	Indicator	Subindicator	Entity
Urban Mobility	10	Smart Parking		Easy Park Group

[626] BERRONE, P. & RICART, J.E. "IESE Cities in Motion 2019", *IESE*. p.19 https://media.iese.edu/research/pdfs/ST-0509.pdf retrieved by Jan2020

	10	Car Sharing Services		Easy Park Group
	40	Traffic INRIX Congestion		INRIX
	40	Mobility and Transportation		IESE Cities in Motion

As we have explained, we have two main components: An in deep traffic analysis from INRIX (main issue) and an overall all mobility means study from IESE Cities in Motion, so we'll give them main weight shares. The other two elements (Smart Parking and Car Sharing Services) are relevant, but small modern advanced solutions for main traffic problem, so we'll give them 20% to split between them. (See at Appendix XXXV for City Profitability. Services. Urban Mobility)

- City Services Performance: Urban Planning

Why is this proxy relevant?

We have studied how much urbanism marks the city identity and life, how it impacts the lifestyle and even the happiness of its inhabitants. We have studied that our cities must be rebuilt from the current concept of cities built for cars (more than 40% of the city's spaces dedicated to cars, their movement, operation and parking[627]) to the concept of cities built for humans, recovering spaces and making the city walkable again. We saw that the ideal 'happy' city is the one with 95% of everything you need within a 15 'walk. We saw the excellent work of urban transformation that cities like Bilbao or Copenhagen have undertaken and that have meant a human revolution for them. And we studied the opposite: the Koolhaas' generic city, the inhuman, sad, cold, repetitive city, annihilating creativity and human encountering. We studied how all this composes the city identity and its magnetism, but now, we are going to study Urban Planning as a service. The city has or should urgently have a team of architects and urban planners who must plan the city urban future in a 5, 10 or even 25/30 years plan, setting very clear strategies, where they want to go, what to achieve, defining a strategic plan and another annual

[627] PETERS, A. "Here's how much space U.S. cities waste on parking" *FAST Company*. https://www.fastcompany.com/90202222/heres-how-much-space-u-s-cities-waste-on-parking retrieved by Jan2020

practical implementation plan. In short, the city gives us a service in the form of urban development, sorting out the city shape and spaces. For a talented citizen, it is very important to know whether that city has a plan, has a team of experts who lead its development, or on the contrary, the city grows amorphously, amoeboidly, spreading tentacles where there is private investment fresh money, without counting on the citizens, in a chaotic development, as a metastasis.

Urban planning provides us with constructive services such as urban planning, the different physical networks like sewer, water, energy, communications. Thinking of our today cities, they are building bicycle lanes, recovering spaces from cars and converting them into areas of human relationship such as boulevards and promenades. We must study what our city canvas is like, in height or width, are there enough spaces for humans? What are our buildings and houses like? Are there decent homes for everyone, or are there overcrowded housing? Is there a control and a strategy in the balanced and sustainable construction of skyscrapers?

The EU stresses this topic into its principles for a city that respects the citizens while designing a sorted-out urban strategy. Those principles set that city should check citizens input about all major urbanistic developments, explaining what's going to be built, purpose, potential, resources and benefits. Urban and regional planning must be conducted by professionals avoiding opportunistic chaotic growth. Ideas, suggestions and co-creation, especially from those younger should be encouraged.[628]

How to measure it?

It is very difficult to measure urban planning as a service, since it depends on each city characteristics, its climate, and its lifestyle, but there are things that everyone assumes are good or bad and that can be measured.

The best approach to this concept has been made (again) by IESE Cities in Motion in the Urban Planning chapter.[629] (see figure 75)

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[628] "Manifesto for new urbanity", *EU Urban Chapter*, p.56. https://rm.coe.int/urban-charter-ii-manifesto-for-a-new-urbanity-publication-a5-58-pages-/168095e1d5 retrieved by Jan2020.

[629] BERRONE, P. & RICART, J.E. "IESE Cities in Motion 2019", *IESE*. p.20 https://media.iese.edu/research/pdfs/ST-0509.pdf retrieved by Jan2020

Indicator	Description / Unit of measurement	Source
Bicycles for rent	Number of bike-rental or bike-sharing points, based on docking stations where they can be picked up or dropped off.	OpenStreetMap
Percentage of the urban population with adequate sanitation facilities	Percentage of the urban population that uses at least basic sanitation services—that is, improved sanitation facilities that are not shared with other households.	World Bank
Number of people per household	Number of people per household. Occupancy by household is measured compared to the average. This makes it possible to estimate if a city has overoccupied or underoccupied households.	Euromonitor
High-rise buildings	Percentage of buildings considered high-rises. A high-rise is a building of at least 12 stories or 35 meters (115 feet) high.	Skyscraper Source Media
Buildings	This variable is the number of completed buildings in the city. It includes structures such as high-rises, towers and low-rise buildings but excludes other various others, as well as buildings in different states of completion (in construction, planned, etc.).	Skyscraper Source Media

Figure 75. IESE Cities in Motion. Urban Planning.

This way, the study analyzes the use of spaces for city bycicles, adequate sanitation (this is relevant in some emerging world cities), then the city housing strategy (very relevant for most cities). For large attractive cities because they need to accommodate a massive amount of immigrants and for the least attractive because they need to avoid slums and house overcrowding. Then the indicator pays attention to the excessive amount of skyscrapers and the real-state status (we studied the correlation with city attractiveness in the JLL report at chapter 2)

Main Source:

Class	Weight	Indicator	Subindicator	Entity
Urban Planning	100	Urban Planning		IESE Cities Motion

(See at Appendix XXXVI for City Profitability. Services. Urban Planning)

- City Services Performance: Safety

Why is this proxy relevant?

City safety is one of the fundamental decision criteria when choosing a city to live. I think it is the first criterion and works by discard. In the same way that in the selection criteria of our 140 analyzed cities, we eliminated those that did not meet a minimum of 50 in The Economist Liveable Cities ranking, since they are cities where living entails a risk to physical integrity (see chapter 3). Well, once we understand that our possible candidate city has acceptable conditions, studying its

security is a very important decision component. We discussed the challenge of security for the city in Chapter 1.6 and explained the risks in both physical and virtual or digital security (cybersecurity).

and a strategy in the balanced and sustainable construction of skyscrapers?

The European Union highlights safety in its list of fundamental urban principles. Pursuing and preventing crime is a city task, in permanent collaboration with its citizens and with other supra-local administrations such as the state, country or even international. At the local level, the persecution of organized gangs, especially drug gangs, is of particular importance. Priority should be given to caring for victims, the convicted social reintegration and providing security forces with the necessary financial resources.[630]

How to measure it?

If we think about security from the perspective of the talent that explores cities to settle, it is clear that the main priority is personal security. For this reason, we will dedicate a specific section to it.

In addition to physical personal security, Safe City must be considered as a wider concept that integrates other facets of life such as virtual, digital or cybersecurity; health security (although this section has already been included in the health and social services); and the physical city's infrastructure security and its resilience.

To study Personal Safety, we will take the already known INSEAD Global Talent Competitiveness Index.[631] This Global analysis includes a special study for cities and Personal Safety is addressed as homicide rate per 100k inh, Data is provided by UN Office on Drugs and Crime, UN-Habitat, Eurostat, and FBI.

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[630] "Manifesto for new urbanity", *EU Urban Chapter*, p.53. https://rm.coe.int/urban-charter-ii-manifesto-for-a-new-urbanity-publication-a5-58-pages-/168095e1d5 retrieved by Jan2020.

[631] LANVIN, B & MONTEIRO, F. "Global City Talent Competitiveness Index". *INSEAD*. 2020. p.114 https://gtcistudy.com/ and https://gtcistudy.com/special-section-gctci/ retrieved by Jan2020

Figure 76. The Economist Safe Cities Index 2019 indicators. [632]

The Economist's Safe Cities Index 2019 report ranks more than 60 cities with 57 indicators as descripted in Figure 76.

[632] SAHGAL V. & SHARMA NAG D. "Safe Cities Index". *The Economist Intelligence Unit (EIU)*. 2019, p.11 https://safecities.economist.com/safe-cities-index-2019/? Retrieved by Jan2020.

As we explained, it covers three angles: digital security (including privacy, cyberthreats, identity), health security (already studies in other indicators, but can't be excluded here), infrastructure security (interesting approach to study the infrastructures resilience, transport, natural disasters) and personal security (reinforcing previous indicator)

Main Source:

Class	Weight	Indicator	Subindicator	Entity
Safety	50	Safe Cities Index		The Economist
	50	Personal Safety		INSEAD - GCTCI

Safe Cities makes an integrated analysis on all potential threats a citizen can suffer from in a city. We have added the Personal Safety specific data because of its capital relevance here, and to keep main focus on it. That way, we don't lose the integrated picture nor the specific priority. Both indicators take same 50% weight, so we make them impactful.
(See at Appendix XXXVII for City Profitability. Services. Safety)

City Services Performance: All data sources Integration.

Very important to notice that we are not assigning any weight to these 10 main areas. App users will do. They will provide their inputs. In other words, we are giving the users (citizens, cities) the freedom to tune the tool to match their preferences, to choose the City Services that better match their needs or their scale of values in their particular moment in life, and according to their dependencies from children or elder relatives at their charge.
Thus, we will ask the user to assign some weights (which will be normalized to total 100) for each of those ten areas. The questions to ask would be:

Evaluate and assign weights to each of these City Service or Performance groups according to your preferences.

- DIGITAL GOVERNMENT: Democratic efficient transparent participatory digitalized city Government. Digital government as a Service.
- EDUCATION. Lifelong Training: Quality Business Schools, Training and Development on the job.

- EMPLOYABILITY: Talent Demand. Local demand matching offer.
- CONNECTIVITY: Internet infrastructure. 4G / 5G Deployment. WiFi.
- HEALTHCARE / SOCIAL SERVICES.
- ENVIRONMENTAL SUSTAINABILITY: Water, Energy efficiency. Air quality. Carbon emissions reduction, Carbon Neutral Plans. Circular City.
- CULTURE-TOURISM: Culture as a City Service, not as customs/traditions, again, not emotions, but valuable services.
- URBAN MOBILITY: Traffic. Public Transportation. Mobility as a Service.
- URBAN PLANNING: Urbanism as a City Service. Design and functionality.
- SAFETY: Physical and Virtual Safety. Personal and City Resiliency.

Then, we can draw the complete City Profitability - Services Area with these indicators / descriptors:

Subarea	Weight	Class	Weight	Indicator	Sub indicator	Entity
Services	User Input	Digital Government	25	Online Service Index		United Nations
			50	eParticipation Index		United Nations
			25	Digitalization of Government		Easy Park Group
	User Input	Education. LifeLong Training	33,3	Quality of Management Schools		INSEAD - GTCI
			33,3	Prevalence of Training in firms		INSEAD - GTCI
			33,3	Employee Development		INSEAD - GTCI
	User Input	Employability	50	LinkedIn Talent Hiring Demand		LinkedIN
			50	Employability		INSEAD - GTCI
	User Input	Connected City	20	4G LTE		Easy Park Group
			20	Internet Speed		INSEAD - GTCI
			20	Wifi Hotspots		Easy Park Group
			40	ICT Infraestructure		INSEAD - GTCI
	User Input	Health/Social SVS	40	Social Expenditure (% GDP)		OECD
			20	Life Expectancy at age 60		United Nations
			20	Physicians (per 1k)		INSEAD
			20	Public Health Expenditure (%GDP)		World Health Organization
	User Input	Environmental Sustainability	50	Sustainable City Index	Planet	Arcadis
			50	Environment		IESE Cities Motion

	User Input	Culture-Tourism	50	Culture Creative Jobs %		World Cities Culture Forum
			50	City Destination.		Euromonitor International
	User Input	Urban Mobility	10	Smart Parking		Easy Park Group
			10	Car Sharing Services		Easy Park Group
			40	Traffic INRIX Congestion		INRIX
			40	Mobility and Transportation		IESE Cities Motion
	User Input	Urban Planning	100	Urban Planning		IESE Cities Motion
	User Input	Safety	50	Safe Cities Index		The Economist
			50	Personal Safety		INSEAD - GCTCI

(See at Appendix XXXVIII for City Profitability. Services. Summary)

5.2 City Cost of Living. Net Purchase Power

In our citizenship contract, we have already studied what the city provides us based on public services. We will now try to understand the other side: what we 'pay' for living in that city in comparison with another. This component is essential when making decisions about our future. The economic question is not the only element to evaluate, and I daresay it is not the most important either. For many millennials and talented young people, money is less important than for previous generations. Cities are located in different economies, different working conditions and offer on average very different labor compensations. Not everything is the salary, we must take into account the city tax burden and understand how much money we have available for our purchases, from the most basic to personal preferences in culture, leisure, etc. Also, with the same money we will buy different amounts of the same things in one city or another. In the end, this analysis will try to understand the social justice that each city grants me, that is, the things that I can buy or do at month end by doing the same kind of work and effort in different cities. Imagine that we have the same work function and living standards in two different cities. At the end of the month, we will make a different net money to buy what we want. That is the price we pay to live in that city compared to others. We can also look at the issue in the negative, and think about the opportunity cost or how much we are losing today by not immediately moving to a better place with better opportunities to develop our full potential. In other words, doing the same type of work, paying all the required taxes and after buying my necessary things according to my lifestyle, such as food, housing, education, health, mobility, utilities, public services, how much money will be left in my pocket at month end for my things? It is important to note that some cities offer higher wages, but also higher taxes or higher costs of living. The ideal would be a city with high wages and quality of life, but low taxes and an affordable cost of living. Does it exist? Let’s explore the alternatives.

- Cost of Living: Net Real Income

Why is this proxy relevant?

Plan is to analyze how much money (Net real income) left in my pocket after my professional activity compensation and paying all my obligations (taxes). A good approach will be based on AVERAGE WAGE – (DIRECT TAXES + SOCIAL CONTRIBUTIONS) = AFTER TAXES INCOME. With this money, at the moment of purchasing anything, we'll pay the INDIRECT TAXES (basically sales taxes or VAT). The remaining is the NET REAL INCOME that we can spend.

How to measure it?

First, we need to analyze the average wage per city in constant USD. There are many different sources and financial analyst to choose from, but all take the UN info as base reference. Let's take that one. In fact, we'll use the United Nations Economic Commission for Europe[633]. UNECE Statistical Database >> Economy >> Labour Force & Wages >> Gross Average Monthly Wages by Country and Year in Constant USD. As complementary information for some difficult cities and to take alternative sources of information, we go to the basics again, now to the International Labor Organization Statistics (ILOSTAT).[634] Although our total compensation includes many components such as grants, insurances, and many other benefits, ILOSTAT tries to assess pure gross remuneration, before any deduction like taxes, social security, social contributions, pension plans, unions or other obligations. As additional info source, we'll use OECD Statistics database.[635] Ok, with that salary, we have to immediately pay direct taxes and social contributions. This concept also varies very much, not only country by country, but also, within same country, it depends on the specific personal situation (single or married, number of children, and many other specific details). There are large books

[633]"Gross Average Monthly Wages by Country and Year." *UNECE Statistical Database* https://w3.unece.org/PXWeb2015/pxweb/en/STAT/STAT__20-ME__3-MELF/60_en_MECCWagesY_r.px/ retrieved by Jan2020

[634] "Earnings and Labor cost" *International Labor Organization.* https://ilostat.ilo.org/resources/methods/description-earnings-and-labour-cost/ retrieved by Jan2020.

[635]"Total gross earnings before taxes". *OECD.* https://stats.oecd.org/Index.aspx?QueryId=57321 retrieved by Jan2020

and reports annually published by experts like PWC[636] or KPMG[637] on the specific country taxation model. But our intention here is to compare cities, so, let's take the basic idea of a single, no children person, and let's find the average total taxes (direct+social contributions) for our 140 cities. We go then again to OECD Stats info.[638]

Once we got the after taxes income, we will deduct the sales tax applicable to every city. We will take the standard VAT (value-added tax) or GST (Goods & Sales Tax) or sales tax, as there are different taxes depending on the goods, basic, standard or even luxury goods. There are also different state or city taxes, then we'll take the average applicable to a standard purchase in every studied city. We take again OECD.[639] Then, we'll obtain the desired Net real money or the After taxes and VAT average Income for a Single no Children.

Main Source:

Class	Weight	Indicator	Subindicator	Entity
Net Real income	100	Avg Wages/month	SINGLE, No CHILD	UNECE, ILOSTAT
	100	Direct Tax + Social Contributions		OECD
	100	Indirect Tax		OECD

We are using USD Constant dollar 2018. Formula is quite simple:

AVG Wage x (1-(Direct Tax+Social Contribution)) x (1-Indirect tax) = Net Real Income

(See at Appendix XXXIX for City Profitability. Cost of Living. Net Real Income)

- Cost of Living: Cost of Life. Net purchase Power

[636] "Worldwide Tax Summaries." *PWC* https://www.pwc.com/gx/en/services/tax/worldwide-tax-summaries.html retrieved by Jan2020

[637] "Global Withholding Taxes." *KPMG* https://tax.kpmg.us/articles/2020/global-withholding-taxes-guide.html retrieved by Jan2020

[638] "Table I.6. All-in average personal income tax rates at average wage by family type." *OECD STATS*. https://stats.oecd.org/index.aspx?DataSetCode=TABLE_I6 retrieved by Jan2020

[639]"Consumption Tax Trends 2018. VAT/GST and Excise Rates, Trends and Policy Issues." *OECD* http://www.oecd.org/tax/consumption/consumption-tax-trends-19990979.htm retrieved by Jan2020

Why is this proxy relevant?

Ok, then with this pocket money, we go to the market to buy all kind of goods. Those things have different prices in every city.

This is not new, and it's very well studied by many famous indicators like BigMac Index.[640] Proposed by The Economist magazine in 1986, the Big Mac compares the prices of a very popular hamburger in each of the studied cities in the world (and that have this restaurant chain). As it comes to exactly the same type of food and basically the same staff and effort to produce it, the Big Mac is considered a good, uniform and simplified economic indicator of a country's individual purchasing power.

For our study we will use PPP (Purchase Power Parity) instead, because is far more comprehensive and standard. PPP compares purchasing power in different cities and buying a different set of things ('basket of goods'). The aim is to inform the consumer (in our case, the new citizen) of what is the cost of life in that city compared to another. New York City is used as a unit (NYC = 1). This means, for example, that a city with PPP = 0,8 is on average 20% less expensive than NYC. We could then say that BigMac Index is like a PPP where there is only one item in the basket of goods,

There are other good calculators among different cities cost of life. In those, you can specific your personal situation, activity, etc and locations, then they will help you compare the economic terms for that two different cities. Let me mention "*SalaryExplorer*"[641] and 'Cost of living Reports'[642] with detailed information by country.

How to measure it?

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[640] "Big Mac Index" *The Economist*. https://www.economist.com/news/2020/01/15/the-big-mac-index retrieved by Jan2020

[641] "Cost of Living Calculator. Compare your monthly spending to that of other people." *Salary Explorer*. http://www.salaryexplorer.com/cost-of-living-calculator.php retrieved by Jan2020.

[642] Cost of Living Reports https://costoflivingreports.com/ retrieved by Jan2020

Best and largest prices database per city is Numbeo.[643] This amazing large database includes (as of April2020) around 6 million price items from 9,520 cities. We'll take the standard PPP including housing rent. We do that not to forget the cost of accommodation or housing, very relevant in most cities. Then, we'll take the Cost of Living plus Rent Index 2020, with New York City as reference = 1

Main Source:

Class	Weight	Indicator	Subindicator	Entity
Cost Of Life	100	Purchase Power Parity Plus Rent (NY=1)		Numbeo

So, our final Net Purchase Power will be calculated as previous Net real income divided by this PP, ie if we had 1000 USD as Net real income and PPP-RentIncluded for our studied city is 0,5 (50% less expensive than NYC) then the final Net Purchase Power will be 1000/0,5 = 2000 USD.

Cost of Living: All data sources Integration.

Here below we can see the full items description to calculate our Net Purchase Power per studied city.

Subarea	Weight	Class	Weight	Indicator	Subindicator	Entity
Cost Of Living. Net Purchase Power	50	Net Real Income	100	Avg Wages/month	SINGLE, No CHILD	UNECE, ILOSTAT
			100	Direct Tax + Social Contributions		OECD
			100	Indirect Tax		OECD
	50	Cost Of Life	100	Purchase Power Parity Plus Rent (NY=1)		Numbeo

(See at Appendix XL for City Profitability. Summary Cost of Living. Net Purchase Power)

[643]"Cost of Living Index by City 2020" *Numbeo*. https://www.numbeo.com/cost-of-living/rankings.jsp retrieved by Jan2020

5.3 Methodology to combine/rationalize City Profitability

All variables are rationalized to 0..10 interval (direct classic standardization)

Then, the following standardization approach is used:

Score $x_i = \left(10 \times \frac{a_i - a_{min}}{a_{MAX} - a_{min}}\right)$

When we consolidate into the 10 City Profitabilty. Services areas, we are rationalizing 1..10, as we don't want to multiply by less than 1 any of these 10 areas inputs, so the standardization approach is slightly different:

Score $x_i = \left(9 \times \frac{a_i - a_{min}}{a_{MAX} - a_{min}}\right) + 1$

We had for City Profitability = City Services Performance x Net Purchase Power. These two items weight equally or 50%.

Note that the 10 areas inside City Services Performance are NOT weighted, and user will assign them his personal weights according to his preferences, scale of values, personal situation, etc.

(See at Appendix XLI for City Profitability. Summary using the City Services Performance provided by SmartCityExpo attendees survey (will be explained later))

Model for City Profitability includes 28 Indicators for City Performance Services, and 5 for Cost of Living-Net Purchase Power, for a total of 33 for City Profitability. The number of subindicators inside them is very large, as some include more than 100 components.

6. City Attractiveness. Research. Key findings. Conclusions

6.0. City Attractiveness Model

Honest / fair Analysis Disclaimer.

The obtained results are a true reflection of user input and the data obtained from the aforementioned studies. Only on very few occasions where some data from a city is missing has an attempt been made to extrapolate from other well-known data from nearby or similar cities. There has never been any favoritism towards any city, or towards achieving a striking, curious or beautiful model. The results are what they are. A model is always a simplified representation of a very complex reality. This is the best model / approach to the concept of Attractive City. It will need an annual evolution and adaptation as our society changes and as new disruptive technologies appear. In my presentations / discussions to multiple cities, some have done some little pushback of one indicator that they did not like or that did not reflect in their judgment their city merits. I mainly agree, and I showed them the information sources and suggested that they explain their arguments to those sources. I have not had neither the time nor the resources to do a comprehensive from scratch research, without counting on the numerous set of studies already published on this thesis partial areas. Feedback always welcome.

To summarize, full Model for City Attractiveness includes 67 indicators for City Magnetism and 33 for City Profitability, plus 3 for PreConditions (Main Religion, Main Language, Landscape) for a total of 103 Indicators. The number of subindicators inside them is very large, as some include more than 100 components. Then, to summarize our City Attractiveness Index is calculated by multiplying City Magnetism x City Profitability, so each has 50% weight. Inside City Magnetism, user will provide weights for its three components (City Identity, City Dynamism and City Strategy). Inside City Profitability, we have City Services Performance with 10 main Areas that user must weight as well. This City Services Performance multiplies Net Purchase Power to make City Profitability. So, user must provide 3 + 10 weights or preferences, plus some preconditions (if any) about Religion, Language and Landscape for the desired cities.

See below full description:

Main	W.	Area	W.	Subarea	W.	Class	W.	Indicator	Entity
City Attractiveness	50	Magnetism	User Input	Identity	20	History. Culture	70	Age	Wikipedia
							20	UNESCO	UNESCO
							10	Top Museums	Wikipedia
					10	Government Basics	50	Democracy Index	The Economist
							50	Safe City Index	The Economist
					10	Reputation	100	Reputation	Reputation Institute
					10	Space. Density	50	% Natural Space	Wikipedia
							50	Density (inh/km2)	Demographia
					15	Climate	33,3	Avge. Temperature Desviation	Climatemps
							33,3	Avge. Precipitation Desviation	Climatemps
							33,3	Avge. Daily Sunshine	Climatemps
					5	Geo Risk	100	Natural Disaster Risk	WorldRiskReport
					10	Geo Economics	100	GDP Proximity	Own Work
					5	Gastronomy	50	RK Food Index	OXFAM
							50	Michelin Guide	Via Michelin
					15	Branding. External Image	25	Movies	Wikipedia
							50	Sports	Football Database NBA Topendsports
							25	Main Events	Olympics org
									Wikipedia
									Day Zero Project
			User Input	Dynamism	25	Compe titiveness	25	Creativity Index	Martin Prosperity
							25	Global Competitivenes	World Economic Forum
							25	Cities In Motion	IESE
							25	Global Talent Competitiveness	INSEAD

					25	Expat Social Experience	33,3	Life Style - Quality	HSBC Expat Explorer
							33,3	People Around	HSBC Expat Explorer
							33,3	Relationship - Social Life	HSBC Expat Explorer
					25	Ethics. Well-being	40	Happiness	Happiness Report
							20	World Giving Score	Charities Aid Foundation
							20	Civic Engagement	OECD
							20	Work-Life Balance	OECD
					25	Equality	25	GINI Index	WorldBank
							25	Gender	INSEAD
									INSEAD
									INSEAD
							25	Tolerance	INSEAD
									INSEAD
							25	Poverty	IndexMundi
			User Input	Strategy	20	Human Capital	20	Population Age Average Per Country	Wikipedia
							80	Ranking Human Capital	IESE Cities Motion
					50	Smart Cities Plan	100	Plan Smart Cities	Own Work
					30	Innovation	25	R&D (% GDP)	INSEAD - GTCI
							25	Global Innovation Index	Cornell INSEAD WIPO
							50	Innovation Cities	2ThinkNow
	50	Profitability	50	Services	User Input	Digital Government	25	Online Service Index	United Nations
							50	eParticipation Index	United Nations
							25	Digitalization of Government	Easy Park Group
					User Input	Education. LifeLong Training	33,3	Quality of Management Schools	INSEAD - GTCI

							33,3	Prevalence of Training in firms	INSEAD - GTCI
							33,3	Employee Development	INSEAD - GTCI
					User Input	Employ ability	50	LinkedIn Talent Hiring Demand	LinkedIN
							50	Employability	INSEAD - GTCI
					User Input	Connected City	20	4G LTE	Easy Park Group
							20	Internet Speed	INSEAD - GTCI
							20	Wifi Hotspots	Easy Park Group
							40	ICT Infraestructure	INSEAD - GTCI
					User Input	Health/ Social SVS	40	Social Expenditure (% GDP)	OECD
							20	Life Expectancy at age 60	United Nations
							20	Physicians (per 1k)	INSEAD
							20	Public Health Expenditure (%GDP)	World Health Organization
					User Input	Environ mental Sustain ability	50	Sustainable City Index	Arcadis
							50	Environment	IESE Cities Motion
					User Input	Culture-Tourism	50	Culture Creative Jobs %	World Cities Culture Forum
							50	City Destination.	Euromonitor International
					User Input	Urban Mobility	10	Smart Parking	Easy Park Group
							10	Car Sharing Services	Easy Park Group
							40	Traffic INRIX Congestion	INRIX
							40	Mobility and Transportation	IESE Cities Motion
					User Input	Urban Planning	100	Urban Planning	IESE Cities Motion
					User Input	Safety	50	Safe Cities Index	The Economist
							50	Personal Safety	INSEAD - GCTCI
			50	Cost of Living. Net	50	Net Real Income	100	Avg Wages/month	UNECE, ILOSTAT

				Purchase Power			100	Direct Tax + Social Contributions	OECD
							100	Indirect Tax	OECD
					50	Cost Of Life	100	Purchase Power Parity Plus Rent (NY=1)	Numbeo

ADDITIONAL PRE-CONDITIONS:

Landscapes	Own Work
Language	Wikipedia
Religion	Wikipedia

6.1. City Attractiveness. Field Work.

"*We especially need imagination in science. Not everything is mathematics and not everything is simple logic, it is also a bit of beauty and poetry*. "María Montessori[644]

That is one of the principles of this thesis: to combine the city study from the technological, urbanistic and above all, humanistic perspectives. We have built a model for Attractive Cities. Let's test it. Let's add some statistics to our human model.

We are making a meta-analysis research, choosing the best available reports / studies for all the analyzed city dimensions, as proxies to model the seek concept: City Attractiveness. In addition, as a way to reduce bias and offer the best information for each a every citizen, we are allowing them to enter their weights in all variable items (economical terms are fixed, so, unquestionable). To test the model, we'll expose it directly to many different cities and will run two surveys among clear talented citizens and city experts.

We set that we were not going to publish yet another cities ranking. We are going to allow readers, all of them talented citizens, a good degree of freedom to decide which city style (magnetism) they like best and what city services they most appreciate at this point in their lives. Unfortunately, they can't decide about cost of life, as this is a clear city characteristic / fixed term. That's the price you have to pay for your bet for one attractive city.

To prove that the model works and that all its components are relevant, we are going to carry out two surveys as a test. If any element is not minimally valued, it should not be there. We will also appreciate that the model is understood in a short time and that weight assessment for each element can be answered in a very few minutes, not to say in seconds.

We will ran two surveys in two SmartCities events, so our audience will include a twofold advantages: They will be quite familiar with the SmartCity concept, and we can nominate them all as talented citizens.

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[644] MONTESSORI, M. *The Montessori Method* Translated by Anne Everett George. New York: Frederick A. Stokes Company, 1912. p.198

We are using for both surveys the same questions, slighting adapted to match each event main theme. So, we are basically asking for custom sorting the three City Magnetism Components and then the 10 City Performance Services. In addition, some control info is requested as sex, age and some relevant personal circumstances that will impact those prioritizations, like Dependency for Children or Dependency for elder people at your charge. It seems obvious that depending on these conditions, one will differently weight the city services because we mainly live in families and our decision to move to one particular city will impact more or less our family.

Survey at NordicEdge Event

We ran our first survey at NordicEdge[645] event in Stavanger (Norway) by September 2018. This annual event is the largest SmartCity event in the Nordics. The 2018 edition attracted around 4500 visitors, mainly from Norway and all other Nordic Countries like Finland, Sweden, and Denmark. Solution providers companies brought professionals (like me) from many other countries, but mainly from Europe and China, which held some specific activities in this event.
(specific Questionnaire can be found at Appendix XLII)
Wanna try? You can also answer same questions at this form in the footnote.[646]
To match event's main suggestion, we used same main theme "*Smart with a Heart*", and we asked about City Performance / Services by asking about 'Smart', while we asked about Magnetism by asking attendees for answering 'by Heart'.
Survey ran live for just 2 days, as I had the opportunity to explain the concept in a short speech in the second day for the event, and it ended the day after.

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[645] NordicEdge. Stavanger. https://www.nordicedgeexpo.org/ retrieved by Oct2018

[646] "Attractive Cities Survey." *NordicEdge* Sep 2018. https://forms.office.com/Pages/DesignPage.aspx#FormId=v4j5cvGGr0GRqy180BHbR4L8YT1UMAdFgiXBzCdEJSBUMDVFMlhOVzdWUDRIVklENTZNOTlPNjRGVS4u retrieved by Oct2018

I got 264 answers, which for a population (attendees) of N=4500 means a valid and informative test, with Confidence=90% and Error=5%[647]

We can confidently say that the sample target is a good representation of talented IT related, Cities related, Nordic professionals in 2018. Let's analyze the results. (See results Data Summary at Appendix XLIII)

Our target had an average age of 41 years, most of them with children (62%) and no elder people at their charge (only 20%). Balanced gender (48%-52%) which is very good in a sector (Information technologies) where professionals are mainly STEM (Sciences, Technology, Engineering, Math's), so mainly men.

Magnetism: All three components are very similarly weighted (Identity 33%, Dynamism 36% and Strategy 31%) which means that these three areas are very well indicative about the topic. Nordic cities are not very string on branding and projected identity, so not a surprise that Dynamism were the most appreciated topic, then Identity, then Strategy. Strategy is important, but it is perceived as something unknown (future main problem is that it's unknown…) so we consider this as something we can fix or easily improve while past is the consequence of our acts and experiences, and it takes longer to change (we stated that a city needs at least 50 years to define an Identity). Younger people prefer Strategy than Identity. It's a good indicator that Identity is more and more appreciated as people get older, improving from least item for younger to best for people over 50. Men and women agree on Magnetism, which means same preferences, aesthetics, same education and customs.

Overall Ranking for City Services is:

CITY SERVICES - SCALE OF	RK
ENV. SUSTAINABILITY	1
SOCSERVICES / HEALTH	2
URBAN MOBILITY / TRANSPORT	3
SAFETY (PHYSICAL/VIRTUAL)	4
EDUCATION	5
EMPLOYABILITY	6
URBAN PLANNING	7
CONNECTED CITY	8
GOVERNANCE	9
CULTURAL SVS / TOURISM	10

We can identify 3 zones (top positions 1,2,3,4), then mid (5,6), then low (7,8,9,10). We can appreciate changes along the different studied age ranges but within these groups, which are very well identified.

[647] Data from SurveyMonkey Calculator. https://www.surveymonkey.com/mp/margin-of-error-calculator/ retrieved by Oct2018

First good impression is that all 10 studied areas are relevant, as all take from 8% to 12% score, so none is well over the rest, and differences are not peaking. Not a surprise to see Env. Sustainability as top score in the Nordics, which are leading this topic, and specially in this event, with a clear motivation to invest and highlight this concept. Then Health/SocialSVS, Urban Mobility and Safety take top positions along the range of ages. Environmental is more relevant for youngers and Urban Mobility for those over 50 meaning that Env Sustainability is a relatively new concept, so youngers have this more fresh from education while elder know the problems associated to a poor mobility or the advantages of a good one. Younger were born with decent mobility so they can't appreciate the benefit. By gender, almost same rankings, with only differences in the low range. Those with children add better consideration to Education, those without specially consider mobility (more freedom to move?), or experiencing new places, or quickly and efficiently move around the city?. People with elder at their charge place in top the Health/Social Svs as expected, those without placed first employability (they think more about themselves, as they don't have to take care of others. Finally, sad to see that least appreciated City Services are Culture/Tourism. Although not far from others, this is clearly a main pending subject for more of our cities: serve as a permanent citizens University while constantly offer, incentivize and promoting cultural services. A more skilled society is always a more prosperous, and the opposite.

City	Country	MAGNETISM	PROFITABILITY	ATTRACTIVENESS	ATTRACTIVENESS INDEX
Melbourne	Australia	9,31	9,18	85,40	**1**
Adelaide	Australia	8,38	10,00	83,84	**2**
Stockholm	Sweden	9,69	8,46	81,98	**3**
Zurich	Switzerland	8,26	9,60	79,32	**4**
Berlin	Germany	9,00	8,70	78,28	**5**
Sydney	Australia	9,46	8,10	76,66	**6**
Bern	Switzerland	7,39	9,99	73,89	**7**
Montreal	Canada	8,22	8,98	73,77	**8**
Oslo	Norway	8,99	8,00	72,00	**9**
Gothenburg	Sweden	8,07	8,75	70,68	**10**

Figure 77. Top10 Attractive Cities for NordicEdge attendees. Source: Author

If we assign these scores (3 Magnetism and 10 City Services) to our model, we find that 4 main Nordic Cities are in the top10 positions, (not a surprise as well), only

surpassed by some Australian and Swiss cities because of their excellent Profitability, mainly Net Purchase power, with high wages, moderated taxes and cost of life.

Survey at SmartCityExpo WW Congress Event

We ran our second, but largest and most significant exploration at largest SmartCity event in the world, the SmartCityExpo WW Congress[648], that Barcelona is holding every November. At the 2018 edition, we had the chance to include our survey in the port-event feedback ask for the more than 21.000 attendees.

Attendees come mainly from Western Europe (around half of them, mainly from Spain) and the other half from the rest of the world (mainly US and Asia) to accommodate people from 146 countries. Attendees profile are again SmartCity concept familiar people, from demand to offer, good technical skills, but also decision makers from cities, well balanced sales people from exhibitors and government officials from the many participant cities across the globe.

(specific Questionnaire can be found at Appendix XLIV)

Wanna try? You can also answer same questions at this form in the footnote:[649]

To match event's main suggestion, we used same main theme "*Cities to Live IN*", and we asked attendees to think about City Performance / Services and Cities Magnetism from Attractive cities they could consider to 'Live IN'.

Survey ran live for one week after the event, since attendees received a communication asking for feedback and complete the survey. I had the opportunity to explain the concept in a short speech in the second day for the event to a limited audience (around 200), so the whole concept was absolutely new for most who answered.

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[648] SmartCity Expo & WW Congress. www.smartcityexpo.com retrieved by Dec2018

[649] "Attractive Cities Survey." *SmartCityExpo* Nov2018. https://forms.office.com/Pages/DesignPage.aspx#FormId=v4j5cvGGr0GRqy180BHbR4L8YT1UMAdFgiXBzCdEJSBURTNWRjhDS05BMzNHMkdPUEw0VFFEUVpNTi4u retrieved by Dec2018.

We got 1550 answers, which for a population (total attendees) of N=21334 means a solid, valid and very informative test, with Confidence=95% and Error=2%[650]
We can confidently confirm that the sample target is a good representation of the whole SmartCity Industry and world cities officials, let's say the urban technology experts, talented IT related, Cities related, mainly European professionals in 2018.
Let's analyze the results. (See results Data Summary at Appendix XLV)
Results are not very different than those from NordicEdge, although the confidence provided by the large number of answers is providing more trust on the model.
Our target had an average age of 42 years, half of them with children (51%) and no elder people at their charge (only 25%). Unbalanced gender sample with 67% male which is consistent with a very male-driven technology market.
Magnetism: Again, Dynamism rules, then Identity them Strategy. Identity and Dynamism are significantly larger than Strategy, confirming the trend that Future and potential is less valued than present facts or gained experience and Identity. This result can easily be associated to South Europe Latin lifestyle, more interested on present, loving past and not very forward looking, but differences are not than large to consider Strategy as irrelevant (survey got a worldwide participation) Identity is more and more appreciated as people get older, improving to become the best for people over 50. Again, Men and women agree on Magnetism, which means same preferences, aesthetics, same education and customs.

[650] Data from SurveyMonkey Calculator. https://www.surveymonkey.com/mp/margin-of-error-calculator/ retrieved by Oct2018

Overall Ranking for City Services is:

CITY SERVICES - SCALE OF V	RK	1-10
URBAN MOBILITY / TRANSPORTA	1	10,00
SOCSERVICES / HEALTH	2	9,04
ENV. SUSTAINABILITY	3	8,95
SAFETY (PHYSICAL/VIRTUAL)	4	8,37
EDUCATION	5	7,67
EMPLOYABILITY	6	7,11
URBAN PLANNING	7	4,78
GOVERNANCE	8	2,85
CONNECTED CITY	9	1,83
CULTURAL SVS / TOURISM	10	1,00

Figure 78. City Performance/Services Ranking for SmartCityExpo Attendees. Source: Author

Again, We can very clearly identify three zones (top positions 1,2,3,4), scoring more than 8,30, then mid (5,6) (Education and Employability), then low (7,8,9,10). We can appreciate changes along the different studied age ranges but always within these groups, which are very well identified.

All 10 studied areas are relevant, as all get a minimum of 3,5 out of 5 as average, so we can say that none is irrelevant and none is leading by far distance with the rest. Main top area is Urban Mobility, as everybody recognizes that this city service is crucial to make city alive, as we have named it, 'city blood'. Not strange if we define a city as a point in space/time where people meet / encounter each other, then the service that is making that possible, moving all people to same place, should be the most appreciated. Then Health/SocSVS, Environmental, Safety are following, grouped at short distance. Safety is top1 for those over 60. Then the Education and Employability group. I was surprised by finding these in positions 5 and 6 and not higher. It must be that our attendees are so talented that they face no challenges on these areas. Anyway, Education jumps to position 3 for youngers, which seems reasonable. Employability falls to bottom position 10 for those aged more than 60, obvious, as they are about to get retired! Urban Planning, Governance, Connected City, and CulturalSVS are taking lowest positions across all segments. I was expecting more from Connected City; maybe audience didn't understand the

concept and disruptive implications that 5G will bring, or maybe they consider this as an static obvious service like water or energy, and see no difference on it among cities. Governance and Urban Planning are not perceived as star city services, but business as usual, regular tasks that must be provided for sure, but not brilliant vocal services citizens perceive as new, innovative or disruptive. They have been there since first city foundation. By gender, almost same rankings, with few differences on top ones, as women position Health/SocSVS as top1 and men promote EnvSustainability to top2. Those with children add better consideration to EnvSustainability (thinking about the planet we leave for them?), those without are exactly following on the average. People with elder at their charge place Health/Social Svs on top as expected, those without improve the score to EnvSustainability. Finally, again sad to see that least appreciated City Service is Culture/Tourism as mentioned before.

If we assign these scores (3 Magnetism and 10 City Services) to our model, then we find top positions (see figure 79) for Australian, Swiss cities, plus some Nordics, Berlin, Austria, Amsterdam, Phoenix (AZ). Extraordinary Profitability with good wages and reasonable taxes push them to those positions. Best at Magnetism like Stockholm, Vienna, Amsterdam compete from the other angle.

We can perceive a balanced summary of results with no surprises on which cities take leadership (from the SmartCityExpo leaders' opinion). Given the large amount of answers or small error, we can conclude that the model works, it is easy to understand and correctly reflects the complex reality (Attractive City) it describes. Anyway, we'll study this in detail in next chapter.

City	Country	MAGNETISM	PROFITABILITY	ATTRACTIVENES	ATTRACTIVENESS INDE
Melbourne	Australia	9,23	9,01	83,16	1
Adelaide	Australia	8,34	9,96	83,09	2
Stockholm	Sweden	9,62	8,39	80,74	3
Zurich	Switzerland	8,32	9,46	78,71	4
Berlin	Germany	8,95	8,54	76,41	5
Bern	Switzerland	7,47	10,00	74,75	6
Sydney	Australia	9,41	7,88	74,19	7
Montreal	Canada	8,26	8,75	72,28	8
Oslo	Norway	9,02	7,97	71,86	9
Gothenburg	Sweden	8,04	8,73	70,23	10
Basel	Switzerland	7,34	9,30	68,32	11
Vienna	Austria	9,34	7,26	67,87	12
Canberra	Australia	7,20	9,25	66,57	13
Phoenix	United States	7,15	9,11	65,08	14
Amsterdam	Netherlands	9,61	6,67	64,07	15

Figure 79. Top15 Attractive Cities for SmartCityExpo attendees. Source: Author

6.2 Main overall Analysis.

Once again, if we take the inputs from SmartCityExpo 2018 attendees, then we can observe the cities score and balanced Magnetism vs Profitability contributions. Later in next chapters, we will analyze Magnetism components and Profitability components.

(See full list of 140 Cities Attractiveness Score with SmartCityExpo attendees' input at Appendix XLV)

Looking at the worldwide selected top140 cities list, we can group them in 4 areas:

Advanced: From position 1 to 70 we find all the advanced western civilization. Australian cities lead with their 4 cities studied in the top13 positions with Melbourne (1), then trying to learn and approach them New Zealand starts from Wellington (25). Then, we find all Western Europe, starting from the Swedish Stockholm (3) and the rest of the Nordic along with the Swiss Zurich (4). Then Vienna (12) leading the German and Dutch world Amsterdam (15), then UK led by London (21). Just after it, South follows, with France Paris (47), Spain Barcelona (40), Madrid (50), Dublin (51), Belgium Antwerp (61) and we ended up in Italy with Milan in 69 and Rome in 70. In parallel to UK North America begins, with Canada Montreal (8) and Toronto (20) ahead of US, led by Phoenix (14) and NYC (27). From Asia, only the main tigers compete to enter this leading squad, such as Seoul (34), Japan Tokyo (49) rest of Japan around 65, Singapore (60) and Hong Kong (73).

Competition in this leading group is fierce. Climbing a few positions means strong investments, solid, well-ordered and executed plans and dedicated teams with a strong budget and international influence. Southern European cities may fall into the next group if they don't accelerate smart investments soon. Their magnetism and quality of life are very significant, but they won't be in that group much longer without a strong innovation component as well. I especially see Italy on this border.

Someone might question why we dedicate 50% of the studied cities to this advanced segment. The answer is within the question. Precisely because it is the most interesting segment for talented citizens exploring the world of cities, we must add more granularity and detail to it, and that is why we have included half of the cities. Also because if we remember (chapter 3) the criteria for selecting cities, we find

this same photo from the original source of potential cities to study. We have included the five continents and all cultures, but the indicators select and value the best into this group.

Challengers: In this area we group cities from positions 70 to 90 which progress rapidly, competing to join the leading group, following the example of the Asian tigers. We are talking about the Middle East, led by Israel Tel-Aviv (71), Eastern Europe Prague (76), Emirates Dubai (82) and the Gulf. Any of these cities can join the main group as soon as they gain prestige and consolidate their interesting advances made in recent years.

Emerging: Positions 91-122. We find in this group Buenos Aires (91) leading Latin America, then Mexico (100), Montevideo (102), Brazil Rio de Janeiro (103 then till 112) to Colombia Bogotá (117) and Medellín (121). All China led by Shanghai (95) to Shenzhen (116). Turkey Istanbul (99). Also Russia Moscow (96). It is like a BRIC group but without India, which needs strong urban transformation (they already have an ambitious 100 SmartCities plan). We could replace that 'I' with Indonesia Kuala Lumpur (107) although with obvious different dimensions. The cities in this group have plans, recognize this global competition, and are making rapid progresses.

Starters: Positions 123-140. South Africa CapeTown (123), India starting from Delhi (124), Maghreb starting from Tunis (135), Southeast Asia with Bangkok (122), Manila (131), Vietnam Hanoi (134), and we finished with Cairo (139). These cities begin to plan their position in the competition for talent world although they continue to be burdened by solving basic social and economic issues.

AREA	n	MAGNETISM	PROFITABILITY	ATTRACTIVENESS
Africa	5	122	133	129
Asia-Pacific	17	69	64	66
CE Europe	17	90	96	92
China Ext	9	102	101	103
India	3	131	125	128
LatinAmerica	17	110	112	112
Middle East	10	108	84	98
NorthAmerica	18	43	34	38
WesternEurope	44	34	41	38
	140			

Figure 80. Average positions. Attractive Cities by Geographic Area. Source:Author

If we look at the table in figure 80, we can study the average positions of the studied cities by geographic area. It is curious to see the face to face competition between NorthAmerica and Western Europe, with the same average position (38). Western Europe enjoys more Magnetism, history, culture, human values, but it pays a high price in taxes to maintain that well-being society and its Profitability worsens.

NorthAmerica does the opposite: it makes up for a lack of history, cultural and human flavor, although they strongly compete and win on all economic and competitive issues, with high profitability, high wages, moderate taxes and good cost of living.

In APAC (Asia-Pacific) we find the best and the worst, with Australia leading the concept of City Attractiveness (its only problem is far distances), with New Zealand, South Korea, Japan and Singapore pushing very hard and with very good results in citizen services, but with Southeast Asia in very low positions. Some initiatives are seen in Kuala Lumpur, Bangkok and Jakarta, but Vietnam is in the last positions in almost all indicators.

In Eastern Europe, we observe central positions, from Prague (76) to Kiev (118). It is a segment with a good Identity, following in the wake of Western Europe, with some good initiatives in Innovation such as Talinn and Moscow, but with great problems in creativity, competitiveness and mainly social sustainability, so its Magnetism is not what we expected. At Profitability, low wages mean that while taxes are low, the bottom line is not attractive as many desired products come from German cost price standards.

In the Middle East, we find promising cities in middle positions such as the Israelis and the Emirates / Gulf. Also, Kuwait with a zero-tax wage system that strives to be attractive. But it is not just an economic issue and they can improve a lot if they develop innovation, citizen services and private competitiveness (not only with public money). Turkey has a good identity and an acceptable cost of living, but it fails in everything else. Negative surprise in Saudi Arabia, with the same approach as Kuwait in economic attractiveness but very poor in the other indicators. Closing the group with Cairo, with everything to improve and fix. In general, the Arab world must progress a lot in social sustainability, especially when the oil-based economic impulse is being strongly counteracted by environmental sustainability issues, and prices will continuously drop.

We take extended China including Hong Kong and Taiwan (Taipei). These two cities show the attractive city road to the rest of Chinese cities. Strengthening identity and strategy and the ability to offer advanced services put these two cities in intermediate positions, with the capacity to attract foreign talent. This is not the case with Chinese cities despite strong state directed investments, but still hitting insurmountable barriers for foreign talent. Internal talent sees good opportunities and development, but we live in a global world and when Chinese companies are going to compete abroad they must take into account their ability to recruit and attract talent. They are paying a bonus for the lack of appeal that social, ethical and reputational issues weigh down on China's global position.

Latin America has huge potential in the emerging group, due to its human capital and resources. We started with Santiago (80) with parameters close to Europe but with a problem of distances and seismic risk. Then Argentina, Buenos Aires (91) with more plans than execution, Montevideo (102) with new local talent impulse and development, Mexico with problems of services, especially social, although with enormous academic potential, Brazil, where the main problems are strategy and the social balance, to Colombia that is falling back into inaction after important advances and we reach the end of this list finding populisms where technology does not exist like Bolivia and Paraguay.

Indian cities range from Delhi (124), Mumbai (129) to Bangalore (130) where a massive central government managed SmartCity program is activated, but far from competing in the global race for talent due to poor social conditions.

Same situation in the studied areas from Africa, North - Maghreb with Tunis (135) and Casablanca (136) with some directed projects from central governments and South Africa (123 to 127).

To summarize, no surprises where economic and social problems are main priority, a very active middle zone trying to achieve a relevant role in the global context and a wide zone of leading cities in NorthAmerica and Western Europe that are investing heavily to stand out over the others, in a tremendous fight for talent that also further expands the West appeal.

Graphically, using the weights provided by the SmartCity Expo survey, we obtain the following honors board per indicator. See next table.

Honor Ranking (TOP 1)											
ATTRACTIVENESS		Melbourne									
MAGNETISM	London						PROFITABILITY		Bern		
	IDENTITY	London	DYNAMISM	Toronto	STRATEGY	Copenhagen		PERFORMANCE	Amsterdam	Net Purchase Power	Kuwait City
	HISTORY	Rome	SOCIAL ACTION	New York City	HUMAN CAPITAL	London		GOVERNANCE	Copenhagen	MONTH WAGES AVG	Zurich
	GOVERNANCE	Oslo	EXPAT EXPERIENCE	Madrid	SMART CITY	Copenhagen		EDUCATION	Zurich	MONEY AFTER DIR TAXES	Zurich
	REPUTATION	Tokyo	ETHICS	Amsterdam	INNOVATION	New York City		EMPLOYABILITY	San Francisco	REAL MONEY AFTER INDIRECT TAXES	Zurich
	SPACE / DENSITY	Hong Kong	EQUALITY	Helsinki				CONNECTED CITY	Singapore	COST OF LIFE	Córdoba
	CLIMATE	Jerusalem						HLC / SOC SVS	Paris		
	GEORISK	Doha						SUSTAINABILITY	Stockholm		
	GEOECONOMICS	Prague						CULTURE-TOURISM	London		
	GASTRONOMY	Bern						URBAN MOBILITY	Amsterdam		
	EX_IDENTITY	London						URBAN PLANNING	Toronto		
								SAFETY	Tokyo		

Figure 81. Attractive Cities Rankings Honors board by Indicator using SmartCityExpo Survey inputs. Source:Author

6.3 City Magnetism Findings

First of all, and as preconditions, we shouldn't forget that Landscape, Language, Religion are positive/negative Magnets. We are talking about personal preferences, so landscape has a strong meaning most times, seashore, mountains proximity means happiness or the opposite for many. Man is the best animal on Earth able to adapt to all ecosystems, ok, but we personally prefer some from other. There are also some healthcare conditions impacted by this. Language is also very fundamental, as it impacts our chance to socialize / communicate with others. So, use of English as alternative global language is a must for all top cities candidates. Spanish and Chinese are also globally spoken, but not so clearly accepted. And finally, Religion, our personal choice on connecting with the divine. There are more or less tolerant or intrusive religions, depending on the geographic areas and civilizations. Also, very relevant the Ethics and the way they treat women, immigrants, non-believers, etc, so better to study those candidate cities religion first, and avoid being surprised later.

The cities with the highest Magnetism are London, Stockholm, Amsterdam, Paris, NYC, Sydney, Vienna, Barcelona, Melbourne, ... We find no surprises here. There is a combination of strong identity, branding, reputation, in geographical conditions that push the city development; together with current conditions of vibrant, creative, suggestive economy, in a friendly social environment, with equity and justice and with respect and equality; and with a strategy, a strong investment on innovation and in human capital generation. All these components build the city of our dreams ideal image. It is the perfect city to live in, with the perfect environmental, cultural, social and innovation conditions for creativity development and progress. We just need the numbers to be adequate too, in terms of received services and cost of living. Thus, we see cities with an important gap between attractiveness and magnetism, cities with enormous magnetism that are being wasted by their leaders, since the conditions of services and cost of living do not help at all. They are cities with a lot of flavor, but with little future if they do not react and ride the wave of innovation and improve the economy. The city with the largest gap in this regard is Lisbon, along with the Italian ones. It is unfortunate to observe how the historical effort of its inhabitants is not leveraged now to make a top attractive city. We can

say that the reality of low wages, or high taxes, kills Magnetism and turns it into nostalgia, and we neither live nor prosper from that.

Of the two surveys, Talented Citizens prefers City Dynamism (Vibrant, Competitive, Friendly, Equity, Equality) because we live from the present. The identity (past) is also very important (short distance) since we need past references to plan the future, so the (future) strategy is considered the least relevant (the future can be arranged ...). Also because many citizens live daily, without preparing for the future or giving it less importance, thinking that they will have time for it, when what is really scarce in our ephemeral life is that, time. We have therefore found, in the Magnetism study, the most brilliant and prosperous cities in the world. We could have concluded the City Attractiveness study here, but the Profitability makes us put our feet on the ground and also attend to the reality of our citizen contract terms and conditions: the city benefits/services and its economic terms.

EUR cities have a great advantage due to their strong identity. They enjoy from many years of advantage in branding, but the main cities of USA / CAN / AUS are also in the first positions due to dynamism and strategy.

- Identity (Past): Balance the use of the city's assets in history, climate, reputation, with permanently building branding. It is a constant construction process that is eroded by competition with other cities.

The top 30 are fundamentally traditional European cities led by London (with the exceptions of Seoul (8), NYC (12), Tokyo (19)). Apart from the historical component, which is also present from other civilizations such as China, the rest of Asia, etc., European cities have built a strong identity as the cradle of Western civilization and on the constant contribution to branding bricks. The enormous concentration of people in a small space has favored human density and cultural development for centuries.

As for History, obviously Rome and Athens are in the lead, with the rest of Europe behind, Seoul and the Chinese cities. This component is a handicap for US and AUS, although they compensate it with other topics. History is always the benchmark, although too much could turn into a drag on the spirit of entrepreneurship, exploring the unknown, which are so strong in these new world countries. On the other hand, sense of belonging or citizenship is stronger in cities with longer history culture. Feeling of ‘Proud of living here’ is deeper

on old cities than new ‘planned’ cities, with almost not a clear identity created yet. Community sense is also stronger in smaller cities, because long distances avoid contact, sharing, density and community sense.. So, small and historical cities enjoy a strong sense of Identity

The Governance marks the acceptable basics on democracy and security to develop our public and political facet. Lead Oslo, CAN, Nordics, AUS, EUR. CHN, RUS and Middle East have severe problems in this regard.

Reputation takes decades to be built, few days to be destroyed. It leads Tokyo, Nordics, AUS, CAN, and CHN, Colombia and the Arab countries have severe problems in this fundamental concept. Recent independentism riots have partially destroyed the long-time cultivated Barcelona’s reputation.

Green spaces / Density. We are looking for the perfect city in that, with large green areas for recreation (and incidentally, millions of trees to contribute to Carbon neutral objectives) combined with very high human density, for the development of social creativity and competitiveness. With this definition, Hong Kong leads, with 40% of green space but with a density of more than 26k inh / km^2, then Singapore, but also Oslo, CHN with its new large, green and highly populated cities. Here, US has problems with the excessive space dedicated to cars and UAE, with a lot of sand and few trees.

Climate. We look for the city with the perfect climate. Although global warming will make an important effect, turning arid very formerly rich and sensitive areas, destroying coastal cities, forcing now desert countries to live underground, protected from the sun, and improving conditions in places today extremely cold such as the Nordic countries, Canada, etc., ok, we are going to study the known climate. We are looking for a city in the middle, mild, temperate, neither humid nor dry, without significant variations, without downpours or droughts and with many hours of real sun so that citizens can get out of their houses and do big things together: develop the city. The leading city that is in average temperature, rain, without great peaks and with a lot of sun is Jerusalem. Then Johannesburg, Montevideo, San Francisco, Lisbon, Madrid, Nice, WD.C. follow. On the contrary, the cities with the most infernal climate of those studied are the Indies and those of Southeast Asia, with Mumbai (too hot, too monsoon, little sun).

Geoposition. A good Geoposition is a huge advantage. As for risk due to geographical position, the most stable and least risky city is Doha, then Middle East, Nordics, CH (Switzerland) and Europe in general. The Netherlands (living below sea level), Chile and Manila suffer from this condition due to high seismic and tsunamis risk. The geographical position also helps economic relations and foreign trade, as well as the ability to same day business travel (studied less than 2.5 hours flights). Prague (CZR), EUR, CHN lead with surprise. US, AUS, Latam, Middle East do suffer the distances problem.

Gastronomy. Although OXFAM's analysis on quality and quantity of healthy food includes that it must be affordable, the study in general takes little account of the price of food. EUR, CH lead then the rest of the West. My favorite city in this sense, Bilbao (Spain) is in a 14th place, although it has an incredible number of excellent restaurants. Terrible food is available in India and Southeast Asia.

Branding. It is the area that we cannot neglect and where the city identity is expressed abroad. The abundance of international events, sports, activities of global importance, etc., position the most brilliant cities as leaders: LON, NYC, PAR, BCN, LA, Melbourne, ... It is an individual competition. This is where cities play alone, without their countries in the back, in competition with all others. The same countries second cities greatly suffer from the shadow of these special cities, which they compete with for this international relevance. Thus, many European cities fight against their capitals. As an example, Linz is a long way from Vienna in this concept.

- Dynamism (Present): We try to measure the city present and dynamic attractiveness. It is a balance between a competitive, creative and vibrant society, combined with a friendly treatment for immigrants and excellent social sustainability (equity, happiness, equality, tolerance). It is not easy, and it is the most observed topic because it reflects the conditions with which talent will be faced as soon as it arrives. Toronto leads and the rest of CAN, then NZ, AUS, Western Europe. US is very competitive, but suffers from social unbalancing. In the worst positions we find China (good competitiveness, with very poor Ethics and Equality), India (treats very well the expatriate, but has poor social sustainability).

Competitiveness. US leads, followed by the most prosperous cities such as Singapore, LON, AMS, PAR, Copenhagen, Sydney. Thus, in Creativity, AUS, US lead, then NZ, CAN, Nordics. In the specific Competitiveness index, top positions are occupied by Singapore, US, Hong Kong, NED, CH. The Cities in Motion and GTCI (Global Talent Competitiveness) indexes are closely aligned and place LON, NYC, AMS, PAR in front. We see this section closely related to economic prosperity.

Expatriate experience. Here, we are going to try to understand what the landing will be like, the newcomer social immersion, or in another way, how friendly and welcoming the city is from a social point of view. It is a very important point because it connects with the very essence of the city, in promoting the man social aspect. Here we see leading Madrid, the rest of Spain, Portugal, NZ, CAN, Singapore, MEX, Colombia, France, AUS, India. At the other extreme, tough, difficult, almost hostile cities to foreigners would be the Arabians, CHN, Belgium, Eastern Europe, UK, CH. This is a very relevant point to consider for explorers, and thus, we have included it here.

Ethics. As for social sustainability, or social Ethics, NED, AUS, lead then CAN, NZ. We start with happiness. Although the Happiness index is ,in my opinion, mainly a well-being and comfort index and assigns a large weight to the city economic success and leaves the rest to a matter of perceptions and opinions, forgetting relevant questions like number of suicides, let's take it as best approach. It scores Helsinki, NZ, CH, Nordics, NED, CAN as the happiest cities. Someone should wonder why many citizens from these cities escape to the South to seek sun to avoid falling into depression once again, but I will not question any report until another more accurate one appears.

Giving. The concept of Giving is interesting, very strong in the US, NZ, AUS, IRE, CAN, UK, that is, very rooted in Commonwealth and something that other countries should learn from school: donate part of the achieved success.

Civic Engagement. AUS, NED, lead, then KOR, BEL, NZ, UK, US, being an excellent sign of freedom, social participation and mature and advanced society.

Work / life balance is mainly an European concept, with NED, ITA, Western Europe, being one of the most important European social achievements in the

last century. The absence of labor rights for the sake of competitiveness destroys the family and mentally exhausts the worker creativity.

And finally, Equality. Here Helsinki, Nordics, CAN, AUS, NED, NZ, CH rule. Very important, as we already anticipated, the GINI index, which measures inequality and unbalancing on the wealth distribution. The leadership of NED, Nordics and Europe in general is surprising, making these cities places with good social balance and sustainability. Unbalanced societies such as South Africa (already well known and divided), UAE, BRA, Hong Kong, Colombia score very poorly. US obtain bad results, as we have already studied the tremendous imbalance in the wealth distribution.

Gender equality. Eastern Europe (Baltic countries) leads, then Nordics, US. The advanced position that the Nordic countries have achieved in this regard is very relevant and definitely leads the world.

Tolerance. It is key to open the city gates with tolerance so that talent can enter. Dublin leads as a paradigm of western technological city openness to talent, then POR, FIN, CAN, Nordics, AUS. It is surprising to see the many reluctance and barriers that are still placed on talent, even in cities with low human capital, and therefore, with a great need to accommodate it.

Poverty. There are different criteria depending on the country and cluster, and it is surprising to see advanced countries with impossible numbers and countries with serious problems with very good. In any case, this is the official report and it serves us from the perspective of comparison within the 4 groups that we have found in the results.

- Strategy (Future): As we studied, this is a very granular issue, as it depends a lot on the city managers leadership and their ability to attract investment. We are not talking about doing a correct and efficient governance, it is about looking to the future and being able to think and dream about what city we want to achieve and where we want to go. We find in the first positions the leading cities in Innovation and SmartCity plans such as Copenhagen, Seoul, San Francisco, Stockholm, NYC.

In Human Capital we combine young cities like those Emerging, with the creation of human capital from that large number of young people. Jakarta, US, lead, then UK, Moscow, LON, Western Europe. It is good to see that there is a

universal cast of raw talent giving everyone a chance to use it, nurture it to prosper or simply lose it.

In the SmartCity Plan we see the real implementation of this strategy and where the city points its priorities. Western Europe, AUS lead, then some star cities such as Tel-Aviv, Taipei, Doha, San Francisco, Seoul, Hong Kong. It is extremely important to see how many cities use this SmartCity plan to compensate for lack of City Identity or social issues in City Dynamism. Some cities, like the Swiss, are at the beginning of their SmartCities plans, basically because they were attractive enough per se, without having to pay attention to this. Fortunately, they are realizing the concept and reacting.

Innovation: We are going to look for the money to invest on innovation and we find this fresh money betting on the city future in US, KOR, JAP, GER, ISR, Western Europe.

6.4 City Profitability Findings

- Best Combined Profitability (Services x NetPurchasePower) at CH, led by Bern, then AUS, Nordics, Germany, US. It is about combining excellent citizen services with high wages, moderate taxes and a cost of living that does not ruin final net purchase power.
- Best in Services are at Western Europe, led by AMS, STO, BER, LON, OSL, then NYC, Tokyo, Gothenburg, Vienna, Frankfurt, Copenhagen, Zurich. We can say that with certain exceptions, the best city public services among all its 10 groups are enjoyed in Western Europe.

By Service, in Digital Government, Copenhagen leads, then Nordics, US, UK, with surprisingly low scores in BEL, AT, CH, because of low use of technologies to online connect to citizens. Good job in India, Brazil, Latam.

In Education or Longlife Training, we have no surprises with CH, US, SGP, NED, Nordics, UK, BEL, CAN leading. SPA, and mainly ITA could do better.

In Employability, US leads, then NED, Dublin, Germany, CH. Good job by Malaysia, Philippines.

Best Connectivity is enjoyed in SGP, then Vienna, Budapest, Seoul, NZ, and some specific cities with good operators' investment like Antwerp, Montreal, Sydney, Eindhoven, Madrid. Good job at Gulf, poor in ITA. Asian best cities have an advantage on Connectivity and as soon as 5G is available, this leadership will widen.

Health/Social Services, Top is France, SWE, AT, NOR, ITA, DK, BEL, GER, FIN, SPA, so Western Europe excels in Social Services and quality of Healthcare. Not so good in NED, CH, Eastern Europe because is leans on too much on private hands?

Stockholm leads Environmental Sustainability, with surprisingly Montevideo right after, NZ, Nordics, AT, with Paraguay, Panama, La Paz doing good job. Poor job from Kiev, and US in general although here cities, grouped on C40 and other associations are facing Federal Government inaction.

London tops at Culture/Tourism, with Hong-Kong, Paris, Tokyo, Seoul, Bangkok, Los Angeles, Rome, Amsterdam. Number of visitors give extra score to Asian Cities competing with western cultural paramount.

Urban Mobility. Amsterdam, Germany, Vienna, Spain, NED in the best positions paying attention to public transportation and the traffic problem. Japan, London, US, CAN, AUS are suffering with this, and this score is pushing them down the overall services performance.

Urban Planning sets at top Toronto, CAN, US, surprisingly Taiwan and Hong-Kong, AUS, London, Amsterdam, Rotterdam are first European at pos9, 11, 16. Good surprise from Latam. Worsts at India, SouthAfrica.

Safety is ruled by Tokyo, SGP, Japan, South Korea, NED, Nordics, AUS, CAN. Poor score from most US, closing with Latam and SouthAfrica. The right to own guns is definitely a showstopper in US cities attractiveness.

- Best NetPurchasePower (NPP) is enjoyed at Kuwait, AUS, CH, then US cities covering top15 positions. US has a predominant position is this context because of good wages, moderated or low taxes. Cost of live (especially NYC, and San Francisco) is high, but not enough to ruin the deal. Kuwait takes that position after applying to a moderated wage a very low direct tax (5%) and zero indirect (VAT)
- Best gross Wages found at CH, LUX, Nordics, Germany, US, AUS,…
- Best final Net Income is enjoyed at CH, Kuwait, US, AUS, Nordics. CH has moderated taxes for single no child (that's the studied case). Even at this low level step at the progressive taxes ladder, worst taxes are suffered in Western Europe with many countries paying more than 30% direct and more than 20% indirect like BEL, GER, DK, AT, ITA, NED, FR.
- Most Expensive Cost of Live are also found at CH, Nordics, some USA, JPN Cities. With NYC as Cost of life = 1 as reference (including housing), we can only find a more expensive place, San Francisco, with 1,02. Other expensive areas are CH with Zurich at 0.96. This Cost of life is helping some cities to improve the total Net Purchase power because of their low one, like Santiago, with a 0,29 that is rising the city to position 59 in Net final income. So cheap cities are perfect, but wages are most important component of the economic equation. You can ruin a good wage with high taxes (like in Western Europe), improve a moderated one with low taxes (Santiago), but if your wage is very small, then there is no way to add more money on top of it.

There is significant opportunity for midsize/non Capital cities because they can offer similar high quality services as main capitals, but better cost of life (not so expensive) will finally rise the net purchase power. This is the case of Phoenix (US) making pos4 in Net Purchase Power, or Gothenburg scoring better than Stockholm, or Cologne better than Berlin, Rotterdam vs Amsterdam and so. To ensure that we have chosen a good wine we can pay a lot of money. We can do the same, paying a high price and cost of living then choosing an expensive city, but also with high benefits / services. This is easy but expensive. It will be difficult to find a very good wine for an affordable price. Here we have again the same thing: it is advisable to look for second cities where you are not going to pay the extra that the capital status means, while you enjoy the same or even better quality of services.

There are cities with good quality of services that take average positions in Profitability due to their mid wages and high taxes (ITA, POR, Eastern Europe, ISR). Also, cities ruining top positions in Performance/Services because of taxes like Paris, or the opposite, good salary, low taxes cities poorly balanced by low quality city services like Arabia, Qatar or Kuwait.

Opportunity for Emerging cities (fix the basics and enroll the global game!), Like ARG, BRA, MEX.

Special guest stars: Apart from above best… Gulf, Asian Tigers (KOR, SGP, TWN, HNK) with good services, moderated-high wages, challenging the top leaders.

6.5. Attractiveness: Balancing City Magnetism with City Profitability.

The Indian Government's "Smart Cities Mission" is a massive development program for 100 smart cities and postulates that there is no single Smartcity model, neither globally nor locally in India. The concept varies from site to site depending on many factors such as the initial level of development, commitment, resources and aspirations of the inhabitants. Depending on each city economic and socio-cultural situation, digital modernization will create different cities with different social and cultural benefits.[651]

We are, therefore, impacting the fixed terms that make up the city identity with the development of better services to make them evolve, transforming the city, while improving general living conditions (social and economic).

It is a balance between transforming the essence of the city (its physical and virtual shape) while improving its benefits and services. One thing feeds back the other. The essence of the city determines how the services provided will improve, while the new services impact transforms the essence of the city.

Investing on creating an attractive city contributes to well-being, prosperity and sustainable development. The transition to an information and knowledge economy represents a revolution due to its new acceleration and speed, but also a challenge when balancing the concept of an attractive and accessible city with a social and environmental progress.[652]

Therefore, we must look for cities that inspire us, that motivate us and humanly enrich us, magnetic cities where living has a meaning, a flavor, a destiny and a mission; with cities that compensate us for our daily effort, that help us with good services and benefits, that provide us with good living conditions and where the end of month numbers are enough to pay for the our aspirations development. If we are just looking for a beautiful and suggestive city, then we may find it very difficult for us to develop our potential due to lack of benefits or financial compensation. If

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[651] "Smart Cities Mission". *India Government*. http://smartcities.gov.in/content/ retrieved by Jan2020.

[652] VAN DEN BERG, L.; VAN DE MEER, J.; OLIGAAR, A. "The attractive city: Catalyst of Sustainable Urban Development". *Erasmus University, Rotterdam. San Sebastián: Eusko Ikaskuntza*, 2006. p.489

we are just looking for a perfect city as a good deal or transaction, we can find ourselves living in a generic, horrible, boring city that psychologically destabilizes us and where displaying our human face is almost impossible. We must therefore find full sustainable development, social and human, economic and labor, and environmental and urban planning. We return to the three intertwined facets: technology, urban planning and humanism.

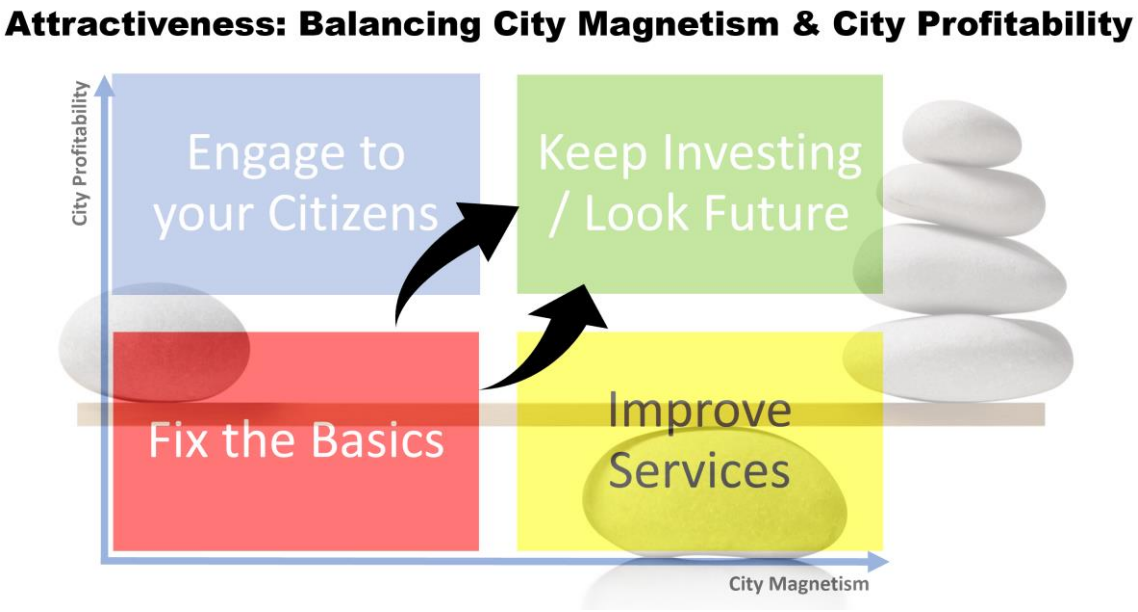

Figure 82. Balancing City Magnetism and City Profitability. Source: Author

We can study our 140 cities according to this balance. We found 4 quadrants that suggest where they are and where they should move to. The magic quadrant is the upper right (see figure 82) where we find cities with high Magnetism and Profitability. These are mainly Advanced & Challengers cities. These cities compete hard day by day to stay there, gain positions little by little, with a lot of economic effort and talent. The message for them is clear: keep investing, keep progressing, anything else is failing, it's falling, and the recovery is even more difficult because the competition is fierce and they will neither forgive nor stop investing.

In the lower left quadrant, we see cities with low magnetism and profitability. These are Emerging and mainly Starters cities, as we have named them before. (See chapter 6.2). Our message is clear: ‘fix basics’. If they are considered into this study it is because they have possibilities, potential, size and relevance and because they

can progress by improving the two facets in parallel: services and benefits and citizen engagement, social and human attractiveness.

In the upper left quadrant, we find cities with low magnetism but high profitability. They are mainly some not magnetic US, Japan cities, some very industrial cold German cities and Kuwait. They have the opportunity to improve and evolve into the magic quadrant if they invest on achieving social sustainability, improving their dynamism, cultivating their scarce identity, designing an attractive future plan and connecting with their citizens.

In the lower right quadrant, we find cities with high magnetism but little profitability. They are cities with great identity, tradition and human values, but our talents also seek compensation and professional and personal success. They must improve the provision of citizen services and the economic equation or they run the risk of going back to the basic group. Is about the Italian, Portuguese cities with high Magnetism and flavor, but poor Profitability, and Hong-Kong, with high Magnetism but declining Profitability with the China's integration process.

(See at XLVII.- AttractiveCities. City Magnetism vs City Profitability Quadrants) all studied cities positioned according to their scores and named according to their UNLOCODE three letters nomination, so you can easily position any of them).

Correlation factor R^2= 0,6053 is high and means that both magnitudes are highly related. In this way, we see that most cities obtain approximate results in both Magnetism and Profitability. This suggests that, in general, cities that take care of their image, that have achieved a strong identity and have good social and economic sustainability, also offer advanced services and a reasonable cost of living to the same extent. On the contrary, neglected cities or those with social sustainability problems, lack of strategy, identity and reputation, are offering us poor services and low net purchase power. But the city is a living entity and it evolves. We know that today's prosperity helps but does not guarantee the future and we can find many examples of past brilliant cities that are now mediocre or even very unattractive. From history, none can live in the present nor is the future built. On the other hand, City Magnetism due to social sustainability is impossible without economic sustainability. In other words, Magnetism requires constant investment and good economic terms to shine. When economy fails, social terms tremble. Good salaries and high net incomes make life easier and improve well-being, let's remember that

City Happiness indicator has GDP/Capita as first and main non surveys-based component. When we say than emerging or starter cities should fix the basics, we mainly mean that they should fix or improve their economies.

Let's study those unbalanced cities as well (ie cities with more than 3 net points (out of 10), or 30% of maximum potential score difference between Magnetism and Profitability, or with poor correlation). (See figure 83)

On one hand we find Kuwait, with good profitability, mainly due to close to zero taxes. Good deal? Yes, but Magnetism is really poor. Short history, questionable Government basics, low reputation, little space, extreme weather, far from other economies, basic gastronomy and no international image make a poor Identity score. Poor creativity and competitiveness, poor expat experience, basic Ethics and long room for improvement in Equality make Dynamism poor as well, and finally low human capital, short SmartCity plan and low innovation set low score for Strategy.

City	Country	MAGNETISM	PROFITABILITY	ATTRACTIVENESS	ATTRACTIVENESS INDEX	UNBAL
Kuwait City	Kuwait	1,84	6,41	11,81	**97**	4,57
Paris	France	9,49	5,33	50,57	**47**	4,16
Milan	Italy	8,25	4,20	34,63	**69**	4,05
London	United Kingdom	10,00	6,07	60,65	**21**	3,93
Rome	Italy	7,79	3,95	30,78	**70**	3,84
Lisbon	Portugal	7,32	3,50	25,63	**77**	3,82
Shanghai	China	5,90	2,23	13,13	**95**	3,67
Barcelona	Spain	9,30	5,79	53,83	**40**	3,52
Florence	Italy	7,36	3,87	28,49	**74**	3,50
Porto	Portugal	7,26	3,78	27,43	**75**	3,48
Moscow	Russia	5,67	2,25	12,74	**96**	3,42
New York City	United States	9,48	6,07	57,49	**27**	3,41
Hong Kong	Hong Kong	7,28	4,04	29,46	**73**	3,24
Rio de Janeiro	Brazil	5,20	2,02	10,47	**103**	3,18
San Francisco	United States	8,59	5,51	47,34	**56**	3,08
Cape Town	South Africa	4,15	1,15	4,77	**123**	3,00

Figure 83. Unbalanced cities according to the City Attractiveness model. Source: Author

On the other way, we find cities with significant gap between an acceptable or very good Magnetism, but scoring poorly on Profitability. These cities very magnetic, but very expensive as well (so, low Profitability) like Paris, Milano, London,

Barcelona, NYC, San Francisco, or Magnetic, but low wages, so final low income and profitability like Portuguese cities, Roma, Florence, Hong-Kong, and finally, cities with midpoint Magnetism but very low wages, so significant gap as well, like Shanghai, Moscow, and Cape Town.

These cities have great potential and chance to improve Attractiveness if they fix the lowest term. Those very high taxes cities should maximize services (if they can't reduce taxes). Those with low wages will have to pay an extra if they want to retain and attract talent.

6.6. City Attractiveness & City Metaphysics

We said that to the city, "*nothing human is alien to*".[653] We could also say that to city, nothing beauty is alien to, and nothing truth is alien to, or nothing good is alien to. As city is essentially human, all human being essential transcendentals are also city components. So, we studied the city personified with a physical urban body and the soul of its dwellers.

If we think about the transcendentals of being 'City', then we would start with Beauty. The Beauty of the city is associated with its shape as a result of its constant transformation with the passage of time (history), with the addition of collective experiences from its inhabitants, and also the constant destruction or erosion from most city components. Beauty is also associated to its climate, its landscape, its smell, colors, slopes and hills, rivers, its gastronomy, customs and events, in short, its Identity.

The Truth of the city is expressed in its present, in its social and economic sustainability, its creativity and competitiveness, its citizens human quality, its equity and equality. We could very well associate the Truth of the city with its Dynamism. And what about City Strategy (Future)? It is about the potential, the hope of reaching new goals, it is a projection of the expected truth, also the City Strategy could be associated with the Truth. All religions rise to the truth as a guide to face the future.[654] Then the Truth of the city guides its development, its strategy and its future.

The Good, the goal of goodness, of justice, is reflected in our citizen contract with the city, because the city does good with the services and benefits it offers us, because it protects, encourages, stimulates, connects, heals, educates us, and it allows us to move and develop. Let's remember again the main City essencial principle: it makes possible us to meet and encounter each other. And in fair consideration we pay our price for it, for living in that particular city and not in any other. We could therefore associate the Good of the city with city Profitability. We might think now, ok, but social equity and equality are part of this model Dynamism

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[653] TERENCE (Latin: Publius Terentius Afer) *Heauton Timorumenos (The Self-Tormentor)* written 163 BC, Act I, scene 1, line 25 (77). "Homo sum: humani nihil a me alienum puto."

[654] Psalm 43:3-5

and they are also basic components of the social good concept. True, but without economic sustainability there is no social justice, so Good is well mirrored by City Profitability.

Unity. Although we know that the city expands as urban mobility becomes more efficient and we see that the city is confused with its region, then it becomes a metropolitan area, it is clear that from a human point of view, the city is a unit of coexistence and social development. After the family, as a basic social element, the city is the unit of synergy and social expression par excellence, and even more in a global context with economic stability and peace, where countries cease to make much sense. The city dwellers share their destiny, they travel to the future in the same ship, with its advantages and possibilities and also with its uncertainties and problems. In our model, unity is associated with the overall concept of City Attractiveness. Talent takes or leaves the option to go live in a city. As we said, it is like a marriage commitment. I commit to the city in the same way that I marry my partner, with everything that person is, means and has got (not partially, but unified). As it is said in weddings, for good and for bad, ...

The sense of unity is found in the city as a whole world. As we discussed earlier, as a possible world of people and things interconnected by relationships. We speak of a city as one whole world concentrated in one place. It's a world within the world, like a world-in-world. The city is the place where the world takes place.[655] It is the place where things happen. The city unifies the world's people and things since the moment it integrates, connects and relates them, making them unite, add and multiply their creativity and development.

Uniqueness. Each city is different, it includes, cultivates and develops its hallmarks, its branding, its offer and its proposal for internal and external talent. No two cities are the same because their history, their inhabitants are always different. The concept of uniqueness would be closely associated with Identity, although all City Magnetism just describes a specific city. However, there are many similar services and benefits between cities and many share a similar model of wages and taxes (by

[655] MARÍN, H. *Mundus. Una arqueología filosófica de la existencia* Nuevoinicio, Granada, 2019, p.145

country or economic block). Therefore, the uniqueness of the being 'city' would be associated with all City Magnetism.

Each city is different, but for a city to be such, to be complete, it must have a universal meaning. The city must have a vision of the world, its vision, its reality, its way of developing human potential. For this world view, the city must have developed a series of attributes. It must have a great capacity for connection with the rest of the world, such as the neural projection of its brain. 'All roads lead to Rome', it was said at the time of imperial Rome; and it was said because Rome was in fact, the center of the world. It must have a market, a place where economic relations develop. The city is a market.[656] This concept of a market city was already present at imperial London, Seville as a Spanish-American market, Babylon, or the Xanadu that Marco Polo visited in China. It is the concept of world trade center that we have today in many modern cities. It is the city wealth and economic power dynamic heart. To attack the heart of the USA, the NYC world trade center was sadly selected. It must have a stadium, a podium where to place the champions, the best, those who lead the city by example, its favorite children. Let's remember the song about NYC placing the city on top of the world, as a lighthouse for the rest of the world. The city must have a place for victory, for glory.[657] The Greek goddess Niké had it on top of the Acropolis. And our flags have it, with its meaning of pride, patriotism, and glory. That is the reason why all main great cities have their arcs of triumph, to give glory to their best sons. All modern cities are paying special attention to their main stadium, as a place where the city's achievements are celebrated, as they were at the Coliseum in Rome. The city must have places to be visible, to project art, culture, to improve and educate its children as a mother does. It must have theaters, opera houses, museums. If the city is a world unto itself, it needs a place where it represents itself, it needs a theater. The city is a theater of the world,[658] because everything that happens, anything human, all what is represented, is done there. The city also needs an agora, a public place where everyone speaks, anything is discussed, it is fought with the word. Nowadays, and with new technologies, agora is in the media and especially on social networks, which allow

[656] Ibid. p.146

[657] Ibid. p.152

[658] Ibid. p.158

any citizen expression. The city must also have its temple, its place of expression of the transcendent, of the connection between the world and the cosmos, the projection towards the divine, as we already explained in cities that enjoy high levels of human values. We said that a city is a point in space / time where humans meet / encounter each other. That point is a cross.[659] It has a horizontal mundane dimension, with its market, its stadium, its agora, its mini worlds, all embedded in the city. And it has a vertical, universal dimension, connecting with the cosmos from the temple, radiating energy, attracting the world sight.

Other being transcendentals like Entity, Reality, and Aliquant (it is something, it is no-nothing) are obvious for a City and cover all the many studied dimensions.

And finally, the idea of a universal city,[660] an open city, a city that seeks the best people in the world regardless of their origin. Are we talking about talent?, and tolerance?, of course, please remember the chapters dedicated to 3 T's (Technology, Talent, Tolerance). Without that universal place character, a world city where the best happens, where the champions go, where talent is fascinated and empowered, where you can elevate from the world to the universe, it would not be a city with capital letters, but just a project. If it had not been for that character of universality, the philosophers would not have gone to Athens, nor the best and brightest scientists and artists to Vienna in 1900, nor Picasso and many other artists to Paris, nor Nicola Tesla (a Croatian emigrant, and my favorite inventor) to NYC to create amazing energy machines, nor the best talents at interpretation would go to Hollywood. Half of Fortune100 companies were founded by immigrants.[661] This is the meaning of this analysis: to find how to make attractive cities in all their expression. Universal and transcendent cities, where human talent becomes sublime and all where all that human can reach its highest levels of development, well-being, equity and equality.

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[659] Ibid. p.189

[660] Ibid. p.169

[661] SHOOT, B. "Immigrants Founded Nearly Half of 2018's Fortune 100 Companies, New Data Analysis Shows", *Fortune*, https://fortune.com/2019/01/15/immigrants-founded-half-fortune-500-companies/ published Jan2019, retrieved by Jan2020

6.7 City Attractiveness vs Population vs GDP

We study the possible correlation of City Attractiveness with the cities population (Metropolitan Area). In figure 84, we can see the 140 studied cities, distributed horizontally according to their size and vertically according to their score in the model. There are megacities in high and low positions, as well as medium-sized cities. In the chapter dedicated to Magnetism, we rated high density as positive, as an enabler of personal communication and activity development. We also commented that despite the possible dispersion in small towns brought by the new communication and Internet technologies, citizens continue to prefer medium and large cities over living in isolated small towns. We should not confuse small cities close in commuting time to other large cities: as we have already explained, they must be associated to that main city. For humans, they are psychologically the same city.

Well, from the observation and the correlation coefficient $R^2 = 0{,}0875$ we conclude that there is NO correlation between City Attractiveness and city size. Furthermore, we see that largest cities are strongly attractive due to Magnetism, although they are usually more expensive, and therefore with less Profitability, but that the second / third cities in each country are more affordable, maintaining very good performance standards and high Profitability, although they are less Magnetic, so both things are offset in both city sizes. Perhaps we could say that we find megacities with more problems and handicaps to be leaders in Attractiveness, but they provide a plus of Magnetism that is important to value.

In figure 85, we can compare City Attractiveness with GDP/Capita. Here $R^2 = 0{,}7294$ indicating a strong correlation between these two magnitudes. No surprises, larger budgets to invests improve city branding, external image, events, cultural activities, competitiveness and obviously the city services and Net purchase power, because of higher wages. And the opposite, as we studied, low budgets to invest lead to poorer city development, urbanism, quality of live and services and lower wages, so all main items are severely impacted. Again, we cannot conclude that City Attractiveness is a just a question of rich cities. That’s not true, as we can see in vertical (same GDP) all US cities ranging from 20 to 60 positions, but obviously city wealth and capacity to invest strongly contributes to City Attractiveness.

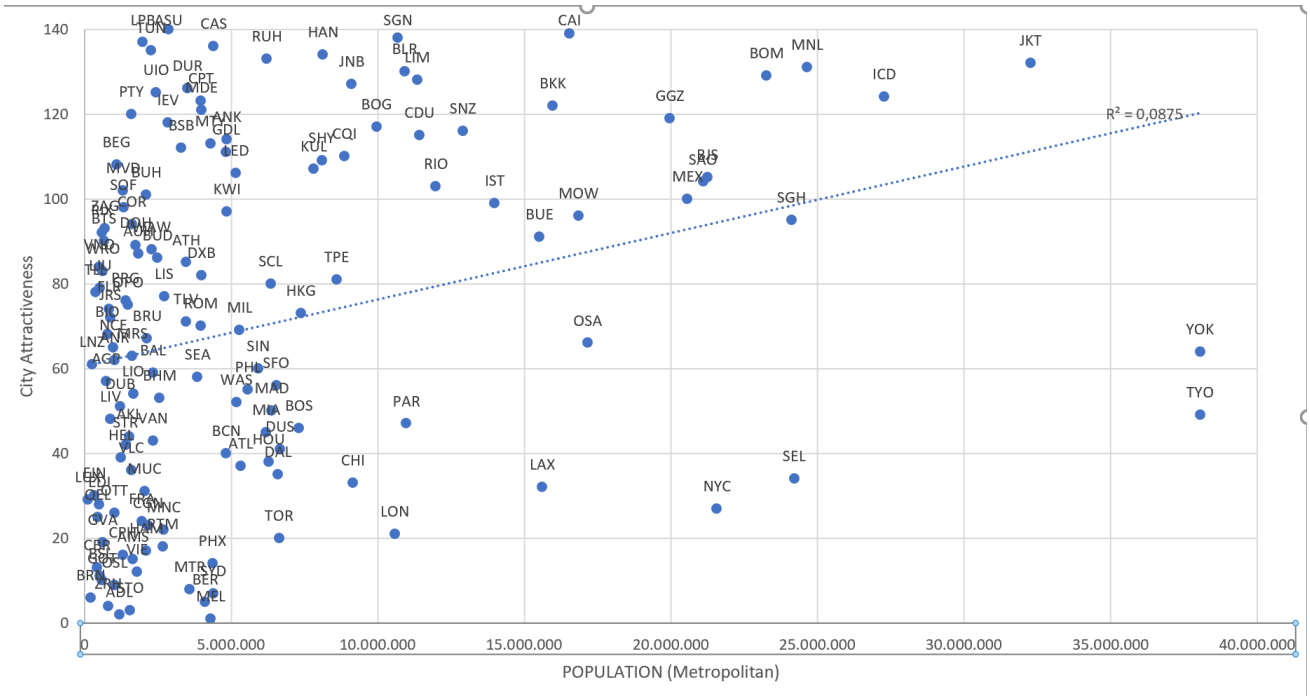

Figure 84. City Attractiveness vs Population (Metropolitan Area). Source: Author

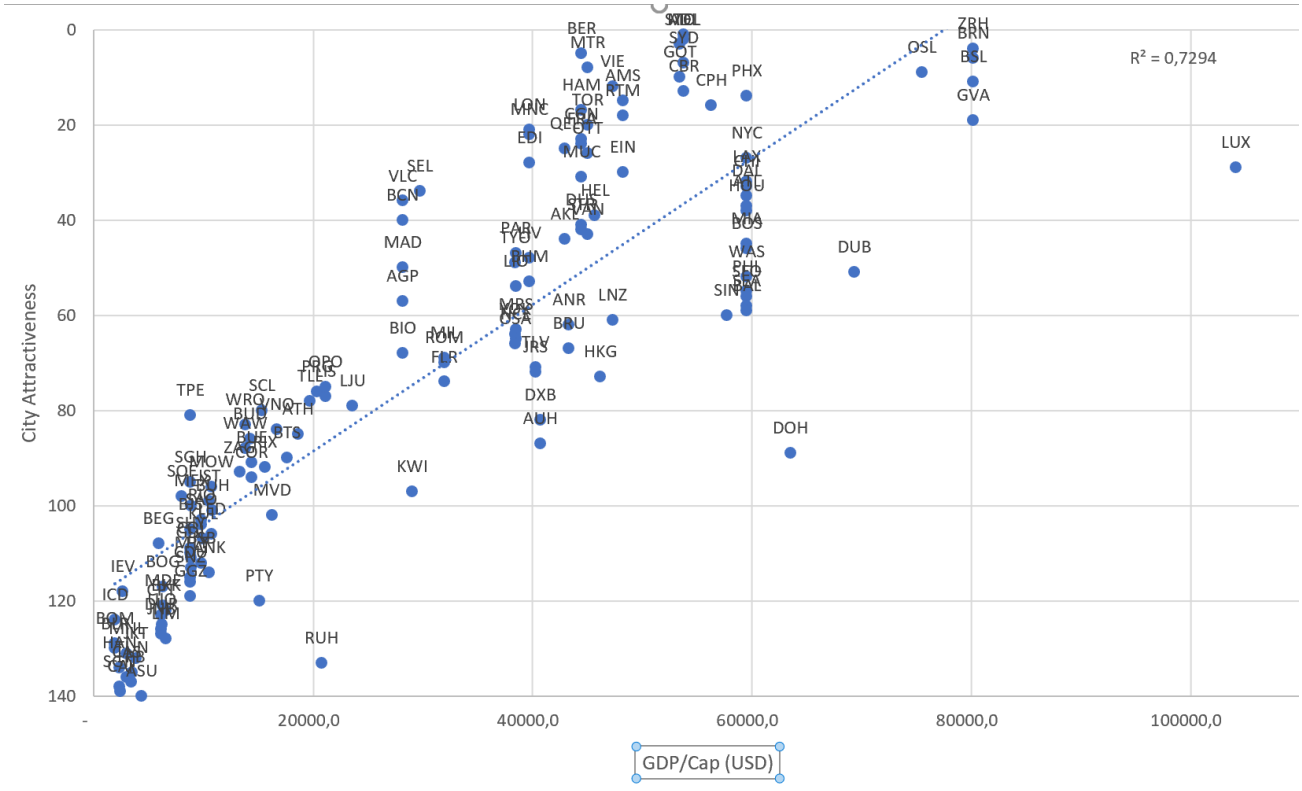

Figure 85. City Attractiveness vs GDP/Cap (USD). Source: Author

(See all data for these analytics at Appendix XLVIII.- AttractiveCities vs Population vs GDP/Capita)

6.8 Attractive Cities vs SmartCities

We are going to study the impact of investments in SmartCities on making the city more attractive. We found that for many cities, investments in their SmartCity plan are the main axis of their strategy to improve their attractiveness. These investments directly improve performance in city services, and therefore their City Profitability. In addition, they improve their investment in the future, their strategy, also their image of modernity and their reputation, and therefore, their Magnetism. For many cities, it is an important question of prestige (Chinese cities). However, we see many cities that pay little attention to a consolidated SmartCities plan (even if they offer very good services), because they do not consider that they should shine or improve their external image, just because they think they do not need it, as they are already very attractive? We place the Swiss cities here. Let's study figure 86.

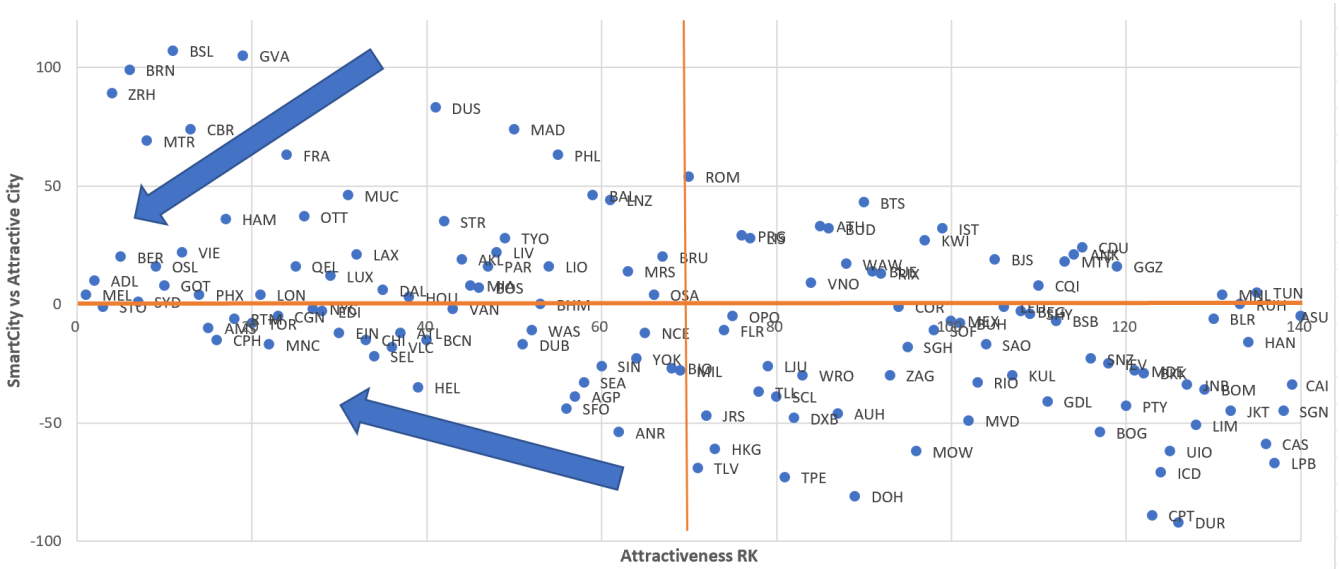

Figure 86. City Attractiveness Ranking vs Gap (SmartCity vs AttractiveCity). Source: Author

The horizontal line at zero places: Over that line those cities more Attractive than Smart; under that line those Smarter than Attractive.

In vertical, the orange line marks rank 70 or midpoint in Attractiveness, so to the left those Advanced; to right those Challenging, then Emerging then Starters.

To the left, above the top arrow we find the Swiss cities, much more attractive than smart, with poor smart city plans, but they don't need them either! However, they are reacting and realizing that they need to invest in technology to maintain that

leadership. Just below that arrow and to the right we find many German cities, with very good attractiveness, but that should improve their smartcity plan. Next we find American and European cities such as Madrid with SmartCity plans that can be improved. We then reach the orange line that marks Rome, limiting with the challenging cities. On this same left side, at the bottom, we find the leading cities in SmartCity, investing heavily to improve positions in Attractiveness (Copenhagen, Amsterdam, Helsinki, Barcelona, ...). Here is where the main battle for Attractiveness is fought nowadays, with large investments on Sustainability, Citizen services, etc

From the vertical orange line to the right, we see that most cities are at under the horizontal line: they are the Challengers, investing heavily in SmartCity plans to get promoted to the advanced group (Tel-Aviv, Hong Kong, Doha, Taipei and many from Eastern Europe, ...). If we advance to the right, then we enter the Emerging group first and the Starters at the right end. We see that they all obtain better positions in SmartCity than in Attractiveness (most under the horizontal line), which indicates that they all use investments in SmartCity to improve their services to the citizen, their image of modernity and their attractiveness in general.

Therefore, as a general guideline, the SmartCities Plan fulfills its mission of improving citizen services (Profitability), while helping in strategy, reputation, modernity (Magnetism) and becomes the most powerful tool to improve in Attractiveness. Little can be done on fixed issues like geolocation. Investments in changing or improving Identity are slow and always in the medium-long term. It is difficult to quickly improve economic conditions and net purchase power. Therefore, the obvious lever, with more short-term results (even in a 4-year legislature) is to invest heavily in a solid SmartCities plan. The cities that fail in this, have either fallen asleep in the leadership glory (and are now waking up, like the Swiss) or are losing positions and do not take advantage of excellent magnetism to improve positions (Southern Europe). On the other hand, cities with handicaps in Magnetism, either due to a lack of history (US), weather conditions (Nordics) or long distances (AUS) compensate with attractive plans that improve their attractiveness to leadership positions.

Finally, at Appendix XLIX.- AttractiveCities vs SmartCities by GDP we can see that investing on SmartCities is quite independent from GDP, so all cities can invest

resources on creating and executing a compelling SmartCity Plan. This will improve Attractiveness, and if investment is done rationally, progress can be very significant with moderated cost (we have seen great progress in Latam Cities with very reasonable budgets, but wise investments). On the other hand, Attractiveness is more directly depending on GDP, so everything that could contribute to improve it counts and is welcome (including the improvement in talent and investors investment because of increase in awareness due to a brilliant SmartCity plan). So, we are circling around same concept. As a conclusion, all areas are intertwined, and a balanced plan will touch those most effective levers.

6.9 Cities Attractiveness analytics deliverables.

City Radiography

With this model and its more than 100 indicators, we can make a complete radiography of a city, and evaluate its SmartCity plans, all in comparison with the rest of the world or only with its cluster of nearby cities, as we have seen.
Let's look at an example of a city radiograph in Figure 87.

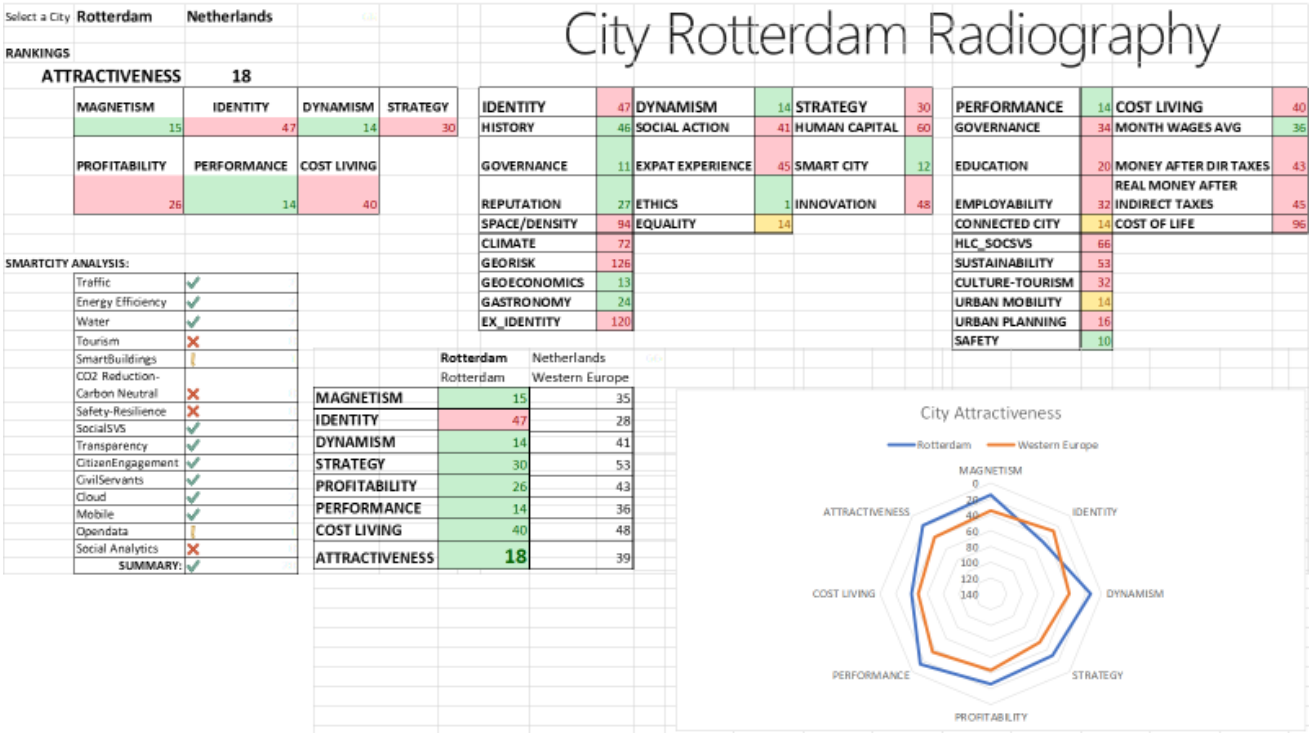

Figure 87. Example of City Radiography using the Attractive Cities model. City of Rotterdam (The Netherlands). Source:Author

In the city radiography we observe which elements add up and which subtract from the city total result. This is very easy, just comparing the city raking on them with the aggregated ranking. (See areas in green – those which contribute, yellow, neutral, or red – those who push the result down)
There are components impossible to change due to their fixed nature, like climatic or geographical conditions. They are elements that will help (and therefore we can take advantage of them and use them as a city flag or benefit) like mild climate in

Jerusalem or those that represent a handicap (and therefore we must mitigate or minimize their impact) like seismic risk in Santiago de Chile.

There are other components that can be changed such as taxes, macroeconomic or sociological elements (educational, health system, etc.) that do not depend directly on the city management, but on the state or the country. In any case, the city can modify them to some extent, reinforcing those that are short with local services or policies, for example, reinforcing social services or preventing healthcare services, or postgraduated training or non-regulated education or languages skills.

Where the city can make a great impact is on everything that depends on its management, its inherent public services, its governance, its branding, its SmartCity Plan. These are the elements to study more in depth and once been compared to others, determine priorities, design a strategy and implement it.

We can also compare the city with its nearby cluster and discover its advantages and the topics where it should improve. This is very important in the last term decision, that is, let's imagine that a Syrian by origin talented citizen is very well deciding for The Netherlands, then the last term decision will be where within the Netherlands and then this nearby mini-competition between Dutch cities is established.

Cities Real Testing

Many cities have checked the model so far. For 18 months (1 Sep2018- 31 March2020) model has been directly explained to main city officials, results analyzed, and feedback obtained from these cities (M states for direct Major conversation):

Spain: Madrid (M), Barcelona, Bilbao, Santander (M), Pamplona-Navarra, Seville, Zaragoza (M), Málaga, Cartagena, Murcia, Santiago de Compostela.

Italy: Rome, Milano, Firenze // Austria: Vienna // Switzerland: Basel

Ireland: Dublin (M) // UK: Belfast, London // Germany: Cologne

Belgium: Brussels, Antwerp, Ghent, Mechelen

The Netherlands: Amsterdam, Rotterdam, Eindhoven, Alkmaar (M), Haarlemmermeer

Luxembourg // Denmark: Esbjerg, Frederiksberg // Sweden; Stockholm, Gothenburg, Helsingborg, Umea, JÖNKÖPINGS, Lunds, ÖREBRO, Nacka // Portugal: Lisboa, Braga
Finland; Helsinki, Oulu, Turku // Norway: Stavanger, Bergen, Oslo, Bodø, Sandnes
Japan: Tokyo // US: Atlanta // Panama // Colombia: Medellín

All of them understood it, found their cities very well represented in the facts, and very few challenged some data (they wanted to drill down on the contributing data indicators to challenge sources). Not our intention to challenge data sources, we simply took the best available that match our selection criteria, as explained. All exposed cities took good note on areas to improve and thankfully said they were going to, or were already planning for prioritizing those red areas.

Conferences. Congresses.

For the same time (1 Sep2018- 15 Apr2020), the model has been shared directly to more than 12.000 people in many different events and congresses:

DATE	Event	City	Country	#Attendees	
Sep-18	NORDICEDGE	Stavanger	Norway	500	
Sep-18	FERIA DE LA TECNOLOGÍA MUNICIPAL	Madrid	Madrid	200	
Sep-18	Murcia Digital Week	Murcia	Spain	200	
Sep-18	Urban Transitions Partner Workshop IV	Malaga	Spain	200	
Nov-18	Safer/Resilience Cities	Madrid/Barcelona	Spain	50	
Jan-19	Urban Mobility EBC	Brussels	Belgium	40	
Jan-19	JORNADA INNOVACION SMARTCITIES	Girona	Spain	300	
Feb-19	TEDx Speech. Alcobendas	Alcobendas	Spain	500	
Feb-19	Mobile World Congress	Barcelona	Spain	2000	
Mar-19	EBC SmartInfraestructure/SmartBuildings	Brussels	Belgium	40	
Mar-19	EBC AI for SmartCities	Brussels	Belgium	40	
Mar-19	GreenCities. Forum de Inteligencia y Sostenibilidad Urbana	Málaga	Spain	250	
Apr-19	SmartSuisse. Mobility	Basel	Switzerland	500	
Apr-19	Geospatial World Forum	Amsterdam	Netherlands	300	
May-19	Portugal SmartCities Summit	Lisbon	Portugal	300	
May-19	Technopolis EU Innovation	Brussels	Belgium	500	
Jun-19	Mayor Cities of Europe.	Venice	Italy	200	
Jun-19	V Congreso Ciudades Inteligentes	Madrid	Spain	250	
Jun-19	Mañana Event	Madrid	Spain	500	
Jun-19	Trilateral Commision Meeting	Paris	France	200	
Jun-19	Mobility Hub Workshop	Lisbon	Portugal	150	

Jun-19	GrowSmarter StudyVisit event	Cologne	Germany	50	
Jun-19	Digital Cities Challenge: A strategy for EU cities in the 21st Century	Brussels	Belgium	200	
Jun-19	Public Sector and IoT: concerns and tenders	Zaragoza	Spain	300	
Sep-19	SANITAS - HEALTHY CITIES	Madrid	Spain	250	
Sep-19	Congress Govern Digital & Tokyo City	Barcelona	Spain	20	
Sep-19	ICT Proposers day EU	Helsinki	Finland	300	
Oct-19	European Week of Regions and Cities	Brussels	Belgium	400	
Oct-19	BIG DATA SERVEIS SOCIALES	Barcelona	Spain	200	
Oct-19	APD: El mundo que viene	Santiago	Spain	500	
Nov-19	SmartCityExpo WW Congress	Barcelona	Spain	500	
Jan-20	TEDx URJC	Pozuelo	Spain	200	
Jan-20	Connected Smart Cities & Communities Conference 2020 - Fair Artificial Intelligence	Brussels	Belgium	400	
Jan-20	IoT in Action Smart Cities Amsterdam	Amsterdam	Netherlands	700	
Feb-20	UNESCO/NetExplo Meeting	Madrid	Spain	100	
Feb-20	A European perspective on Artificial Intelligence (AI)	Brussels	Belgium	300	
Apr-20	FICIS at 'Smart Technology & Innovation'	Braga	Portugal	300	(moved to Virtual)
Apr-20	UNESCO/NetExplo Meeting	Paris	France	200	(moved to Virtual)
				12140	

Delivered in Alcobendas (Spain) by Feb 2019, main event to highlight would be the TEDx Speech on Cities Attractiveness[662]. You can watch it in Spanish or English.

Smartphone Apps

As we want end users to use the model to find the best city according to their preferences, we released by Nov 2019 the AttractiveCities App from most popular smartphones stores:

[662] AUTHOR "Attractive Cities: Contest for Talent" *TEDx Alcobendas*. Feb 2019. Youtube in Spanish: https://www.youtube.com/watch?v=vu7pmcVrUAM and https://www.ted.com/talks/jose_antonio_ondiviela_attractive_smartcities_contest_for_talent and doubled into English: https://www.youtube.com/watch?v=DAABkQRIcM8 retrieved by April 2019

Android (Google)[663], and IOS (Apple)[664] (See also AttractiveCities App downloading QR Codes & App Screenshots at Appendix L)

When using the tool, you enter your input (weights) on City Magnetism (Identity, Dynamism and Strategy), and 10 City Services – Profitability. Also preconditions as Religion, Language and Landscape can be selected. Tool returns your best top25 cities matching your preferences.

Other Future Deliverables.

We have ambitious plans to develop a WW Observatory on Attractive Cities, together with some Universities and relevant companies. Annually updated, plan is to release a new version for all indicators used here, updated or replaced by other better to describe the relative topic.

This potential action shares this thesis objectives: help Millennials and talented citizens to choose the best city for their preferences and make well-informed decisions and help City managers to properly prepare their cities to compete for talent. Additionally, the plan is to use this observatory as a reference site for documents, training, solutions and consultancy about everything that is creating attractive cities, including the SmartCities plans.

Additionally, a new book, training courses, masters, etc are in the cook, so stay tuned!

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[663] "AttractiveCities." *Android Store*. https://play.google.com/store/apps/details?id=com.trackglobe.attractivecities retrieved by Dec 2019

[664] "AttractiveCities". *IOS Store*. https://apps.apple.com/us/app/attractive-cities/id1487782051 retrieved by Dec 2019

6.10. Conclusions. Recommendations to create a more Attractive city.

Placing the Citizen back at the City priorities center.

We already studied in depth in Chapter 1.2 Citizen at the Center, and Chapter 2.4 Humanizing SmartCities, the importance of designing and implementing our city strategies WITH citizens and FOR citizens. The best actions will always be those that promote the sense of community, that serve all and that take advantage of the city mission: deploying social synergy, where the collective is much more powerful than the sum of the parts. It is the humanistic concept of the city, but it must be complemented by the urbanism, creating the appropriate spaces and distances to make that human encountering easy and possible; and technology always present to help us connect, communicate, monitor and manage our city, achieve higher levels of well-being and develop the brain of the city, as a network where we are all connected and we all contribute, like the Avatar neural tree. In this development process, fostering transparent collaborations, making a democratic use of data, and finding the creative ways of communication, engagement with citizens and social marketing are key to success. This is the most difficult part of a good strategy in SmartCities: the citizens buy-in. It is much more difficult than finding financing, choosing the best technology and implementing it. None of that makes sense if citizens do not appreciate it, use it or find improvements in their lives because of this new urban benefit. Many times, simpler and more direct solutions are more impactful than others that are often more complex, expensive and sophisticated. You have to ask first, do pre-tests, work with the trial-error method, and above all, get to know your citizens.

The SmartCity plan should not be interpreted as the technology that some experts propose to help citizens. It must go much further, and it must think about how citizens shape and transform their city through the technology capabilities. It is about citizens being empowered enough, through the use of technology, to contribute to urban change and achieve their professional and social ambitions. Thus, the SmartCity simply provides the conditions and resources to make that possible: as we have said many times, technology is the great enabler. Smartcity is a huge urban laboratory, as an ecosystem (with many stakeholders) of innovation,

an agent of change, a catalyzer, an engine of transformation driven and directed by citizens, aimed at helping them solve their problems. Thus, the city develops its collective intelligence, it becomes smart.

It is a tool for citizens, but as we have said, it must be a process WITH citizens, a human process. And therefore, it must address the moral aspects like ethics and privacy. It must understand the motivations and needs of citizens and engage with smart services.[665] And it must operate in a decentralized way so that everyone is heard, and all initiatives are taken into account.

We often make four fundamental mistakes that turns our SmartCity plan not as human as it should be and become just a sum of technologies that supposedly offer functionality and benefit, but without the expected human orientation.[666]

1. We don't think about our citizens human rights when we implement technologies. We are blinded by technical possibilities and do not value that real final users are our citizens, that we often use their data and that we should not manipulate them with information or physically handle them as herds. We must always keep clear the rights to non-discrimination (solutions must be able to be used by all), not to affect the basic rights of freedom of movement and expression, essential in a city, and with the utmost respect for privacy and virtual identity.

2. We make many decisions in the SmartCity plan without having all the agents that must contribute to it. It is good that it is managed by technology experts, but you also have to listen to citizens individually or organized, to the private sector, to the academia, etc. We must always seek equity and equality, paying special interest to marginalized people or people with various disabilities, making an inclusive city. The strategy must be opened from the beginning to allow transparency and the flow of contributions and experiences.

3. In order to seek synergies, save costs and simplify processes, we often adopt 'one size fits all' technologies. This impedes the services personalization and adaptation, shortens transparency and security, and finally impacts efficiency, questioning their transparency, security, openness and effectiveness. We must, and as technology

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[665] Gothenburg SmartCity. https://www.thisisgothenburg.com/smart-city retrieved by Jan2020

[666] "Smart Cities: Utopian Vision, Dystopian Reality" www.privacyinternational.org Oct2017. pp.22-23

enables us, we also can offer personalized services that understand each citizen specific needs.

4. Security, privacy and respect for each citizen sensitive and personal information must be by default new design conditions. When using citizen data we must comply with data protection regulations such as GDPR. Specifically, we must observe the principles of collection limitation in quantity and quality; data must be specific and only necessary data should be used; preserve security in your treatment; openness and transparency to know why they are used and their purpose; and finally always act with responsibility and strict compliance with the laws.[667]

Cities of Future. How might they look like? Talent race.

Just as there is no ideal person to serve as a model for all others, but there are virtues and goodness's that are an example for all of us, it happens that there is no ideal city. Each city is different and by knowing its virtues (where it offers better benefits or what characteristics make it unique) and its defects or areas to improve, it defines its strategy and marks its future path.

We can summarize the main cities future strategies in two parallel lines that converge in the future: On the one hand the competition for talent, and on the other the 'Zero' objective in many fundamental city parameters.

The race to retain and attract talent.

As we have already studied, we are at the beginning of the 4th industrial revolution and the most disruptive general technology here is Artificial Intelligence. Artificial Intelligence moves robotics, autonomous cars, city intelligence, and we can find it in all the advanced applications we use today, such as this word processor, our smartphone, our new car or our conference call tool. This industrial revolution does not have a clearly highlighted city or area that serves as a beacon or lighthouse for talent attraction. For this reason, all advanced cities want and strive to become

[667] Main are in Europe: EU Council of Europe Convention for the Protection of Individuals with regard to Automatic Processing of Personal Data (No. 108), 1981 and the Organization for Economic Co-operation and Development revised Guidelines on the Protection of Privacy and Transborder Flows of Personal Data (2013), and 2018 EU General Data Protection Regulation.

international artificial intelligence centers, cultivate their own talent in innovation centers with local universities and attract the best external talent with relevant city investments and innovative companies.

To achieve this, cities prepare, improve their magnetism, their image, their branding and also their skilling and professional development offer around Artificial Intelligence.[668] Proper working conditions in terms of innovation, wages, ethics, diversity, time schedules and respect for work / life balance will pave the way clear to welcome talent.

Given its importance, artificial intelligence becomes the city's services transformation and improvement plan fundamental engine. In this way, the city becomes a huge test bench for Artificial Intelligence technologies, introducing them by default in the innovation design for all its services (security, traffic, social services / health, water management, energy, citizen engagement and information analysis). If a city stands out in the use of Artificial Intelligence in its citizen services, then it is positioned as SmartCities leader and therefore, in attractiveness for talent.

Cities of Future. The 'Zero' City

'Zero' as Cities magic score. McKinsey[669] mentions around six, but I could figure out around 36 'Zeroes'. Best cities of the Future will score zero in most relevant indicators:

- Zero traffic congestion.
- Zero traffic fatalities, as states by the Zero Vision (Swedish parliament)
- Zero impact of planet future. (Environmentally sustainable in buildings and operations). Self-sufficient in energy, water.
- Zero Pollution. Clean air. Zero noise pollution.

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[668] LANVIN, B. and MONTEIRO, F. "INSEAD Global Talent Competitiveness index (GTCI) Key findings" *INSEAD*, Fontainebleau, France, 2020 , https://gtcistudy.com/key-findings/ retrieved by Feb2020

[669] FREM, J., RAJADHYAKSHA, V. and WOETZEL, J. "Thriving amid turbulence: Imagining the cities of the future" *McKinsey*. Oct2018 https://www.mckinsey.com/industries/public-sector/our-insights/thriving-amid-turbulence-imagining-the-cities-of-the-future retrieved by Nov2019

- Zero wasted space for cars, unused space. All possible space dedicated to a chain of interconnected green areas, parks, gardens. reduce current cars space dedication from 40% to 25%.
- Zero net carbon emissions. Carbon Neutral first, then Carbon negative, then Carbon free.
- Zero fossil fuel energy consumption. All from renewable energy (solar, wind mainly, then hydro-powered)
- Zero private owned cars. Large walkable and bikeable areas and public spaces. Cars as a service, ride sharing, public transportation as default. Transforming a city made for cars into a city made for humans. Mobility as a Service as urban mobility standard.
- Zero wastage water supply chain. All water from natural and sustainable resources or from green powered desalination and purification.
- Zero untreated grey water. Energy production, purification before return to nature or city cycle.
- Zero non-recycled matter. Aim to reach fabcity concept (a city self-sufficient in matter)
- Zero hunger. Guaranteed access to food in quantity and quality. Zero poverty. Zero homeless people.
- Zero physical or virtual crime.
- Zero damage. Resilient City against human-made or natural hazards.
- Zero Generic Cities. Inspiring landscapes and human urbanism public spaces design, incenting a strong sense of belonging, community, and emotional affection.
- Zero healthcare inefficiencies. Zero uncontrolled pandemias. Zero elder people undesired loneliness. Zero unattended vulnerable citizens.
- Zero bureaucracy. Zero non-digital administration. Zero citizen abstention (full participation).
- Zero discrimination. Zero inequity. Zero inequality. Zero gender violence, ethnic discrimination. Zero human rights / liberties repression.
- Zero excessive working hours patterns. (perfect work/life balance). Respect for leisure, entertainment, culture, arts, sports or divine.
- Zero cash. All transactional, traceable, and taxable tradings.

- Zero illiteracy, Zero digital gap.
- Zero unemployment.

Cities of Future. The Real-time City.

New technologies allow us to create a ‘continuum’ City. Same as we are continuously sensing, and we immediately react to external inputs, new technologies like (bottom-up order) massive amount of sensors and citizens smartphones, 5G connectivity and fiber infrastructure, edge computing, cooperative intelligent transportation systems, short-term processing (also known as ‘fog’ cloud with very short latency), multiformat (structured, unstructured data) massive analytics in Datalakes, IoT Platforms, Digital twins, Advanced Artificial intelligence Algorithms equip the city with the tools to achieve a real-time live response organization. That way, traffic can be dynamically adapted and changed to prioritize specific paths, Major can pulse the opinion and feedback from citizens every few hours (as soon as they react), remote care allow to permanently monitor health constants and alerts from vulnerable people at home, digital twin offers us a real-time vision of what’s happening in the city, first responders forces (police, healthcare, civil protection, firemen) can react and face any challenge real-time. All those examples are almost automatic, in the already explained concept of Senseable city, only pending for humans to make decisions applying our common sense and ethics.

Interaction and engagement with citizens must also be universal, permanent and immediate, like our brain is connected to our members or a large tree is connected to all its thousands of leaves. Apps, tools, alerts, must be in place, engaging and incenting citizens to use them, providing them clear justification and benefits, encouraging them to provide some private information to better serve them, always ensuring maximum protection and regulations compliance. This is critical to multiply the city management, create a crowdsourcing for info, alerts, safety, donations, contributions of any kind. Imagine that I am the real-time witness of an accident or a crime, I can take video and stream it to police. Some famous arrests were never happened without this kind of real-time cooperation. Same if I see a broken waste basket or a pothole in the pavement or a dried tree or I have an idea

to improve the efficiency of that cross, or I want to receive invitations for all cultural events around symphonic rock bands,…

Real-time translation for tourists or newcomers, opening them our city. Real-time position dependent information around what you are discovering in front of you (augmented reality). This is very relevant for visitors, and also for visually unpaired citizens, making an inclusive city.

Real-time environment, energy, water consumption monitoring, minimizing use and maximizing production and use of renewables. Real-time waste, disposal, matter cycle management.

And Predictive City, as we have explained. City must know what's very likely going to happen tomorrow, next week, next month, next season, next festivals or relevant events, plan next year, and design strategy for next 10 or event 25 years. Take all that massive amount of unused historical and real-time data and place it all in a Datalake Artificial intelligence fueled cloud and start understanding your citizens and your city behavior!

City can't improvise, can't be surprised even by a natural disaster, it must be resilient, must be prepared for next hit, and for next opportunity.

City of Future. Balancing distances and commuting.

Ideal city should provide 95% of all you might need around 15' walk distance, including your job. Short distances means short times, energy consumption, no need for large vehicles (micro electric vehicles like eScooters are rocking). For anything else, public transportation should make commuting affordable in time terms.

But we have explained that city dimension is permanently growing as urban mobility efficiency improves, and all reachable places in less than 90' commuting time is psychologically associated to same metropolis, same City.

True, perfect plan is the association of a large number of micro communities where you enjoy the balance between both short-distance, mid-distance terms, with most things you need at hand, but all other wonderful things you need in your life like an Opera house, a theater, your favorite football team stadium, your best museum or library, your University or confessional place are also reachable in acceptable and efficient terms. Urban Mobility is cities blood, as we stated in this thesis, and let's

remember that SmartCityExpo survey responders placed it as most important urban service (over safety, healthcare, environment or employment), so it needs special attention. It marks city dynamism, it makes all other services work, it tells a lot of information and characteristics about the city and its dwellers, and it is the first impression for visitors. Umm, you won't take a second chance to make a wonderful first impression…

Transforming your City Magnetism.

We studied that City Magnetism is a status that is reached after many years of construction and evolution. The city identity and shape cannot be changed overnight, it requires a transformation process that may need a minimum of 15 years. We are talking about how changing or generating a new City Identity from scratch could take us 50 years. We are talking about a long time for the speed we are accustomed in the digital age, but it is the city pace of change. This slow but constant evolution should not discourage us from its transformation. Before beginning the development and implementation of a strategy for transforming the City Identity / Magnetism, we must analyze very well where we start from and precisely know our city. We must recognize our existing advantages, assets, our values, identity, heritage, culture and use them to build on it, to lean on them to thrive. There are things that we cannot change such as the geographical position, landscape, the climate, the geological and natural risk, some customs. Main language, main religion / ethics can change but very slowly. But there are many other things that we can change and impact on, such as large areas urban planning, cultural activities and places, the city promotion and international projection in sporting, cultural and arts events and activities. We must understand which sociocultural areas we are strong at and maximize them, and also where we are unattractive to put a plan to fix it. We must think of our city as a house that we want to sell, or rather, that we want to rent to talented citizens. We must include in that house the most appreciated elements so that this talent can live, achieve maximum well-being and develop its potential, and all this with a reasonable income or price (citizenship contract). Magnetism is the continent (the house itself), Profitability will be the content (services available in the house) and rent (price) for that house.

We must balance past and future, preserving our identity, history and culture, with a strong investment in the future, on innovation, on external image.

Let us have exquisite care with reputation, we must avoid populisms, manipulations, otherwise our city image will suffer.

A city with low Magnetism like those secondary or tertiary cities in a country with a recognized and strong leading capital can transform and stand out globally if the right political decisions are made and all citizens contribute to that regeneration. The transformational plan must be the result of debate and consensus among all political leaders and interest groups[670] and must be a long-term plan (I personally doubt about the actual implementation of any city plan that does not last more than 5 years, any more short-term plan seems to me populist, opportunistic and associated to little impact). This plan must be reflected in a city vision for 10 or more years and there must be an agreement to develop it even if the ruling political party changes. There must also be strong popular support and consensus and the conditions we describe in Chapter 2 on change management.

We are talking about large numbers, macro projects, never specific actions that improve a specific service. A combination of the three fundamental axes is needed: Urbanism, Humanism and Technology, with urbanism leading and the others supporting and complementing.

We can tackle a fundamentally urban transformation like the one Bilbao (Spain) did in the 90s, changing the city center, from a declining industrial environment, high unemployment, in the midst of a strong social conflict aggravated by the natural disaster of a high flood; for a new environment, various new buildings, each by a famous architect, and a new subway and a brand new museum (Guggenheim) built by Frank Gehry. Bilbao is studied as a model for transforming the city shape, but this was also made possible by the strong and resilient spirit of its citizens, the ambition for improvement and solidarity. Today, Bilbao is a very attractive city with a very high well-being and quality of life standards. (See KPMG,[671] "Magnet Cities" study)

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[670] SINKIEN, J, & KROMALCAS, S. “Concept, Directions and Practice of City Attractiveness Improvement” *International Symposium Enhancing City Attractiveness for the Future*. Nagoya Congress Centre, Japan, 2005. p.152

[671] HAYNES, C. *Magnet cities. Decline | Fightback | Victory* KPMG. UK. 2014 pp.4-32

We can, therefore, consider a strong urban action, develop a new neighborhood, transform and regenerate an area, build a new sports stadium, reconvert an industrial area, clean up a devastated natural area, recover a river walk, build a famous museum, design a huge park etc. I remember some urbanism plans say 'let's invest something worth 500 m€ in this area to revamp that area and bring tourism there'.

In parallel, we should invest on the city image / branding. Let's remember how Barcelona invested for being part of a Woody Allen's film cover. Let us realize the impact that sporting events like Real Madrid have in Madrid, or the Nobel prizes in Stockholm, or the film festival in Nice-Cannes or the F1 race in Monaco. There are many cities that should seriously consider appearing in the eyes of the world with one of these shocking activities. It is an investment on projected image, on branding. This investment in human perception must be complemented by a high reputation and minimum standards of social and economic sustainability. Otherwise, it seems like an unnecessary superfluous expense in a city or country that should first fix its basic problems.

And finally, the technological part, from investment in innovation, the focus on human capital and the proposal of an ambitious SmartCity plan. That is future.

Thus, fundamentally with urbanism we transform the past, the body of the city built for a long time, with humanism we change the social and economic present and with technology we face in the future, and design our dreams.

Finally, a reflection from Mr. Luca Bergamo,[672] Vice Mayor for culture of Rome (Italy). In a recent online meeting, he said that "*Culture is missing in the SDGs. If we don't have the cultural tools to think and live in a sustainable way – there is no way we can behave sustainably and therefore achieve the SDGs. In this sense, the city has also based the city strategy on article 27 of the charter of human rights that put participation and culture at the center*."

Where is Culture in all this process? in all this City Attractiveness model? Same role as technology, it is everywhere, from fixed City Identity, changing Dynamism, and planned Strategy to Culture as a City Service or benefit. So, changing the City Magnetism is always a cultural change, and citizens must participate along all

[672] BERGAMO, L. "How are local governments co-creating local actions for Agenda 2030" Online session Diana Lopez, *UN-Habitat* April 2020, p.5

process, since the conception till finishing and required social adaptation to the new city reality.

Then, hire an architect or urbanists to design the big transformation, a sociologist or phycologists to ensure citizens are always in, and finally a Chief Technology Officer (CTO) to put technology and strategic SmartCity Plan over it all.

Improving your City Profitability (Citizenship Contract)

It is difficult to change the City Net Purchase Power because its salary conditions, taxes and cost of living (prices) depend mostly on decisions or fixed terms at the state or country level. You can improve the cost of living by influencing the price of various things like housing and some others, but this is a long-term complex strategy. In any case, as we have studied, when a city is attractive to talent, a vicious cycle occurs in rising wages, then purchasing power, then again rising prices, increased cost of living,…then it stops being attractive for all (case of Seattle area), then intervention is needed at housing market, urbanization and social areas. Progress is never uniform, and sometimes creates inequalities, but those inequalities help create incentives to overcome them and lessons to others.[673] And the opposite is also true, as jobs disappear in a certain area, the falling value of houses traps people in certain neighborhoods, because sometimes the value of their mortgage pending principal is higher than the real house price, and if they stop paying and move, then they lose the house and everything they have already paid.

Undoubtedly, the area where we can most clearly impact is the provision of City Services. We have studied 10 groups of City services/benefits. The SmartCity plan, as we explained in chapter 2, should make an evaluation of where we are in each of those services compared to the leaders, define priorities (there are always many possibilities to impact), design a strategy and implement it.

You need to balance the concept of doing everything well with outstanding excelling on something. I think it is not about being the best in one thing, but being very good in all, so that talent appreciates a compact city, with a solid strategy,

[673] Cf. DEATON, A. *The Great Escape: Health, Wealth, and the Origins of Inequality*. Princeton University Press. New Jersey, 2013

without ups and downs, without fissures, without problems to solve. In other words, a city that may not be the best in traffic, urban mobility, social services, security, environmental sustainability, employability, but that does not have a serious deficiency in any of them and is progressing in all of them in parallel. Here we can think of plans for 4 or less years, impacting on priority areas. But it is also a continuous process, because we must recognize that everyone progresses and competes with each other, and a good position in one area can become mediocre next year. It is, therefore, a continuous plan for innovation, adding new technologies as they appear, taking advantage of their advantages and improving services to citizens together with the city's general attractiveness. It is a circular process around getting current data / status, analyze it, compare, evaluate and prioritize, then take decisions, implement new technologies, impact the citizens, then get data again, and start over.

It is a constant and unstoppable process, led by technology, with urban planning as a follower, and as always, with the citizen as co-creator, implementer and user.

Very important to note that we must start moving, without thinking too much, avoiding paralysis by analysis. Action is what matters, as it is a process of constant learning and feedback: we think, execute, implement, adjust, learn and readjust, or we may have to throw away what we have done so far and start again, always looking at what other cities do and the availability of the latest technologies in the market.

You have to play and bet big, to be wrong sometimes, but to win strong and establish distances. This may seem crazy, but please remember that this is mainly a technology driven process, and we know how much accelerated the pace of technology is, and its ability to quickly create advantages.

There are model cities, which have been doing certain things very well for years, such as Barcelona in branding, or Tokyo and NYC in security, or Amsterdam in Circular City or Rotterdam in sustainability, or Copenhagen in Carbon Neutral, or Helsinki in activating the data to understand its citizens, or Tel-Aviv in citizen participation, ... They are examples for the others although, as we said before, each city is unique, different, and must write its path by walking it.

6.11 Final Reflection: Technology as Enabler.

"Medellin was an isolated city, cut-off from the evolution of the world and lagging behind, so we invested 2.4% of its GDP in technological innovations, four times Colombia's national average"[674] Elkin Echeverri, Medellin city pilot

Technology as omnipresent enabler and catalyzer.

We live in a world of idols (success, recognition, money, information). We have also put technology in the idol position. We have deified it and we think that there is a kind of magic that makes our smartphone work and that technology is the solution to all our problems. Advances in artificial intelligence and science fiction movies fuel this belief about the quasi-divine quality of technology. Technology enjoys choice, omniscience, taste, ethics, and even personality. Serious mistake. Personally, as a technologist, I am fed up with all that undocumented criticism of technology as the root cause for our current dehumanization. Without technology, we would be just dead of cold and hunger animals in our cavern, exposed to elements and vermin. We live in the best moment of our human history, yes, human, thanks to technology. The problem is that we have turned it into a God, assuming that it is capable of explaining everything and answering everything, including our existential questions.[675] Serious mistake once again. Technology helps us do an unbelievable and massive amount of simple tasks in a very short time, but it only does (and should continue to do if we use Artificial Intelligence with responsibility and under ethical principles) exclusively those tasks that humans who create and code it specifically order it to do. Period, no magic, no surprises. Attributing other human virtues to it is simply pretentious and false. And turning it into real dogma is more than risky, it is very dangerous, as we have seen in so many dystopian movies. It must be said that technology never fails if the information is correct,

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[674] CATHELAT, B. *SMARTCITIES SHAPING THE SOCIETY OF 2030*, UNESCO and NETEXPLO, Paris, 2019, p.154

[675] Cf. Watch Technology Idolatry at this master Polish movie: KIESLOWSKI, K. *Dekalog, jeden - Dekalog 1*, 1988, translated as *Decalogue I: You shall love God above all thing, or you shall have no other gods before me.*

technically speaking. Error is human, and comes from attributing to technology a transcendent, almost divine dimension. Technology is human creation, and we should never forget it. Nor should it be demonized, it must be understood and used for the purpose it was designed, nothing more, nothing less.

With this is mind, we should trust on technology, trust on Artificial Intelligence, because it works for good. Next human prosperity and well-being aspiration is only achievable with intense use of Artificial intelligence, and as we stated, artificial intelligence needs three confluent components: Data, Cloud Computing power and Human algorithms. So, we need data about our city and everything inside it, all things, all humans, all behavioral information, all aspirations and dreams. But it's not just about data, not about creating a Datapolis. We need data in SmartCity 2.0, but we need to turn all that data into insights, knowledge to serve the citizens, our core center, our mission. Then, we need massive computer power and analytics, and we need it at an affordable cost, and always on, always ready to serve us, always secure and compliance, and best on environmental sustainability. Only technical solution for those requirements is public Cloud systems, because they provide the availability, scalability, computing power, portfolio of tools and solutions, environmental efficiency, security, and affordable cost. Without Cloud computing a city should hire a legion of engineers to code, maintain security, scale and adapt power when needed. Also, it will need to purchase an oversized supercomputer, which will become obsolete before it starts serving, to be occasionally used, usually working at less than 10% capacity, environmentally inefficient, a luxury unaffordable solution. Cloud allows to use and pay for needed technology as it is needed, providing the flexibility needed to respond to a dynamic city demand.

And finally, we need talent to code and design the neural city system, the Artificial Intelligence solutions, the main objective for City Attractiveness.

Good luck to Talented Citizens when exploring the world and choose the best city to develop your personal and professional potential. May this thesis orient and help you. Don't be blinded by shine, look for human values, explore second line cities as well.

Good luck to City Managers and Majors when preparing the city to become the most Attractive possible to retain and attract talent, only way to thrive and create a

better city in a better world. May this thesis also help you. Compete hard, but fair, and please, never forget about your citizens. This is a about humans first, technology and urbanism then.

I was in Madrid, stretching my working days to spend time writing this thesis after dinner and weekends, when the COVID-19 pandemic surprised us and forced me to a long confinement that has allowed me to finish this thesis earlier than expected. I don't want to thank the virus for anything. On the contrary, this pandemic is the worst thing that has happened to mankind since WWII and deeply attacks the essence and the social base of the city. Nothing will be the same, everything will change, and I hope we learn the lesson and leverage this to progress as a community. I am going to detail some reflections on the new role that many basic aspects of our daily life will turn after this pandemic.

- New role of technology.

  The use of technology has been strongly highlighted, valued and understood. Imagine this pandemic without advanced communications, without teleworking, without smartphones, without Internet. The world would have stopped, the economy would not have slowed down sharply, it would simply have collapsed. Imagine the impact on education without remote classes, the impact of a stopped supply chain, the impact of the pandemic without data analysis, without the massive communication and information sharing between different health systems. The impact would have been devastating. And that, as Bill Gates anticipated in his 2015 TedTalk[676], we were not prepared for. It seems incredible to me that the communication lines have solidly supported the exponential increase in demand. Without massive cloud computing systems, the impact would have been tremendous, without teleworking, without the ability to remotely provision computing capacity when the supply of computers and resources are so limited and everything must happen with utmost urgency, because people are dying. We thought about the vertigo that the accelerated speed of technology imposed on us ... thanks God it is so fast and that it has helped us respond in a reasonable time, or we would have had figures similar to the

[676] GATES, B. "The next outbreak? We are not ready". *TEDTalk*, 2015. https://www.ted.com/talks/bill_gates_the_next_outbreak_we_re_not_ready retrieved by April2020

1918 Spanish flu (25% world infected, 50 m deaths). We have also understood that technology helps, but that humans manage, and they must get down to work. No time for long discussions, we need to trust on data and evidence from technology and then make fast decisions and agile governance. We all dream of the vaccine and we trust that technology will help us get it as soon as possible, but we have all understood that it takes a lot of human effort to get things done, that technology is a wonderful enabler, but it is human-made like us, it is not divine.

- New role of nature. Despite the continuous mobilizations and contributions from experts and scientists, we were completely ignoring the process of climate change, maintaining an unsustainable pace of urbanization and fossil energy consumption. The relationship of this climate deterioration situation to the spread of the virus is not yet clear, but several fundamental issues have been demonstrated. On the one hand, we must listen to the experts about natural outbreaks and risks, and react by changing our habits, even if it has an economic impact. One the other, we live on a single planet and we breathe a single common atmosphere that requires the entire human race collective care, otherwise all without exception will suffer the consequences, as this pandemic has taught us by a slap on our face. We have learned how low human activity through confinement has caused our planet to recover clear skies, and slightly improve from unsustainable levels of greenhouse gases. It also seems that the hole in the ozone layer has shown improvement. It's like Gaia (mother Earth) was showing us the way to react and that we can recover the planet, that not all is lost, if we learn the lesson. We have learnt in the city about new Spring colors, new smells, new fresh air, new noises (birds, air flows,…). Animals like rabbits, deer, bears, wild boars have returned to empty streets.
- New role of time. Now we have time to empty to zero our inbox, write this thesis and reflect. We realize the enormous amount of time wasted going to work, on trips with little strong justification. We should recognize that same-day traveling to see one single client has little sense, unless a strong business reason. We will travel, but for several days, and we will travel much less.

- New form of events / meetings. Entertainment has moved from large-scale events such as soccer, basketball, etc to small family or neighbor performances. We have discovered that we have artistic neighbors or simply ones with certain musical culture. Events and large gatherings are past figures. An event is no longer conceived without a strong online component, if not 100%. All this needs, once again, technology to happen. Education will no longer be mainly presential, online will be the preferred one, with high touch when needed, but small groups or 1:1's. Technology arena as well.
- New role of Ethics. We were living without ethical values, in a complete relativism (all is ok, no need to think). With this crisis, we all have gained renewed respect for ethics and human rights. We have seen healthcare staff having to decide who was given access to a ventilator and who was not and left to die. We have seen politicians despise the lives of our elders, who fought so hard for us. We have seen enormous lessons of humanity, of healthcare personnel facing the virus almost without protection (and falling sick and dying, because they are also human). We have seen the altruistic organization of volunteer's teams. We have seen humans again living in the cities. Dutch philosopher Rutger Bregman indicates that virus is contagious, so it is our solidarity.[677] True that virus is impacting both our human health as well as to our human conscience, our dignity.[678]. We have had to learn civic behavior in a few hours to maintain confinement for many days. We have seen the value from many anonymous people making things work, not only health and safety, but logistics, utilities, farmers, etc, all low-valued jobs, assuming their role and responsibility and taking the minimum but unavoidable risk. We have had time to reflect on what really matters: family, friends. Who still thinks of soccer? We can live without it, who would have

[677] BREGMAN, R. "The virus is contagious, and so is our behavior" *DW*. Made for minds. 2020 https://www.dw.com/en/rutger-bregman-the-virus-is-contagious-and-so-is-our-behavior/a-52924554 retrieved by April2020

[678]SLIJKHUIS, M. "COVID-19 Rethinking Future." *LinkedIN*. Published April 2020, https://www.linkedin.com/pulse/covid-19-rethinking-future-martin-slijkhuis/ retrieved by April 2020

said it a month ago? Can we live without many other vanities like jewelry, luxuries? How long have we not put on a suit and tie? As only way to stop virus spread is social tracing, citizens will need to cooperate. They will have to consent to a decrease in their freedom and give up some privacy for the city to implement a movement tracking system, to know where an infected person has moved around and who has been close to him, so that everyone takes the proper measures to testing or confinement.

- New role of Public Civil Servants / Governments. The worst countries handling the pandemic are not those with the worst technology or health systems, but those with poorly qualified and unprepared politicians. Should we trust more on skilled managers instead of very vocal and propaganda populist politicians? We have learnt the power of information mismanagement and manipulation. We have learned the value of many professionals and public officials. Before this, we thought that we had way too many civil servants and that we had to limit their wages. Now we appreciate their professionalism, especially those who have been at the forefront of the battle against the virus, such as nurses, doctors, health personnel, and also the security forces, who have gained prestige and our trust. To combat the pandemic, we have had to confine ourselves for a long time, and that is only maintained with respect for our security forces.
- New Economics and business activities. Impact on economy and business is massive, especially those small businesses, services companies, tourism, airlines. We have learnt who much vital our critical infrastructure is, such as utilities (energy, water, gas), goods transportation and logistics, telcos and digital communications and financials. Social distancing will also impact all the services business one way or another. Companies have learnt on how to telework, have discovered many new technology abilities. Many will question the required offices space. Will 50% keep teleworking? Offices real-state crisis is served. Another more to the long list. Forget about cash…who has touched that bill or coin? We were going to a cashless city, now accelerated, all digital transactions.
- New role of Cities. Social distancing is here to stay. Even after the gradual reopening, people will fear about socializing, about crowded spaces. This is

terrible as city essence is creating social conditions, spaces. So, cities will have to learn how to readapt / rebuild spaces. All those unused cars on streets should be moved away to external parkings? We have lived for more than two months without cars, do we still need them all? Urban mobility must be reconsidered as well, as needed distances and capacities will change. Time to allow bikes and eScooters massively. People will prefer to go out walking distance or using mono-user small vehicles than taking public transportation to reach the city other end, even if the available restaurant is not so trendy. The concept of proximity will be very much appreciated. Cities must prepare for the next wave (as vaccination will still take its time), becoming more resilient and better equipped with a strong first responders plan and resources and, again, technology. Cities have a unique opportunity to engage with citizens with new communication tools, offering official accurate information about city services and protecting from the common enemy spread. We were talking about how much difficult citizen engagement and co-creation is. Now, we see citizens contributing, creating new communication ways, opening the windows at 20h to applause the caregivers in general (health and safety). We have many collective tasks to accomplish together, like economic recovery, which will require extra solidarity and crowdsourcing. Most impacted cities will see a decrease on reputation and Attractiveness which will take time to be forgotten.

I open the window from my confinement, and I do not see a city, but thousands of people captured in their flats, in their own cages, as we do with animals (another message from Gaia?). This is the anti-city, the anti-social, anti-human. Ok, lesson learned, please stop, may the vaccine show up soon.

APPENDIX

I.- Wittgenstein's Vienna. Main Actors in the same place and play.

WITTGENSTEIN'S VIENNA (1890-1914)

SURNAME	NAME	S	PHILOSOPHER	ARCHITECT	POET	WRITER	JOURNALIST	MUSICIAN	PAINTER	MEDICINE	MATHS	PHYSICS - ENGINEER	DRAMATIST	POLITICIAN	comments
ADLER	VIKTOR					X								X	
ALTENBERG	PETER				X	X	X								MODERNISM
ANDREAS-SALOMÉ	LOU					X	X			X					PSYCHOANALYSIS
ANDRIAN (von)	LEOPOLD					X								X	
AUERNHEIMER	RAOUL					X								X	
BAHR	HERMANN					X							X		
BEER-HOFMANN	RICHARD				X	X							X		
BERNATZIK	WILHELM								X						
BILLROTH	THEODOR									X					
BOLTZMANN	LUDWIG	X	X								X	X			THERMODYNAMICS
BRAHMS	JOHANNES							X							
BRENTANO	FRANZ		X												
BREUER	JOSEPH									X					PSYCHOANALYSIS
BROCH	HERMANN					X									MODERNISM
BRUCKNER	ANTON							X							ROMANTICISM
BUBER	MARTIN		X			X									DIALOGUE
BÜHLER	KARL									X					PSYCOLOGY
CARNAP	RUDOLF		X												POSITIVISM
CHAMBERLAIN	HOUSTON STEWART		X			X	X								ANTISEMITISM
DEHMEL	RICHARD				X	X	X								
DÖRMANN	FELIX					X									FILMPRODUCER
EBNER	FERDINAND		X												DIALOGUE
ENGELMANN	PAUL			X											
FICKER (VON)	HEINRICH											X			METEOROLOGIST
FREGE	GOTTLOB		X								X				ANALYTIC
FREUD	SIGMUND									X					PSYCHOANALYSIS
FRIEDELL	EGON	X	X			X	X						X		
GOLDMANN	PAUL					X	X						X		
GROPIUS	WALTER			X											
HANSLICK	EDUARD					X		X							
HAUER	JOSEF MATTHIAS							X							CHROMATIC STYLE
HEBRA	FERDINAND									X					DERMATOLOGIST
HERTZ	HEINRICH											X			ELECTROMAGNETISM
HERZL	THEODOR					X	X							X	ZIONIST
HOFFMANN	JOSEF			X											
HOFMANNSTHAL (VON)	HUGO				X	X	X						X		
HUSSERL	EDMUND		X												
DAVID	JAKOB JULIUS					X	X								
KAFKA	FRANZ		X			X									
KELSEN	HANS		X			X								X	LEGAL POSITIVISM
KLIMT	GUSTAV								X						EXPRESSIONISM
KOKOSCHKA	OSKAR								X						EXPRESSIONISM
KRAFFT-EBING	RICHARD									X					PSYCHIATRIST
KRAUS	KARL					X	X							X	
KÜMBERGER	OTTO					X									PULP WRITER
KURZWEIL	MAX								X						
LASKER-SCHÜLER	ELSE				X	X	X								
LAZARSFELD	PAUL					X								X	SOCIOLOGIST
LEHÁR	FRANZ							X							OPERETTAS
LIEBKNECHT	WILHELM					X	X							X	
LINDNER	ANTON				X	X									
LOOS	ADOLF			X		X	X								
MACH	ERNST		X							X		X			PSYCHOLOGY
MAHLER	GUSTAV	X						X							ROMANTICISM
MAKART	HANS								X						
MANN	HEINRICH					X	X							X	
MAUTHNER	FRITZ		X			X	X			X			X		PSYCHOLOGY
MEYNERT	THEODOR									X					PSYCHIATRIST
MOSER	KOLOMAN			X											ARTIST
MUSIL	ROBERT		X			X									
NAGEL	ERNEST		X												SCIENCE
NESTROY	JOHANN												X		
NIETZCHE	FRIEDRICH		X		X	X		X						X	
OFFENBACH	JACQUES							X							OPERETTAS
OLBRICH	JOSEPH-MARIA			X											
OTHENIO	ABEL											X			PALEONTOLOGIST
RAIMUND	FERDINAND												X		
RAMSEY	FRANK		X								X				ECONOMIST
REDL	ALFRED	X												X	
RÉE	PAUL		X			X									
REINHARDT	MAX												X		
RILKE	RAINER MARIA				X	X									
SALTEN	FELIX					X									
SCHIELE	EGON								X						EXPRESSIONISM
SCHLICK	MORITZ		X								X	X			VIENNA CIRCLE
SCHNITZLER	ARTHUR				X	X				X					HIPNOTISM, MODERNISM
SCHÖNBERG	ARNOLD				X	X	X	X	X						DODECAPHONICS
SCHOPENHAUER	ARTHUR		X												
SEMMELWEIS	IGNAZ									X					ANTISEPTICS
ŠKODA	JOSEPH									X					DERMATOLOGY
SPECHT	RICHARD					X		X					X		
SPENGLER	OSWALD		X			X					X	X			
SPITZER	LEO					X									PULP WRITER
SRAFFA	PIERO					X									ECONOMIST
STEINTHAL	HEYMANN		X							X					PSYCHOLOGY
STRAUSS	RICHARD							X							OPERA
STRINDBERG	AUGUST				X	X	X		X						
STRINDBERG	FRIDA					X									
TRAKL	GEORG				X										
VAN DER NÜLL	EDUARD	X		X											OPERA ARCHITECT
VON LILIENCRON	DETLEV				X	X	X								
VON UCHATIUS	FRANZ BARON	X										X			HEAVY WEAPONS
WAGNER	RICHARD					X		X					X		OPERA
WAGNER	OTTO			X											
WAISMANN	FRIEDRICH		X								X	X			
WALTER	BRUNO							X							DIR ORCHESTRA
WASSERMANN	JAKOB					X									
WEDEKIND	FRANK					X	X						X		
WEININGER	OTTO	X	X			X									
WERFEL	FRANZ				X	X	X		X						
WITTGENSTEIN	LUDWIG		X	X		X					X	X			
WOLF	HUGO					X	X	X							ROMANTICISM
WOLTER	CHARLOTTE												X		ACTRESS
ZWEIG	STEFAN					X	X								
	104	7	25	9	14	51	22	14	9	14	7	10	13	11	

Wiener Werkstätte	ARCHITECTURE	BAUHAUS
Vienna Circle	PHYLOSOPHY - WRITER - SCIENCES	
Secession	PAINTER-DECORATION	
Young Vienna	WRITER	
	LOU ANDREAS-SALOMÉ LOVERS	
	WITTGENSTEIN's MAIN INFLUENCER	

II.- Cities Selection. Top140 from 2018 Mercer Quality of Live Index & IESE Cities in Motion Index.

City	Country	Mercer QoL RK	IESE CiM RK	AVG	COMBINED RANKING
Zurich	Switzerland	2	13	7,5	1
Vienna	Austria	1	15	8,0	2
Berlin	Germany	13	9	11,0	3
Amsterdam	Netherlands	12	10	11,0	4
Munich	Germany	4	19	11,5	5
Geneva	Switzerland	8	17	12,5	6
Vancouver	Canada	5	21	13,0	7
Dusseldorf	Germany	6	20	13,0	8
Sydney	Australia	11	16	13,5	9
Toronto	Canada	17	11	14,0	10
Melbourne	Australia	16	14	15,0	11
Bern	Switzerland	14	20	17,0	12
San Francisco	United States	30	5	17,5	13
Copenhagen	Denmark	9	27	18,0	14
Boston	United States	35	4	19,5	15
Paris	France	38	3	20,5	16
Ottawa	Canada	18	24	21,0	17
London	United Kingdom	40	2	21,0	18
Frankfurt	Germany	7	36	21,5	19
Stockholm	Sweden	20	25	22,5	20
New York City	United States	44	1	22,5	21
Auckland	New Zealand	3	44	23,5	22
Singapore	Singapore	25	22	23,5	23
Adelaide	Australia	28	20	24,0	24
Canberra	Australia	29	20	24,5	25
Hamburg	Germany	19	34	26,5	26
Montreal	Canada	23	31	27,0	27
Washington, D.C.	United States	49	6	27,5	28
Tokyo	Japan	48	8	28,0	29
Basel	Switzerland	10	47	28,5	30
Oslo	Norway	32	26	29,0	31
Wellington	New Zealand	15	44	29,5	32
Chicago	United States	47	12	29,5	33
Helsinki	Finland	31	29	30,0	34
Luxembourg	Luxembourg	21	40	30,5	35
Seattle	United States	46	15	30,5	36
Brussels	Belgium	27	40	33,5	37
Dublin	Ireland	34	33	33,5	38
Stuttgart	Germany	26	45	35,5	39
Barcelona	Spain	42	35	38,5	40

Los Angeles	United States	59	18	38,5	41
Milan	Italy	41	38	39,5	42
Madrid	Spain	51	28	39,5	43
Baltimore	United States	60	20	40,0	44
Seoul	South Korea	77	7	42,0	45
Philadelphia	United States	56	30	43,0	46
Dallas	United States	64	23	43,5	47
Lyon	France	39	50	44,5	48
Edinburgh	United Kingdom	45	45	45,0	49
Linz	Austria	46	46	46,0	50
Lisbon	Portugal	43	52	47,5	51
Phoenix	United States	60	37	48,5	52
Houston	United States	67	32	49,5	53
Rome	Italy	57	43	50,0	54
Yokohama	Japan	52	52	52,0	55
Cologne	Germany	45	60	52,5	56
Florence	Italy	60	49	54,5	57
Prague	Czech Republic	69	41	55,0	58
Málaga	Spain	60	51	55,5	59
Hong Kong	Hong Kong	72	42	57,0	60
Birmingham	United Kingdom	53	62	57,5	61
Liverpool	United Kingdom	60	55	57,5	62
Atlanta	United States	65	50	57,5	63
Miami	United States	68	48	58,0	64
Eindhoven	Netherlands	60	58	59,0	65
Rotterdam	Netherlands	60	59	59,5	66
Manchester	United Kingdom	65	57	61,0	67
Marseille	France	50	73	61,5	68
Nice	France	50	74	62,0	69
Osaka	Japan	60	72	66,0	70
Valencia	Spain	70	63	66,5	71
Antwerp	Belgium	70	65	67,5	72
Warsaw	Poland	82	54	68,0	73
Dubai	United Arab Emirates	74	66	70,0	74
Taipei	Taiwan	85	56	70,5	75
Tallinn	Estonia	90	53	71,5	76
Abu Dhabi	United Arab Emirates	79	64	71,5	77
Budapest	Hungary	78	67	72,5	78
Ljubljana	Slovenia	76	70	73,0	79
Vilnius	Lithuania	81	71	76,0	80
Bilbao	Spain	80	75	77,5	81
Bratislava	Slovakia	83	77	80,0	82
Gothenburg	Sweden	80	88	84,0	83
Riga	Latvia	91	82	86,5	84
Buenos Aires	Argentina	93	83	88,0	85

Kuala Lumpur	Malaysia	86	92	89,0	86
Montevideo	Uruguay	80	99	89,5	87
Santiago	Chile	95	85	90,0	88
Athens	Greece	87	94	90,5	89
Shanghai	China	102	80	91,0	90
Zagreb	Croatia	99	84	91,5	91
Porto	Portugal	87	98	92,5	92
Panama City	Panama	97	97	97,0	93
Wroclaw	Poland	100	95	97,5	94
Medellín	Colombia	105	96	100,5	95
Sofia	Bulgaria	116	91	103,5	96
Beijing	China	120	90	105,0	97
Tel Aviv	Israel	105	106	105,5	98
Mexico City	Mexico	128	87	107,5	99
Bucharest	Romania	107	109	108,0	100
Córdoba	Argentina	110	107	108,5	101
Bangkok	Thailand	131	86	108,5	102
Brasilia	Brazil	109	109	109,0	103
Jerusalem	Israel	110	108	109,0	104
Monterrey	Mexico	110	111	110,5	105
Guangzhou	China	121	102	111,5	106
Sao Paulo	Brazil	123	101	112,0	107
Cape Town	South Africa	94	133	113,5	108
Asuncion	Paraguay	115	115	115,0	109
Rio de Janeiro	Brazil	118	114	116,0	110
Istanbul	Turkey	133	104	118,5	111
Lima	Peru	124	116	120,0	112
Doha	Qatar	108	132	120,0	113
Bogota	Colombia	129	113	121,0	114
Durban	South Africa	88	158	123,0	115
Guadalajara	Mexico	130	121	125,5	116
Johannesburg	South Africa	96	155	125,5	117
Tunis	Tunisia	114	137	125,5	118
Quito	Ecuador	122	130	126,0	119
Shenzhen	China	136	118	127,0	120
Kuwait City	Kuwait	126	128	127,0	121
Moscow	Russia	168	89	128,5	122
Belgrade	Serbia	138	124	131,0	123
Chengdu	China	137	137	137,0	124
St Petersburg	Russia	176	103	139,5	125
Manila	Philippines	135	148	141,5	126
Kiev	Ukraine	174	119	146,5	127
Casablanca	Morocco	125	171	148,0	128
Ho Chi Minh City	Vietnam	152	146	149,0	129
Jakarta	Indonesia	143	156	149,5	130
Chongqing	China	147	157	152,0	131

Riyadh	Saudi Arabia	167	138	152,5	132
Ankara	Turkey	160	147	153,5	133
Hanoi	Vietnam	156	156	156,0	134
Mumbai	India	154	159	156,5	135
Shenyang	China	158	162	160,0	136
Bangalore	India	146	174	160,0	137
New Delhi	India	161	161	161,0	138
La Paz	Bolivia	157	170	163,5	139
Cairo	Egypt	165	163	164,0	140

III.- Magnetism. Identity. History. Culture.

City	Country	Age	UNESCO	Top Museums List	HIST
Zurich	Switzerland	-15	Y	0	8
Vienna	Austria	-15	Y	0	8
Berlin	Germany	1307	Y	1	6
Amsterdam	Netherlands	1275	Y	1	6
Munich	Germany	1158	N	0	4
Geneva	Switzerland	-58	N	0	6
Vancouver	Canada	1886	N	0	0
Dusseldorf	Germany	1135	N	0	4
Sydney	Australia	1788	Y	1	4
Toronto	Canada	1750	N	1	2
Melbourne	Australia	1835	Y	1	3
Bern	Switzerland	1191	Y	0	6
San Francisco	United States	1776	N	1	2
Copenhagen	Denmark	1020	N	0	4
Boston	United States	1630	N	1	3
Paris	France	-52	Y	1	9
Ottawa	Canada	1826	Y	0	2
London	United Kingdom	-43	Y	1	9
Frankfurt	Germany	794	N	0	5
Stockholm	Sweden	1252	N	1	5
New York City	United States	1624	Y	1	5
Auckland	New Zealand	1350	N	0	3
Singapore	Singapore	1819	Y	0	3
Adelaide	Australia	1836	Y	0	2
Canberra	Australia	1913	N	0	0
Hamburg	Germany	808	Y	0	7
Montreal	Canada	1642	Y	0	4
Washington, D.C.	United States	1790	N	1	2
Tokyo	Japan	1457	Y	1	6
Basel	Switzerland	374	N	0	5
Oslo	Norway	1040	N	0	4
Wellington	New Zealand	1280	N	0	3
Chicago	United States	1780	N	1	2
Helsinki	Finland	1550	N	0	2
Luxembourg	Luxembourg	963	Y	0	7
Seattle	United States	1865	N	0	0

Brussels	Belgium	979	Y	0	7
Dublin	Ireland	841	Y	0	7
Stuttgart	Germany	90	N	0	5
Barcelona	Spain	-218	Y	0	8
Los Angeles	United States	1781	N	1	2
Milan	Italy	-600	Y	0	9
Madrid	Spain	865	Y	1	8
Baltimore	United States	1729	N	0	1
Seoul	South Korea	-18	Y	1	9
Philadelphia	United States	1682	Y	0	4
Dallas	United States	1856	N	0	0
Lyon	France	-43	Y	0	8
Edinburgh	United Kingdom	1125	Y	1	7
Linz	Austria	799	Y	0	7
Lisbon	Portugal	1256	Y	0	6
Phoenix	United States	1867	N	0	0
Houston	United States	1837	N	0	0
Rome	Italy	-753	Y	1	10
Yokohama	Japan	1853	N	0	0
Cologne	Germany	-38	N	0	6
Florence	Italy	-59	Y	1	9
Prague	Czech Republic	750	Y	0	7
Málaga	Spain	-770	N	0	7
Hong Kong	Hong Kong	-214	Y	0	8
Birmingham	United Kingdom	600	N	0	5
Liverpool	United Kingdom	1207	Y	0	6
Atlanta	United States	1845	N	0	0
Miami	United States	1825	N	0	1
Eindhoven	Netherlands	1232	N	0	4
Rotterdam	Netherlands	1260	Y	0	6
Manchester	United Kingdom	79	Y	0	8
Marseille	France	-600	N	0	7
Nice	France	-350	N	0	7
Osaka	Japan	1889	N	0	0
Valencia	Spain	-138	Y	0	8
Antwerp	Belgium	400	N	0	5
Warsaw	Poland	1300	Y	0	5
Dubai	United Arab Emirates	1095	N	0	4
Taipei	Taiwan	1709	N	1	2
Tallinn	Estonia	1219	Y	0	6
Abu Dhabi	United Arab Emirates	1761	N	0	1

Budapest	Hungary	-1	Y	0	8
Ljubljana	Slovenia	-50	Y	0	8
Vilnius	Lithuania	1323	Y	0	5
Bilbao	Spain	1300	Y	1	6
Bratislava	Slovakia	907	N	0	5
Gothenburg	Sweden	1621	N	0	2
Riga	Latvia	1201	Y	0	6
Buenos Aires	Argentina	1536	Y	0	5
Kuala Lumpur	Malaysia	1859	N	0	0
Montevideo	Uruguay	1724	N	0	1
Santiago	Chile	1541	N	0	2
Athens	Greece	-7000	Y	1	10
Shanghai	China	-4000	N	1	8
Zagreb	Croatia	1094	N	0	4
Porto	Portugal	868	Y	0	7
Panama City	Panama	1519	N	0	3
Wroclaw	Poland	1000	Y	0	7
Medellín	Colombia	1616	N	0	2
Sofia	Bulgaria	-29	Y	0	8
Beijing	China	1046	Y	1	7
Tel Aviv	Israel	1909	Y	0	2
Mexico City	Mexico	1325	Y	1	6
Bucharest	Romania	1459	Y	0	5
Córdoba	Argentina	1573	Y	0	4
Bangkok	Thailand	1782	N	0	1
Brasilia	Brazil	1960	Y	1	3
Jerusalem	Israel	-3000	Y	0	9
Monterrey	Mexico	1596	Y	0	4
Guangzhou	China	-214	N	0	6
Sao Paulo	Brazil	1554	Y	0	4
Cape Town	South Africa	1652	Y	0	4
Asuncion	Paraguay	1537	N	0	2
Rio de Janeiro	Brazil	1565	Y	1	5
Istanbul	Turkey	-667	Y	0	9
Lima	Peru	1536	Y	0	5
Doha	Qatar	1825	N	0	1
Bogota	Colombia	1538	Y	0	4
Durban	South Africa	1880	N	0	0
Guadalajara	Mexico	1542	Y	0	4
Johannesburg	South Africa	1886	Y	0	2
Tunis	Tunisia	-2000	Y	0	9
Quito	Ecuador	1534	Y	0	5

Shenzhen	China	1410	N	0	3
Kuwait City	Kuwait	1613	N	0	2
Moscow	Russia	1147	Y	1	7
Belgrade	Serbia	-279	N	0	7
Chengdu	China	-311	Y	0	9
St Petersburg	Russia	1703	Y	1	4
Manila	Philippines	1258	Y	0	6
Kiev	Ukraine	482	Y	0	7
Casablanca	Morocco	-700	N	0	7
Ho Chi Minh City	Vietnam	1698	N	0	1
Jakarta	Indonesia	397	N	0	5
Chongqing	China	-316	Y	0	9
Riyadh	Saudi Arabia	1746	N	0	1
Ankara	Turkey	-546	N	0	7
Hanoi	Vietnam	-3000	N	0	7
Mumbai	India	1507	Y	0	5
Shenyang	China	-300	Y	0	9
Bangalore	India	1537	N	0	2
New Delhi	India	1911	N	0	0
La Paz	Bolivia	1548	N	0	2
Cairo	Egypt	-100	Y	0	8

IV.- Magnetism. Identity. Climate Temperature & Precipitation Deviations%

City	Country	Min Temp °C	Max Temp °C	Diff Temp °C	TEMP DEV%	Min Precip. (mm)	Max Precip. (mm)	Diff. Precip. (mm)	PRE DEV%
Zurich	Switzerland	-3	22	25	43,243	69	135	66	9,545
Vienna	Austria	-4	25	29	54,054	38	74	36	5,140
Berlin	Germany	-3	23	26	45,946	37	71	34	4,846
Amsterdam	Netherlands	-1	22	23	37,838	44	87	43	6,167
Munich	Germany	-5	23	28	51,351	42	109	67	9,692
Geneva	Switzerland	-2	25	27	48,649	61	88	27	3,818
Vancouver	Canada	0	22	22	35,135	38	179	141	20,558
Dusseldorf	Germany	0	24	24	40,541	40	83	43	6,167
Sydney	Australia	8	26	18	24,324	56	164	108	15,712
Toronto	Canada	-8	25	33	64,865	50	80	30	4,258
Melbourne	Australia	7	26	19	27,027	43	68	25	3,524
Bern	Switzerland	-4	23	27	48,649	54	123	69	9,985
San Francisco	United States	5	23	18	24,324	1	111	110	16,006
Copenhagen	Denmark	-3	22	25	43,243	32	71	39	5,580
Boston	United States	-6	28	34	67,568	72	107	35	4,993
Paris	France	1	25	24	40,541	35	64	29	4,112
Ottawa	Canada	-15	26	41	86,486	50	88	38	5,433
London	United Kingdom	-11	26	37	75,676	61	95	34	4,846
Frankfurt	Germany	-2	25	27	48,649	38	76	38	5,433
Stockholm	Sweden	-5	22	27	48,649	26	72	46	6,608
New York City	United States	-4	30	34	67,568	83	114	31	4,405
Auckland	New Zealand	11	28	17	21,622	70	119	49	7,048
Singapore	Singapore	23	32	9	0,000	141	304	163	23,789
Adelaide	Australia	7	28	21	32,432	19	67	48	6,902
Canberra	Australia	0	28	28	51,351	30	65	35	4,993
Hamburg	Germany	-3	23	26	45,946	39	90	51	7,342
Montreal	Canada	-15	27	42	89,189	65	104	39	5,580
Washington, D.C.	United States	-3	31	34	67,568	69	99	30	4,258
Tokyo	Japan	1	31	30	56,757	45	185	140	20,411
Basel	Switzerland	-3	26	29	54,054	40	94	54	7,783
Oslo	Norway	-7	22	29	54,054	36	90	54	7,783

Wellington	New Zealand	5	20	15	16,216	60	142	82	11,894
Chicago	United States	-7	29	36	72,973	41	103	62	8,957
Helsinki	Finland	-9	22	31	59,459	36	73	37	5,286
Luxembourg	Luxembourg	-2	22	24	40,541	61	83	22	3,084
Seattle	United States	2	23	21	32,432	22	152	130	18,943
Brussels	Belgium	0	23	23	37,838	52	79	27	3,818
Dublin	Ireland	3	19	16	18,919	50	71	21	2,937
Stuttgart	Germany	-3	24	27	48,649	37	96	59	8,517
Barcelona	Spain	6	28	22	35,135	22	94	72	10,426
Los Angeles	United States	9	29	20	29,730	0	78	78	11,307
Milan	Italy	-2	29	31	59,459	60	101	41	5,874
Madrid	Spain	0	31	31	59,459	9	59	50	7,195
Baltimore	United States	-5	31	36	72,973	76	100	24	3,377
Seoul	South Korea	-10	31	41	86,486	21	369	348	50,954
Philadelphia	United States	-5	30	35	70,270	67	109	42	6,021
Dallas	United States	2	35	33	64,865	49	123	74	10,720
Lyon	France	-1	27	28	51,351	54	86	32	4,552
Edinburgh	United Kingdom	0	19	19	27,027	41	67	26	3,671
Linz	Austria	-5	24	29	54,054	35	127	92	13,363
Lisbon	Portugal	8	28	20	29,730	5	114	109	15,859
Phoenix	United States	5	41	36	72,973	3	25	22	3,084
Houston	United States	4	34	30	56,757	74	133	59	8,517
Rome	Italy	2	31	29	54,054	23	120	97	14,097
Yokohama	Japan	1	30	29	54,054	49	218	169	24,670
Cologne	Germany	0	24	24	40,541	40	83	43	6,167
Florence	Italy	1	31	30	56,757	40	111	71	10,279
Prague	Czech Republic	-5	23	28	51,351	23	77	54	7,783
Málaga	Spain	9	30	21	32,432	2	115	113	16,446
Hong Kong	Hong Kong	14	32	18	24,324	23	391	368	53,891
Birmingham	United Kingdom	0	21	21	32,432	46	66	20	2,790
Liverpool	United Kingdom	4	20	16	18,919	50	79	29	4,112

Atlanta	United States	0	31	31	59,459	78	147	69	9,985
Miami	United States	15	32	17	21,622	47	237	190	27,753
Eindhoven	Netherlands	-1	23	24	40,541	42	72	30	4,258
Rotterdam	Netherlands	-1	22	23	37,838	44	87	43	6,167
Manchester	United Kingdom	1	20	19	27,027	50	79	29	4,112
Marseille	France	2	29	27	48,649	14	78	64	9,251
Nice	France	4	27	23	37,838	16	108	92	13,363
Osaka	Japan	2	33	31	59,459	34	206	172	25,110
Valencia	Spain	6	29	23	37,838	16	87	71	10,279
Antwerp	Belgium	0	23	23	37,838	52	79	27	3,818
Warsaw	Poland	-6	23	29	54,054	21	71	50	7,195
Dubai	United Arab Emirates	15	40	25	43,243	0	36	36	5,140
Taipei	Taiwan	12	33	21	32,432	71	322	251	36,711
Tallinn	Estonia	-8	20	28	51,351	29	84	55	7,930
Abu Dhabi	United Arab Emirates	15	38	23	37,838	0	42	42	6,021
Budapest	Hungary	-3	27	30	56,757	34	68	34	4,846
Ljubljana	Slovenia	-4	26	30	56,757	80	155	75	10,866
Vilnius	Lithuania	-9	22	31	59,459	38	78	40	5,727
Bilbao	Spain	7	22	15	16,216	51	165	114	16,593
Bratislava	Slovakia	-3	26	29	54,054	40	73	33	4,699
Gothenburg	Sweden	-4	21	25	43,243	29	86	57	8,223
Riga	Latvia	-8	22	30	56,757	25	79	54	7,783
Buenos Aires	Argentina	8	30	22	35,135	63	134	71	10,279
Kuala Lumpur	Malaysia	22	33	11	5,405	127	285	158	23,054
Montevideo	Uruguay	6	28	22	35,135	73	104	31	4,405
Santiago	Chile	3	30	27	48,649	0	81	81	11,747
Athens	Greece	7	33	26	45,946	4	67	63	9,104
Shanghai	China	1	32	31	59,459	39	156	117	17,034
Zagreb	Croatia	-2	26	28	51,351	47	101	54	7,783
Porto	Portugal	5	25	20	29,730	16	176	160	23,348
Panama City	Panama	22	32	10	2,703	10	305	295	43,172
Wroclaw	Poland	-5	23	28	51,351	26	84	58	8,370
Medellín	Colombia	5	20	15	16,216	33	115	82	11,894
Sofia	Bulgaria	-5	26	31	59,459	31	78	47	6,755
Beijing	China	-9	31	40	83,784	2	182	180	26,285
Tel Aviv	Israel	8	30	22	35,135	0	131	131	19,090
Mexico City	Mexico	5	26	21	32,432	4	160	156	22,761
Bucharest	Romania	-6	29	35	70,270	36	77	41	5,874

Córdoba	Argentina	4	30	26	45,946	11	149	138	20,117
Bangkok	Thailand	20	35	15	16,216	9	344	335	49,046
Brasilia	Brazil	13	28	15	16,216	12	249	237	34,655
Jerusalem	Israel	4	29	25	43,243	0	149	149	21,733
Monterrey	Mexico	10	34	24	40,541	11	156	145	21,145
Guangzhou	China	10	33	23	37,838	24	284	260	38,032
Sao Paulo	Brazil	12	28	16	18,919	39	239	200	29,222
Cape Town	South Africa	7	26	19	27,027	1	93	92	13,363
Asuncion	Paraguay	14	33	19	27,027	42	158	116	16,887
Rio de Janeiro	Brazil	18	30	12	8,108	51	169	118	17,181
Istanbul	Turkey	3	28	25	43,243	24	78	54	7,783
Lima	Peru	15	27	12	8,108	0	1	1	0,000
Doha	Qatar	13	42	29	54,054	0	17	17	2,349
Bogota	Colombia	5	19	14	13,514	33	115	82	11,894
Durban	South Africa	11	28	17	21,622	9	134	125	18,209
Guadalajara	Mexico	4	32	28	51,351	4	263	259	37,885
Johannesburg	South Africa	4	26	22	35,135	4	125	121	17,621
Tunis	Tunisia	7	33	26	45,946	3	66	63	9,104
Quito	Ecuador	7	23	16	18,919	26	149	123	17,915
Shenzhen	China	14	32	18	24,324	23	391	368	53,891
Kuwait City	Kuwait	7	45	38	78,378	0	26	26	3,671
Moscow	Russia	-14	24	38	78,378	34	94	60	8,664
Belgrade	Serbia	-2	27	29	54,054	40	90	50	7,195
Chengdu	China	2	30	28	51,351	5	231	226	33,040
St Petersburg	Russia	-11	22	33	64,865	30	78	48	6,902
Manila	Philippines	22	34	12	8,108	7	474	467	68,429
Kiev	Ukraine	-9	26	35	70,270	39	88	49	7,048
Casablanca	Morocco	7	27	20	29,730	0	78	78	11,307
Ho Chi Minh City	Vietnam	21	35	14	13,514	6	292	286	41,850
Jakarta	Indonesia	23	33	10	2,703	50	335	285	41,703
Chongqing	China	5	35	30	56,757	17	182	165	24,082
Riyadh	Saudi Arabia	3	45	42	89,189	0	29	29	4,112
Ankara	Turkey	-3	30	33	64,865	12	49	37	5,286
Hanoi	Vietnam	13	33	20	29,730	18	237	219	32,012
Mumbai	India	19	33	14	13,514	0	682	682	100,000
Shenyang	China	-17	29	46	100,000	7	167	160	23,348
Bangalore	India	15	33	18	24,324	1	244	243	35,536
New Delhi	India	8	39	31	59,459	9	237	228	33,333
La Paz	Bolivia	-2	16	18	24,324	3	116	113	16,446
Cairo	Egypt	9	35	26	45,946	0	7	7	0,881

V.- Magnetism. Identity. Climate. Temperature, Precipitation, SunHours

City	Country	Avge. Temp. (°C)	VTAVG-TEMP	Avge. Precipitation (mm)	VTAVG-RAIN	Avge. Daily Sunshine (Hrs.)	CLIMATE	CLIMATE-NOR
Zurich	Switzerland	9,3	7,84	1.133,50	272,87	4,63	5,77	5
Vienna	Austria	11,4	5,20	547,9	353,80	5,17	6,33	5,98
Berlin	Germany	9	8,43	566	333,83	4,75	5,66	4,81
Amsterdam	Netherlands	10	6,58	810	78,99	4,28	6,03	5,45
Munich	Germany	8	10,25	920	39,04	5,08	5,83	5,1
Geneva	Switzerland	10,5	6,35	1.005,20	125,41	5,57	6,56	6,38
Vancouver	Canada	10,4	5,91	1.189	367,21	5,02	6,14	5,64
Dusseldorf	Germany	10	6,71	760	132,08	4,33	5,97	5,35
Sydney	Australia	17	2,77	1.130	284,18	6,63	7,4	7,84
Toronto	Canada	7,7	11,66	852,9	32,85	5,53	5,81	5,07
Melbourne	Australia	14	0,98	560	335,84	5,68	7,23	7,54
Bern	Switzerland	7,9	10,22	1.028	157,93	4,80	5,59	4,69
San Francisco	United States	14,1	0,84	538	401,85	8,30	8,29	9,39
Copenhagen	Denmark	8	9,70	640	258,04	4,38	5,38	4,32
Boston	United States	10,7	6,83	1.071	195,91	7,48	7,22	7,53
Paris	France	12,4	3,34	637,4	257,16	5,03	6,66	6,55
Ottawa	Canada	6,6	15,24	919,5	37,00	5,43	5,19	3,99
London	United Kingdom	10,3	7,86	750	140,92	3,98	5,63	4,76
Frankfurt	Germany	10	7,10	690	204,97	4,27	5,81	5,07
Stockholm	Sweden	6	13,04	539	368,23	5,40	5,17	3,95
New York City	United States	13,1	2,81	1.135,40	262,05	7,27	7,69	8,34
Auckland	New Zealand	15,5	0,88	1.150	284,32	5,50	7,22	7,53
Singapore	Singapore	27	12,23	2.271	1716,45	5,65	3,95	1,83
Adelaide	Australia	16	1,62	440	475,08	6,88	7,48	7,98
Canberra	Australia	12	4,20	620	277,61	7,20	7,43	7,89
Hamburg	Germany	8	9,89	750	144,27	4,52	5,54	4,6
Montreal	Canada	7,5	13,76	1.033,90	157,84	5,08	5,15	3,92
Washington, D.C.	United States	14,6	0,29	1.008,40	129,28	7,12	8,17	9,18
Tokyo	Japan	16,3	2,39	1.520	765,33	5,52	6,47	6,22
Basel	Switzerland	9,6	7,97	778	114,69	4,58	5,9	5,23
Oslo	Norway	6	13,52	760	134,09	4,47	4,96	3,59

Wellington	New Zealand	12,9	2,18	1.220	375,51	5,50	6,92	7
Chicago	United States	9,9	8,43	937,3	57,63	7,02	6,92	7
Helsinki	Finland	5	15,59	630	267,85	4,93	4,68	3,1
Luxembourg	Luxembourg	8	9,52	770	117,93	4,07	5,43	4,41
Seattle	United States	11,4	4,47	952,5	80,99	5,58	6,91	6,99
Brussels	Belgium	10	6,58	810	77,25	4,33	6,05	5,49
Dublin	Ireland	9,8	5,92	758	130,12	4,10	6	5,4
Stuttgart	Germany	8	10,07	730	167,56	4,85	5,62	4,74
Barcelona	Spain	15,5	0,98	640	269,89	6,67	7,72	8,4
Los Angeles	United States	18,3	4,57	377	564,78	9,15	7,88	8,68
Milan	Italy	11,4	5,38	1.081,70	208,88	5,20	6,47	6,22
Madrid	Spain	14,1	1,08	450	465,66	7,97	8,04	8,95
Baltimore	United States	12,8	3,41	1.064,30	185,97	7,06	7,59	8,17
Seoul	South Korea	12	5,17	1373	737,56	6,63	6,53	6,32
Philadelphia	United States	13,3	2,51	1.054,10	179,91	7,15	7,78	8,5
Dallas	United States	19,1	7,13	916,9	35,98	7,97	7,55	8,1
Lyon	France	11	5,71	770	119,61	5,52	6,65	6,53
Edinburgh	United Kingdom	9,1	7,21	660	232,64	3,78	5,55	4,62
Linz	Austria	9,4	8,28	860	27,67	5,62	6,38	6,06
Lisbon	Portugal	17	2,89	725,8	183,76	8,27	8,19	9,22
Phoenix	United States	23,9	15,79	203,2	702,21	11,05	6,77	6,74
Houston	United States	21,1	9,92	1.264,90	412,90	7,82	6,64	6,52
Rome	Italy	15,5	1,12	733,1	172,63	6,93	7,91	8,73
Yokohama	Japan	15	0,35	1.670	979,40	5,41	6,52	6,31
Cologne	Germany	10	6,71	847	39,71	3,97	5,92	5,26
Florence	Italy	14	1,21	830	60,00	6,80	7,96	8,82
Prague	Czech Republic	8	10,25	470	446,66	5,20	5,44	4,43
Málaga	Spain	18	4,27	524	419,68	7,97	7,59	8,17
Hong Kong	Hong Kong	23	10,23	2.180	1993,81	5,37	3,85	1,66
Birmingham	United Kingdom	9	7,65	670	220,39	3,55	5,4	4,36
Liverpool	United Kingdom	10,5	5,08	672	221,14	3,50	5,78	5,02

Atlanta	United States	17	3,55	1.262,40	415,74	7,28	7,41	7,86
Miami	United States	25,1	12,56	1.572,30	878,81	8,05	5,82	5,09
Eindhoven	Netherlands	9	8,12	700	192,26	4,39	5,71	4,9
Rotterdam	Netherlands	10	6,58	802	87,49	4,50	6,11	5,59
Manchester	United Kingdom	10	6,06	900	16,24	3,88	6,01	5,42
Marseille	France	15	0,34	580	332,57	7,25	8	8,89
Nice	France	16	1,69	733	171,64	7,58	8,1	9,06
Osaka	Japan	16,9	3,39	1.340	570,00	5,88	6,68	6,59
Valencia	Spain	17,8	4,17	454	474,65	6,93	7,1	7,32
Antwerp	Belgium	10	6,58	730	160,30	4,66	6,1	5,57
Warsaw	Poland	8	10,44	540	369,19	4,58	5,23	4,06
Dubai	United Arab Emirates	27	17,51	160	761,64	9,77	5,89	5,21
Taipei	Taiwan	22	9,57	2.070	1620,84	4,50	3,99	1,9
Tallinn	Estonia	5,5	14,04	693	206,58	4,89	4,97	3,61
Abu Dhabi	United Arab Emirates	27	16,85	130	799,82	9,48	5,83	5,1
Budapest	Hungary	10	7,48	620	277,22	5,43	6,16	5,68
Ljubljana	Slovenia	8	10,62	620	293,14	4,69	5,33	4,23
Vilnius	Lithuania	6	13,99	653,5	244,13	4,35	4,71	3,15
Bilbao	Spain	14,3	0,55	1.195	362,13	4,00	6,55	6,36
Bratislava	Slovakia	10	7,35	580	318,71	5,58	6,2	5,75
Gothenburg	Sweden	8	9,70	740	156,28	5,27	5,87	5,17
Riga	Latvia	6	13,75	560	349,65	4,95	4,89	3,47
Buenos Aires	Argentina	17,7	3,95	970	94,39	6,93	7,55	8,1
Kuala Lumpur	Malaysia	27	12,89	2.420	1889,62	6,10	3,85	1,66
Montevideo	Uruguay	16	1,66	940	58,04	7,95	8,38	9,55
Santiago	Chile	14	1,15	340	608,36	6,73	7,35	7,75
Athens	Greece	18,5	5,44	364,8	566,91	7,53	7,06	7,25
Shanghai	China	16	1,95	1.140	299,13	5,12	6,88	6,93
Zagreb	Croatia	11	5,71	882	2,59	4,93	6,52	6,31
Porto	Portugal	14,7	0,10	1.253,50	455,27	7,30	7,92	8,75
Panama City	Panama	27	12,56	999,9	165,36	6,12	5,77	5
Wroclaw	Poland	8	10,25	580	329,88	4,55	5,29	4,16
Medellín	Colombia	22	8,40	1.570	767,14	5,10	5,35	4,27
Sofia	Bulgaria	10	7,61	570	335,64	5,60	6,15	5,66
Beijing	China	12	5,10	630	321,28	7,40	7,32	7,7
Tel Aviv	Israel	20	7,06	530,3	421,70	9,03	7,59	8,17
Mexico City	Mexico	17	2,95	630	312,31	7,10	7,54	8,08
Bucharest	Romania	11	6,43	580	322,28	6,10	6,56	6,38

Córdoba	Argentina	17,3	3,69	790	113,40	7,27	7,71	8,38
Bangkok	Thailand	28	15,37	1.450	842,99	7,20	5,05	3,75
Brasilia	Brazil	20,6	6,77	1.552,10	899,08	6,47	6,04	5,47
Jerusalem	Israel	16	1,76	554,1	402,09	9,48	8,64	10
Monterrey	Mexico	22,3	10,58	591	355,45	5,67	5,69	4,86
Guangzhou	China	22	9,96	1.690	1111,98	4,86	4,63	3,01
Sao Paulo	Brazil	20	6,21	1.350	601,65	5,33	5,97	5,35
Cape Town	South Africa	17	2,83	580	345,08	8,18	7,98	8,85
Asuncion	Paraguay	23	10,45	1.370	567,60	7,67	6,33	5,98
Rio de Janeiro	Brazil	24,2	10,19	1.090	240,92	6,15	6,08	5,54
Istanbul	Turkey	14	1,11	640	263,43	6,62	7,68	8,33
Lima	Peru	20	5,65	6,4	878,01	4,03	5,21	4,02
Doha	Qatar	27	18,83	80	823,30	9,40	5,46	4,46
Bogota	Colombia	13	2,01	960	84,59	4,67	6,91	6,99
Durban	South Africa	21	7,57	1.050	195,75	6,40	6,64	6,52
Guadalajara	Mexico	20	7,91	900	21,50	7,03	7,05	7,23
Johannesburg	South Africa	16	1,66	720	193,38	8,70	8,55	9,84
Tunis	Tunisia	18	4,71	440	484,86	8,18	7,54	8,08
Quito	Ecuador	14	0,92	1.200	372,13	5,63	7,18	7,46
Shenzhen	China	22	8,98	1.867	1512,13	5,03	4,42	2,65
Kuwait City	Kuwait	26	20,02	107,3	805,63	9,15	5,19	3,99
Moscow	Russia	4	19,22	590	319,91	4,63	3,92	1,78
Belgrade	Serbia	12,5	3,50	690,9	207,43	5,77	7,01	7,16
Chengdu	China	16	1,86	980	127,18	3,21	6,27	5,87
St Petersburg	Russia	4,1	17,60	530	378,86	4,27	3,96	1,85
Manila	Philippines	27	13,22	1.970	1828,45	5,75	3,72	1,43
Kiev	Ukraine	7	13,24	690	208,11	5,03	5,16	3,94
Casablanca	Morocco	17	2,89	400	539,18	7,83	7,62	8,22
Ho Chi Minh City	Vietnam	28	15,01	1.950	1511,55	6,28	4	1,92
Jakarta	Indonesia	27	12,56	1.755	1233,66	8,13	5,47	4,48
Chongqing	China	18	5,06	1.080	242,70	3,53	5,77	5
Riyadh	Saudi Arabia	26	21,24	100	816,66	9,10	4,96	3,59
Ankara	Turkey	10	7,87	414,6	494,64	7,52	6,75	6,71
Hanoi	Vietnam	23	10,67	1.607	953,91	3,18	3,97	1,86
Mumbai	India	27,1	13,99	2.431,30	3093,79	7,33	2,9	0
Shenyang	China	8	13,55	710	215,13	6,96	5,92	5,26
Bangalore	India	23,9	11,35	900	21,14	6,73	6,38	6,06
New Delhi	India	25	16,31	795,4	118,67	7,82	5,95	5,31
La Paz	Bolivia	7	9,67	580	354,47	6,27	6,09	5,56
Cairo	Egypt	21	9,09	20	872,02	9,43	6,96	7,07

City	Country	% Natural Spaces	Density Inh/(km2)	SPACE	SPACE-NOR
Zurich	Switzerland	41%	3.300	3,5	4,18
Vienna	Austria	46%	5.500	4,25	5,2
Berlin	Germany	14%	3.000	1,46	1,39
Amsterdam	Netherlands	13%	3.300	1,41	1,33
Munich	Germany	16%	4.400	1,84	1,91
Geneva	Switzerland	16%	3.400	1,65	1,65
Vancouver	Canada	25%	2.600	2,17	2,36
Dusseldorf	Germany	14%	2.500	1,33	1,22
Sydney	Australia	46%	2.000	3,62	4,34
Toronto	Canada	13%	2.800	1,29	1,16
Melbourne	Australia	10%	1.600	0,86	0,57
Bern	Switzerland	34%	3.800	3,07	3,59
San Francisco	United States	13%	2.100	1,18	1,01
Copenhagen	Denmark	20%	2.000	1,68	1,69
Boston	United States	10%	800	0,71	0,37
Paris	France	10%	3.700	1,22	1,07
Ottawa	Canada	24%	1.900	1,96	2,08
London	United Kingdom	33%	5.600	3,34	3,96
Frankfurt	Germany	30%	3.100	2,64	3,01
Stockholm	Sweden	40%	3.700	3,5	4,18
New York City	United States	27%	1.700	2,15	2,34
Auckland	New Zealand	12%	2.800	1,24	1,09
Singapore	Singapore	47%	10.900	5,39	6,76
Adelaide	Australia	22%	1.400	1,72	1,75
Canberra	Australia	24%	1100	1,81	1,87
Hamburg	Germany	20%	2.600	1,8	1,86
Montreal	Canada	15%	2.700	1,43	1,35
Washington, D.C.	United States	17%	1.300	1,33	1,22
Tokyo	Japan	8%	4.700	1,26	1,12
Basel	Switzerland	15%	2.700	1,44	1,37
Oslo	Norway	68%	3.200	5,49	6,9
Wellington	New Zealand	34%	2.300	2,79	3,21
Chicago	United States	9%	1.300	0,69	0,34
Helsinki	Finland	40%	1.900	3,16	3,72
Luxembourg	Luxembourg	15%	1.600	1,23	1,08
Seattle	United States	16%	1.100	1,21	1,05
Brussels	Belgium	19%	2.700	1,73	1,76

Dublin	Ireland	26%	3.500	2,42	2,7
Stuttgart	Germany	15%	2.900	1,48	1,42
Barcelona	Spain	15%	4.500	1,79	1,84
Los Angeles	United States	35%	2.300	2,84	3,28
Milan	Italy	27%	2.800	2,36	2,62
Madrid	Spain	35%	4.700	3,32	3,93
Baltimore	United States	8%	1.200	0,64	0,27
Seoul	South Korea	28%	8.900	3,58	4,29
Philadelphia	United States	12%	1.000	0,9	0,63
Dallas	United States	9%	1.100	0,69	0,34
Lyon	France	23%	1.400	1,79	1,84
Edinburgh	United Kingdom	19%	4.000	1,99	2,12
Linz	Austria	23%	2.500	2	2,13
Lisbon	Portugal	22%	2.800	1,99	2,12
Phoenix	United States	13%	1.200	1,01	0,78
Houston	United States	14%	1.100	1,07	0,86
Rome	Italy	39%	3.600	3,4	4,04
Yokohama	Japan	15%	4.700	1,82	1,89
Cologne	Germany	25%	2.900	2,23	2,45
Florence	Italy	15%	3.800	1,65	1,65
Prague	Czech Republic	22%	4.600	2,33	2,58
Málaga	Spain	15%	5.300	1,94	2,05
Hong Kong	Hong Kong	40%	26.100	7,76	10
Birmingham	United Kingdom	13%	4.100	1,56	1,53
Liverpool	United Kingdom	13%	4.300	1,6	1,58
Atlanta	United States	14%	600	0,97	0,72
Miami	United States	10%	1.700	0,88	0,6
Eindhoven	Netherlands	33%	2.300	2,71	3,1
Rotterdam	Netherlands	15%	2.700	1,44	1,37
Manchester	United Kingdom	23%	4.100	2,31	2,55
Marseille	France	26%	2.300	2,19	2,39
Nice	France	28%	1.300	2,15	2,34
Osaka	Japan	15%	5.700	2,01	2,14
Valencia	Spain	17%	4.100	1,86	1,94
Antwerp	Belgium	15%	1.600	1,23	1,08
Warsaw	Poland	17%	4.200	1,88	1,97
Dubai	United Arab Emirates	2%	2.500	0,44	0
Taipei	Taiwan	3%	7.500	1,49	1,43
Tallinn	Estonia	14%	2.200	1,27	1,13
Abu Dhabi	United Arab Emirates	5%	1.700	0,51	0,1
Budapest	Hungary	15%	2.600	1,43	1,35

Ljubljana	Slovenia	3%	4.100	0,81	0,51
Vilnius	Lithuania	45%	2.300	3,61	4,33
Bilbao	Spain	30%	5.900	3,17	3,73
Bratislava	Slovakia	20%	3.400	1,95	2,06
Gothenburg	Sweden	20%	2.700	1,82	1,89
Riga	Latvia	15%	2.400	1,39	1,3
Buenos Aires	Argentina	9%	4.700	1,37	1,27
Kuala Lumpur	Malaysia	1%	3.600	0,57	0,18
Montevideo	Uruguay	10%	4.300	1,38	1,28
Santiago	Chile	10%	5.600	1,62	1,61
Athens	Greece	15%	6.000	2,07	2,23
Shanghai	China	16%	5.500	2,07	2,23
Zagreb	Croatia	20%	3.800	2,03	2,17
Porto	Portugal	15%	1.900	1,29	1,16
Panama City	Panama	10%	7.400	1,96	2,08
Wroclaw	Poland	15%	5.000	1,88	1,97
Medellín	Colombia	10%	15.300	3,47	4,14
Sofia	Bulgaria	20%	6.400	2,52	2,84
Beijing	China	8%	4.700	1,3	1,17
Tel Aviv	Israel	19%	6.300	2,43	2,72
Mexico City	Mexico	5%	8.600	1,82	1,89
Bucharest	Romania	21%	5.000	2,33	2,58
Córdoba	Argentina	20%	3.400	1,95	2,06
Bangkok	Thailand	6%	5.300	1,27	1,13
Brasilia	Brazil	39%	3.400	3,37	4
Jerusalem	Israel	15%	3.800	1,65	1,65
Monterrey	Mexico	10%	4.500	1,41	1,33
Guangzhou	China	17%	5.200	2,07	2,23
Sao Paulo	Brazil	24%	6.900	2,91	3,37
Cape Town	South Africa	24%	5.200	2,59	2,94
Asuncion	Paraguay	10%	4.000	1,32	1,2
Rio de Janeiro	Brazil	29%	6.300	3,17	3,73
Istanbul	Turkey	2%	10.200	1,91	2,01
Lima	Peru	9%	12.800	2,92	3,39
Doha	Qatar	10%	2.500	1,03	0,81
Bogota	Colombia	5%	18.300	3,66	4,4
Durban	South Africa	15%	3.300	1,56	1,53
Guadalajara	Mexico	2%	6.100	1,12	0,93
Johannesburg	South Africa	24%	3.600	2,29	2,53
Tunis	Tunisia	3%	5.400	1,06	0,85
Quito	Ecuador	9%	4.600	1,36	1,26
Shenzhen	China	41%	7.500	4,29	5,26

Kuwait City	Kuwait	15%	6.500	2,17	2,36
Moscow	Russia	18%	2.900	1,71	1,73
Belgrade	Serbia	10%	4.500	1,41	1,33
Chengdu	China	42%	6.700	4,24	5,19
St Petersburg	Russia	9%	4.000	1,24	1,09
Manila	Philippines	5%	13.800	2,81	3,24
Kiev	Ukraine	9%	3.800	1,21	1,05
Casablanca	Morocco	5%	16.500	3,32	3,93
Ho Chi Minh City	Vietnam	5%	6.700	1,46	1,39
Jakarta	Indonesia	10%	10.200	2,53	2,86
Chongqing	China	17%	5.600	2,14	2,32
Riyadh	Saudi Arabia	5%	3.600	0,87	0,59
Ankara	Turkey	5%	7.300	1,57	1,54
Hanoi	Vietnam	5%	9.600	2,01	2,14
Mumbai	India	3%	26.900	5,11	6,38
Shenyang	China	6%	4.700	1,15	0,97
Bangalore	India	9%	9.700	2,33	2,58
New Delhi	India	20%	12.600	3,7	4,45
La Paz	Bolivia	10%	7.400	1,96	2,08
Cairo	Egypt	3%	8.800	1,71	1,73

City	Country	RiskReport	GEORISK
Zurich	Switzerland	2,05	8,58
Vienna	Austria	2,87	7,92
Berlin	Germany	2,43	8,28
Amsterdam	Netherlands	7,35	4,27
Munich	Germany	2,43	8,28
Geneva	Switzerland	2,05	8,58
Vancouver	Canada	3,03	7,79
Dusseldorf	Germany	2,43	8,28
Sydney	Australia	4,49	6,6
Toronto	Canada	3,03	7,79
Melbourne	Australia	4,49	6,6
Bern	Switzerland	2,05	8,58
San Francisco	United States	3,76	7,19
Copenhagen	Denmark	2,65	8,1
Boston	United States	3,76	7,19
Paris	France	2,37	8,32
Ottawa	Canada	3,03	7,79
London	United Kingdom	3,3	7,57
Frankfurt	Germany	2,43	8,28
Stockholm	Sweden	2,2	8,46
New York City	United States	3,76	7,19
Auckland	New Zealand	4,67	6,45
Singapore	Singapore	2,51	8,21
Adelaide	Australia	4,49	6,6
Canberra	Australia	4,49	6,6
Hamburg	Germany	2,43	8,28
Montreal	Canada	3,03	7,79
Washington, D.C.	United States	3,76	7,19
Tokyo	Japan	9,19	2,77
Basel	Switzerland	2,05	8,58
Oslo	Norway	2,34	8,35
Wellington	New Zealand	4,67	6,45
Chicago	United States	3,76	7,19
Helsinki	Finland	1,94	8,67
Luxembourg	Luxembourg	2,36	8,33
Seattle	United States	3,76	7,19
Brussels	Belgium	2,79	7,98
Dublin	Ireland	4,37	6,7

Stuttgart	Germany	2,43	8,28
Barcelona	Spain	3,46	7,44
Los Angeles	United States	3,76	7,19
Milan	Italy	4,57	6,53
Madrid	Spain	3,46	7,44
Baltimore	United States	3,76	7,19
Seoul	South Korea	3,08	7,75
Philadelphia	United States	3,76	7,19
Dallas	United States	3,76	7,19
Lyon	France	2,37	8,32
Edinburgh	United Kingdom	3,3	7,57
Linz	Austria	2,87	7,92
Lisbon	Portugal	3,44	7,45
Phoenix	United States	3,76	7,19
Houston	United States	3,76	7,19
Rome	Italy	4,57	6,53
Yokohama	Japan	9,19	2,77
Cologne	Germany	2,43	8,28
Florence	Italy	4,57	6,53
Prague	Czech Republic	2,99	7,82
Málaga	Spain	3,46	7,44
Hong Kong	Hong Kong	5,84	5,5
Birmingham	United Kingdom	3,3	7,57
Liverpool	United Kingdom	3,3	7,57
Atlanta	United States	3,76	7,19
Miami	United States	3,76	7,19
Eindhoven	Netherlands	7,35	4,27
Rotterdam	Netherlands	7,35	4,27
Manchester	United Kingdom	3,3	7,57
Marseille	France	2,37	8,32
Nice	France	2,37	8,32
Osaka	Japan	9,19	2,77
Valencia	Spain	3,46	7,44
Antwerp	Belgium	2,79	7,98
Warsaw	Poland	2,97	7,84
Dubai	United Arab Emirates	3,66	7,27
Taipei	Taiwan	5,84	5,5
Tallinn	Estonia	2,04	8,59
Abu Dhabi	United Arab Emirates	3,66	7,27
Budapest	Hungary	4,94	6,23
Ljubljana	Slovenia	3,34	7,53

Vilnius	Lithuania	2,29	8,39
Bilbao	Spain	3,46	7,44
Bratislava	Slovakia	3,2	7,65
Gothenburg	Sweden	2,2	8,46
Riga	Latvia	2,93	7,87
Buenos Aires	Argentina	3,53	7,38
Kuala Lumpur	Malaysia	7,61	4,06
Montevideo	Uruguay	12,52	0,07
Santiago	Chile	12,45	0,12
Athens	Greece	6,89	4,65
Shanghai	China	5,84	5,5
Zagreb	Croatia	3,96	7,03
Porto	Portugal	3,44	7,45
Panama City	Panama	7,7	3,99
Wroclaw	Poland	2,97	7,84
Medellín	Colombia	6,59	4,89
Sofia	Bulgaria	4,08	6,93
Beijing	China	5,84	5,5
Tel Aviv	Israel	3,24	7,62
Mexico City	Mexico	6,01	5,36
Bucharest	Romania	5,65	5,66
Córdoba	Argentina	3,53	7,38
Bangkok	Thailand	6,48	4,98
Brasilia	Brazil	4,79	6,35
Jerusalem	Israel	3,24	7,62
Monterrey	Mexico	6,01	5,36
Guangzhou	China	5,84	5,5
Sao Paulo	Brazil	4,79	6,35
Cape Town	South Africa	6,4	5,04
Asuncion	Paraguay	3,32	7,55
Rio de Janeiro	Brazil	4,79	6,35
Istanbul	Turkey	5,06	6,14
Lima	Peru	6,65	4,84
Doha	Qatar	0,31	10
Bogota	Colombia	6,59	4,89
Durban	South Africa	6,4	5,04
Guadalajara	Mexico	6,01	5,36
Johannesburg	South Africa	6,4	5,04
Tunis	Tunisia	5,74	5,58
Quito	Ecuador	8,48	3,35
Shenzhen	China	5,84	5,5
Kuwait City	Kuwait	4,49	6,6

Moscow	Russia	3,52	7,39
Belgrade	Serbia	5,17	6,05
Chengdu	China	5,84	5,5
St Petersburg	Russia	3,52	7,39
Manila	Philippines	20,69	0
Kiev	Ukraine	2,66	8,09
Casablanca	Morocco	5,83	5,51
Ho Chi Minh City	Vietnam	10,31	1,86
Jakarta	Indonesia	10,58	1,64
Chongqing	China	5,84	5,5
Riyadh	Saudi Arabia	1,04	9,41
Ankara	Turkey	5,06	6,14
Hanoi	Vietnam	10,31	1,86
Mumbai	India	6,77	4,74
Shenyang	China	5,84	5,5
Bangalore	India	6,77	4,74
New Delhi	India	6,77	4,74
La Paz	Bolivia	4,91	6,26
Cairo	Egypt	1,84	8,76

VIII.- Magnetism. Identity. Government Basics. Safety Basics

City	Country	Democracy	Safe Index	Gov-Safety	GOV-NOR
Zurich	Switzerland	9,03	84,5	8,61	9,12
Vienna	Austria	8,29	85,4	8,24	8,7
Berlin	Germany	8,68	86	8,56	9,06
Amsterdam	Netherlands	9,01	88	9	9,57
Munich	Germany	8,68	85,4	8,49	8,98
Geneva	Switzerland	9,03	84,5	8,61	9,12
Vancouver	Canada	9,22	87,8	9,11	9,7
Dusseldorf	Germany	8,68	85,4	8,49	8,98
Sydney	Australia	9,09	87,9	9,04	9,62
Toronto	Canada	9,22	87,8	9,11	9,7
Melbourne	Australia	9,09	87,3	8,97	9,54
Bern	Switzerland	9,03	84,5	8,61	9,12
San Francisco	United States	7,96	85,9	8,09	8,52
Copenhagen	Denmark	9,22	87,4	9,06	9,64
Boston	United States	7,96	85,2	8,01	8,43
Paris	France	8,12	82,4	7,79	8,18
Ottawa	Canada	9,22	87,8	9,11	9,7
London	United Kingdom	8,52	85,7	8,42	8,9
Frankfurt	Germany	8,68	85,4	8,49	8,98
Stockholm	Sweden	9,39	86,5	9,06	9,64
New York City	United States	7,96	85,2	8,01	8,43
Auckland	New Zealand	9,26	84,5	8,75	9,28
Singapore	Singapore	6,02	91,5	7,52	7,86
Adelaide	Australia	9,09	87,3	8,97	9,54
Canberra	Australia	9,09	87,3	8,97	9,54
Hamburg	Germany	8,68	85,4	8,49	8,98
Montreal	Canada	9,22	87,8	9,11	9,7
Washington, D.C.	United States	7,96	85,2	8,01	8,43
Tokyo	Japan	7,99	92	8,82	9,36
Basel	Switzerland	9,03	84,5	8,61	9,12
Oslo	Norway	9,87	86,5	9,37	10
Wellington	New Zealand	9,26	84,5	8,75	9,28
Chicago	United States	7,96	85,2	8,01	8,43
Helsinki	Finland	9,25	87,4	9,08	9,67
Luxembourg	Luxembourg	8,81	83	8,3	8,76
Seattle	United States	7,96	85,2	8,01	8,43
Brussels	Belgium	7,64	82,1	7,46	7,79
Dublin	Ireland	9,24	85,7	8,88	9,43

Stuttgart	Germany	8,68	85,4	8,49	8,98
Barcelona	Spain	8,29	81,2	7,76	8,14
Los Angeles	United States	7,96	85,2	8,01	8,43
Milan	Italy	7,52	78,1	6,92	7,17
Madrid	Spain	8,29	81,4	7,78	8,16
Baltimore	United States	7,96	85,2	8,01	8,43
Seoul	South Korea	8,00	87,4	8,29	8,75
Philadelphia	United States	7,96	85,2	8,01	8,43
Dallas	United States	7,96	83,1	7,77	8,15
Lyon	France	8,12	82,4	7,79	8,18
Edinburgh	United Kingdom	8,52	85,7	8,42	8,9
Linz	Austria	8,29	85,4	8,24	8,7
Lisbon	Portugal	8,03	81,2	7,6	7,96
Phoenix	United States	7,96	85,2	8,01	8,43
Houston	United States	7,96	85,2	8,01	8,43
Rome	Italy	7,52	76,4	6,72	6,94
Yokohama	Japan	7,99	90,9	8,69	9,21
Cologne	Germany	8,68	85,4	8,49	8,98
Florence	Italy	7,52	76,4	6,72	6,94
Prague	Czech Republic	7,69	71,2	6,23	6,37
Málaga	Spain	8,29	81,2	7,76	8,14
Hong Kong	Hong Kong	6,02	83,7	6,62	6,82
Birmingham	United Kingdom	8,52	85,7	8,42	8,9
Liverpool	United Kingdom	8,52	85,7	8,42	8,9
Atlanta	United States	7,96	85,2	8,01	8,43
Miami	United States	7,96	85,2	8,01	8,43
Eindhoven	Netherlands	9,01	88	9	9,57
Rotterdam	Netherlands	9,01	88	9	9,57
Manchester	United Kingdom	8,52	85,7	8,42	8,9
Marseille	France	8,12	82,4	7,79	8,18
Nice	France	8,12	82,4	7,79	8,18
Osaka	Japan	7,99	90,9	8,69	9,21
Valencia	Spain	8,29	81,2	7,76	8,14
Antwerp	Belgium	7,64	82,1	7,46	7,79
Warsaw	Poland	6,62	71,2	5,56	5,6
Dubai	United Arab Emirates	2,76	79,1	4,04	3,85
Taipei	Taiwan	7,73	82,5	7,56	7,91
Tallinn	Estonia	7,90	71,2	6,36	6,52
Abu Dhabi	United Arab Emirates	2,76	79,1	4,04	3,85
Budapest	Hungary	6,63	71,2	5,56	5,6
Ljubljana	Slovenia	7,50	71,2	6,11	6,24

Vilnius	Lithuania	7,50	71,2	6,11	6,24
Bilbao	Spain	8,29	81,4	7,78	8,16
Bratislava	Slovakia	7,17	71,2	5,9	5,99
Gothenburg	Sweden	9,39	86,5	9,06	9,64
Riga	Latvia	7,49	71,2	6,1	6,22
Buenos Aires	Argentina	7,02	69,7	5,64	5,69
Kuala Lumpur	Malaysia	7,16	66,3	5,33	5,33
Montevideo	Uruguay	8,38	69,7	6,49	6,67
Santiago	Chile	8,08	69,8	6,32	6,48
Athens	Greece	7,43	71,2	6,07	6,19
Shanghai	China	2,26	70,5	2,73	2,33
Zagreb	Croatia	6,57	71,2	5,53	5,57
Porto	Portugal	8,03	81,2	7,6	7,96
Panama City	Panama	7,05	69,8	5,67	5,73
Wroclaw	Poland	6,62	71,2	5,56	5,6
Medellín	Colombia	7,13	55,1	4,02	3,82
Sofia	Bulgaria	7,03	71,2	5,82	5,9
Beijing	China	2,26	70,5	2,73	2,33
Tel Aviv	Israel	7,86	72	6,43	6,61
Mexico City	Mexico	6,09	61,6	4,12	3,94
Bucharest	Romania	6,49	71,2	5,48	5,51
Córdoba	Argentina	7,02	69,7	5,64	5,69
Bangkok	Thailand	6,32	57,6	3,8	3,57
Brasilia	Brazil	6,86	60,9	4,52	4,4
Jerusalem	Israel	7,86	72	6,43	6,61
Monterrey	Mexico	6,09	61,6	4,12	3,94
Guangzhou	China	2,26	70,5	2,73	2,33
Sao Paulo	Brazil	6,86	60,9	4,52	4,4
Cape Town	South Africa	7,24	58,6	4,5	4,38
Asuncion	Paraguay	6,24	55,3	3,49	3,21
Rio de Janeiro	Brazil	6,86	60,9	4,52	4,4
Istanbul	Turkey	4,09	66,1	3,38	3,08
Lima	Peru	6,60	58,2	4,05	3,86
Doha	Qatar	3,19	79,1	4,31	4,16
Bogota	Colombia	7,13	55,1	4,02	3,82
Durban	South Africa	7,24	58,6	4,5	4,38
Guadalajara	Mexico	6,09	61,6	4,12	3,94
Johannesburg	South Africa	7,24	58,6	4,5	4,38
Tunis	Tunisia	6,72	53,5	3,58	3,31
Quito	Ecuador	6,33	55,3	3,54	3,27
Shenzhen	China	2,26	70,5	2,73	2,33
Kuwait City	Kuwait	3,93	64,5	3,09	2,75

Moscow	Russia	3,11	65,8	2,72	2,32
Belgrade	Serbia	6,41	71,2	5,42	5,44
Chengdu	China	2,26	70,5	2,73	2,33
St Petersburg	Russia	3,11	65,8	2,72	2,32
Manila	Philippines	6,64	59,2	4,19	4,02
Kiev	Ukraine	5,90	65,8	4,48	4,35
Casablanca	Morocco	5,10	53,5	2,56	2,14
Ho Chi Minh City	Vietnam	3,08	57,6	1,76	1,21
Jakarta	Indonesia	6,48	54,5	3,54	3,27
Chongqing	China	2,26	70,5	2,73	2,33
Riyadh	Saudi Arabia	1,93	62,5	1,6	1,03
Ankara	Turkey	4,09	66,1	3,38	3,08
Hanoi	Vietnam	3,08	57,6	1,76	1,21
Mumbai	India	6,90	58,2	4,24	4,08
Shenyang	China	2,26	70,5	2,73	2,33
Bangalore	India	6,90	58,2	4,24	4,08
New Delhi	India	6,90	55	3,87	3,65
La Paz	Bolivia	4,84	55,3	2,6	2,18
Cairo	Egypt	3,06	48,6	0,71	0

IX.- Magnetism. Identity. GeoEconomics

		World GDP	**80.250.108**	(m$, 2017)		
City	Country	GDP CITY/STATE	GDP World %	GDP Promixity	%	GEO ECONOMICS
Zurich	Switzerland	680.645	1%	17.750.285	22%	8,7
Vienna	Austria	409.316	1%	18.599.688	23%	9,11
Berlin	Germany	3.651.871	5%	16.572.662	21%	8,12
Amsterdam	Netherlands	824.480	1%	18.027.349	22%	8,83
Munich	Germany	3.651.871	5%	16.572.662	21%	8,12
Geneva	Switzerland	680.645	1%	17.750.285	22%	8,7
Vancouver	Canada	1.640.385	2%	6.890.667	9%	3,34
Dusseldorf	Germany	3.651.871	5%	16.572.662	21%	8,12
Sydney	Australia	1.390.150	2%	1.390.150	2%	0,63
Toronto	Canada	1.640.385	2%	5.519.651	7%	2,66
Melbourne	Australia	1.390.150	2%	1.390.150	2%	0,63
Bern	Switzerland	680.645	1%	17.750.285	22%	8,7
San Francisco	United States	2.402.093	3%	8.328.565	10%	4,05
Copenhagen	Denmark	324.146	0%	16.768.287	21%	8,21
Boston	United States	453.606	1%	5.519.651	7%	2,66
Paris	France	2.574.807	3%	17.428.617	22%	8,54
Ottawa	Canada	1.640.385	2%	5.020.471	6%	2,42
London	United Kingdom	2.565.051	3%	17.333.297	22%	8,49
Frankfurt	Germany	3.651.871	5%	16.572.662	21%	8,12
Stockholm	Sweden	541.889	1%	17.781.106	22%	8,71
New York City	United States	1.111.496	1%	5.519.651	7%	2,66
Auckland	New Zealand	200.837	0%	200.837	0%	0,04
Singapore	Singapore	305.757	0%	2.280.322	3%	1,07
Adelaide	Australia	1.390.150	2%	1.390.150	2%	0,63
Canberra	Australia	1.390.150	2%	1.390.150	2%	0,63
Hamburg	Germany	3.651.871	5%	16.572.662	21%	8,12
Montreal	Canada	1.640.385	2%	5.519.651	7%	2,66
Washington, D.C.	United States	121.798	0%	7.697.807	10%	3,74
Tokyo	Japan	4.884.489	6%	18.351.794	23%	8,99
Basel	Switzerland	680.645	1%	17.750.285	22%	8,7
Oslo	Norway	392.052	0%	17.623.563	22%	8,63
Wellington	New Zealand	200.837	0%	200.837	0%	0,04

Chicago	United States	694.935	1%	8.152.473	10%	3,96
Helsinki	Finland	251.381	0%	10.039.965	13%	4,89
Luxembourg	Luxembourg	63.517	0%	17.099.704	21%	8,37
Seattle	United States	446.096	1%	6.890.667	9%	3,34
Brussels	Belgium	491.672	1%	17.687.203	22%	8,66
Dublin	Ireland	325.649	0%	14.674.252	18%	7,18
Stuttgart	Germany	3.651.871	5%	16.572.662	21%	8,12
Barcelona	Spain	1.307.170	2%	15.707.134	20%	7,69
Los Angeles	United States	2.402.093	3%	8.328.565	10%	4,05
Milan	Italy	1.921.139	2%	17.571.899	22%	8,61
Madrid	Spain	1.307.170	2%	15.707.134	20%	7,69
Baltimore	United States	360.969	0%	7.697.807	10%	3,74
Seoul	South Korea	1.529.743	2%	18.923.247	24%	9,27
Philadelphia	United States	637.282	1%	5.519.651	7%	2,66
Dallas	United States	1.316.411	2%	5.264.835	7%	2,54
Lyon	France	2.574.807	3%	17.428.617	22%	8,54
Edinburgh	United Kingdom	2.565.051	3%	17.333.297	22%	8,49
Linz	Austria	409.316	1%	18.599.688	23%	9,11
Lisbon	Portugal	211.696	0%	11.076.534	14%	5,4
Phoenix	United States	295.445	0%	9.321.002	12%	4,54
Houston	United States	1.316.411	2%	5.264.835	7%	2,54
Rome	Italy	1.921.139	2%	17.571.899	22%	8,61
Yokohama	Japan	4.884.489	6%	18.351.794	23%	8,99
Cologne	Germany	3.651.871	5%	16.572.662	21%	8,12
Florence	Italy	1.921.139	2%	17.571.899	22%	8,61
Prague	Czech Republic	209.652	0%	20.394.678	25%	10
Málaga	Spain	1.307.170	2%	15.707.134	20%	7,69
Hong Kong	Hong Kong	334.104	0%	13.380.271	17%	6,54
Birmingham	United Kingdom	2.565.051	3%	17.333.297	22%	8,49
Liverpool	United Kingdom	2.565.051	3%	17.333.297	22%	8,49
Atlanta	United States	499.180	1%	10.156.671	13%	4,95

Miami	United States	861.745	1%	5.618.967	7%	2,71
Eindhoven	Netherlands	824.480	1%	18.027.349	22%	8,83
Rotterdam	Netherlands	824.480	1%	18.027.349	22%	8,83
Manchester	United Kingdom	2.565.051	3%	17.333.297	22%	8,49
Marseille	France	2.574.807	3%	17.428.617	22%	8,54
Nice	France	2.574.807	3%	17.428.617	22%	8,54
Osaka	Japan	4.884.489	6%	18.351.794	23%	8,99
Valencia	Spain	1.307.170	2%	15.707.134	20%	7,69
Antwerp	Belgium	491.672	1%	17.687.203	22%	8,66
Warsaw	Poland	509.955	1%	18.246.302	23%	8,94
Dubai	United Arab Emirates	378.656	0%	1.057.197	1%	0,46
Taipei	Taiwan	571.453	1%	13.380.271	17%	6,54
Tallinn	Estonia	25.683	0%	9.557.451	12%	4,66
Abu Dhabi	United Arab Emirates	378.656	0%	1.057.197	1%	0,46
Budapest	Hungary	132.034	0%	18.599.688	23%	9,11
Ljubljana	Slovenia	48.078	0%	12.487.553	16%	6,1
Vilnius	Lithuania	46.666	0%	11.647.497	15%	5,69
Bilbao	Spain	1.307.170	2%	15.707.134	20%	7,69
Bratislava	Slovakia	94.997	0%	18.599.688	23%	9,11
Gothenburg	Sweden	541.889	1%	17.781.106	22%	8,71
Riga	Latvia	30.176	0%	9.557.451	12%	4,66
Buenos Aires	Argentina	619.872	1%	972.124	1%	0,42
Kuala Lumpur	Malaysia	309.858	0%	2.280.322	3%	1,07
Montevideo	Uruguay	60.266	0%	3.053.040	4%	1,45
Santiago	Chile	263.206	0%	943.344	1%	0,41
Athens	Greece	204.299	0%	5.423.210	7%	2,62
Shanghai	China	11.937.562	15%	19.257.351	24%	9,44
Zagreb	Croatia	53.481	0%	13.602.882	17%	6,65
Porto	Portugal	211.696	0%	11.076.534	14%	5,4
Panama City	Panama	59.051	0%	465.102	1%	0,17
Wroclaw	Poland	509.955	1%	18.246.302	23%	8,94
Medellín	Colombia	307.475	0%	465.102	1%	0,17
Sofia	Bulgaria	55.954	0%	14.164.439	18%	6,93
Beijing	China	11.937.562	15%	13.467.305	17%	6,58
Tel Aviv	Israel	348.006	0%	2.101.819	3%	0,98
Mexico City	Mexico	1.142.453	1%	3.775.275	5%	1,8
Bucharest	Romania	204.943	0%	11.841.013	15%	5,78
Córdoba	Argentina	619.872	1%	972.124	1%	0,42
Bangkok	Thailand	437.807	1%	1.269.385	2%	0,57

Brasilia	Brazil	2.080.916	3%	2.080.916	3%	0,97
Jerusalem	Israel	348.006	0%	756.051	1%	0,31
Monterrey	Mexico	1.142.453	1%	3.775.275	5%	1,8
Guangzhou	China	11.937.562	15%	13.380.271	17%	6,54
Sao Paulo	Brazil	2.080.916	3%	2.169.962	3%	1,01
Cape Town	South Africa	344.064	0%	344.064	0%	0,11
Asuncion	Paraguay	28.780	0%	2.789.834	3%	1,32
Rio de Janeiro	Brazil	2.080.916	3%	4.161.832	5%	1,99
Istanbul	Turkey	841.206	1%	5.631.199	7%	2,72
Lima	Peru	210.013	0%	346.365	0%	0,11
Doha	Qatar	166.346	0%	166.346	0%	0,02
Bogota	Colombia	307.475	0%	465.102	1%	0,17
Durban	South Africa	344.064	0%	344.064	0%	0,11
Guadalajara	Mexico	1.142.453	1%	1.142.453	1%	0,51
Johannesburg	South Africa	344.064	0%	344.064	0%	0,11
Tunis	Tunisia	39.883	0%	8.051.168	10%	3,91
Quito	Ecuador	98.576	0%	675.115	1%	0,27
Shenzhen	China	11.937.562	15%	13.380.271	17%	6,54
Kuwait City	Kuwait	118.271	0%	118.271	0%	0
Moscow	Russia	1.469.341	2%	8.145.113	10%	3,96
Belgrade	Serbia	39.366	0%	14.205.982	18%	6,95
Chengdu	China	11.937.562	15%	12.487.629	16%	6,1
St Petersburg	Russia	1.469.341	2%	8.145.113	10%	3,96
Manila	Philippines	321.189	0%	13.380.271	17%	6,54
Kiev	Ukraine	104.062	0%	9.403.148	12%	4,58
Casablanca	Morocco	110.708	0%	1.669.457	2%	0,77
Ho Chi Minh City	Vietnam	215.963	0%	1.590.574	2%	0,73
Jakarta	Indonesia	1.010.937	1%	1.626.552	2%	0,74
Chongqing	China	11.937.562	15%	12.487.629	16%	6,1
Riyadh	Saudi Arabia	678.541	1%	678.541	1%	0,28
Ankara	Turkey	841.206	1%	841.206	1%	0,36
Hanoi	Vietnam	215.963	0%	12.925.436	16%	6,32
Mumbai	India	2.439.008	3%	2.439.008	3%	1,14
Shenyang	China	11.937.562	15%	13.467.305	17%	6,58
Bangalore	India	2.439.008	3%	2.439.008	3%	1,14
New Delhi	India	2.439.008	3%	2.439.008	3%	1,14
La Paz	Bolivia	37.776	0%	247.789	0%	0,06
Cairo	Egypt	408.045	1%	3.541.393	4%	1,69

X.- Magnetism. Identity. Gastronomy

City	Country	RK Food Index	Michelin / Minh	Gastronomy	GAST-NOR
Zurich	Switzerland	2	147	9,88	9,96
Vienna	Austria	4	36	8,99	9,05
Berlin	Germany	13	20	7,84	7,88
Amsterdam	Netherlands	1	75	9,645	9,72
Munich	Germany	13	41	8,625	8,68
Geneva	Switzerland	2	140	9,845	9,93
Vancouver	Canada	25	11	6,645	6,65
Dusseldorf	Germany	13	9	7,16	7,18
Sydney	Australia	8	11	7,635	7,67
Toronto	Canada	25	8	6,32	6,32
Melbourne	Australia	8	6	6,955	6,97
Bern	Switzerland	2	181	9,915	10
San Francisco	United States	21	25	7,815	7,85
Copenhagen	Denmark	4	51	9,24	9,31
Boston	United States	21	7	6,46	6,46
Paris	France	2	55	9,485	9,56
Ottawa	Canada	25	8	6,43	6,43
London	United Kingdom	13	51	8,805	8,86
Frankfurt	Germany	13	35	8,445	8,5
Stockholm	Sweden	4	35	8,95	9,01
New York City	United States	21	25	7,855	7,89
Auckland	New Zealand	23	5	6	5,99
Singapore	Singapore	44	36	6,94	6,95
Adelaide	Australia	8	21	8,205	8,25
Canberra	Australia	8	57	9,205	9,27
Hamburg	Germany	13	41	8,66	8,72
Montreal	Canada	25	7	6,285	6,28
Washington, D.C.	United States	21	21	7,46	7,49
Tokyo	Japan	21	15	7,21	7,23
Basel	Switzerland	2	120	9,77	9,85
Oslo	Norway	13	34	8,41	8,46
Wellington	New Zealand	23	18	7,175	7,2
Chicago	United States	21	21	7,565	7,59
Helsinki	Finland	13	20	7,805	7,84
Luxembourg	Luxembourg	8	580	9,635	9,71
Seattle	United States	21	6	6,39	6,39
Brussels	Belgium	4	100	9,595	9,67

Dublin	Ireland	8	43	8,955	9,02
Stuttgart	Germany	13	49	8,73	8,79
Barcelona	Spain	13	24	8,09	8,13
Los Angeles	United States	21	3	5,64	5,62
Milan	Italy	8	24	8,42	8,47
Madrid	Spain	13	22	8,02	8,06
Baltimore	United States	21	3	5,745	5,73
Seoul	South Korea	36	6	5,53	5,51
Philadelphia	United States	21	1	5,245	5,22
Dallas	United States	21	1	5,065	5,04
Lyon	France	2	55	9,45	9,52
Edinburgh	United Kingdom	13	67	8,98	9,04
Linz	Austria	4	19	8,2	8,24
Lisbon	Portugal	8	11	7,67	7,7
Phoenix	United States	21	2	5,46	5,44
Houston	United States	21	4	5,89	5,88
Rome	Italy	8	20	8,03	8,07
Yokohama	Japan	21	15	7,21	7,23
Cologne	Germany	13	26	8,34	8,39
Florence	Italy	8	53	9,1	9,17
Prague	Czech Republic	30	24	7,24	7,26
Málaga	Spain	13	11	7,305	7,33
Hong Kong	Hong Kong	57	33	6,085	6,08
Birmingham	United Kingdom	13	7	6,84	6,85
Liverpool	United Kingdom	13	12	7,445	7,47
Atlanta	United States	21	2	5,315	5,29
Miami	United States	21	8	6,71	6,72
Eindhoven	Netherlands	1	76	9,68	9,76
Rotterdam	Netherlands	1	23	8,68	8,74
Manchester	United Kingdom	13	10	7,23	7,25
Marseille	France	2	21	8,485	8,54
Nice	France	2	115	9,735	9,82
Osaka	Japan	21	24	7,78	7,81
Valencia	Spain	13	26	8,305	8,35
Antwerp	Belgium	4	92	9,56	9,64
Warsaw	Poland	25	13	6,855	6,87
Dubai	United Arab Emirates	41	3	4,52	4,48
Taipei	Taiwan	57	1	2,98	2,9
Tallinn	Estonia	25	5	5,93	5,92
Abu Dhabi	United Arab Emirates	41	14	6,095	6,09
Budapest	Hungary	25	11	6,715	6,72

Ljubljana	Slovenia	33	4	5,155	5,13
Vilnius	Lithuania	51	4	4,29	4,24
Bilbao	Spain	13	124	9,23	9,3
Bratislava	Slovakia	25	8	6,395	6,4
Gothenburg	Sweden	4	38	9,06	9,12
Riga	Latvia	30	3	5,24	5,21
Buenos Aires	Argentina	36	3	4,89	4,86
Kuala Lumpur	Malaysia	44	1	3,475	3,41
Montevideo	Uruguay	51	6	4,79	4,75
Santiago	Chile	44	1	3,975	3,92
Athens	Greece	13	6	6,66	6,67
Shanghai	China	57	5	4,3	4,25
Zagreb	Croatia	30	16	6,775	6,79
Porto	Portugal	8	13	7,78	7,81
Panama City	Panama	36	5	5,245	5,22
Wroclaw	Poland	25	8	6,465	6,47
Medellín	Colombia	36	1	3,82	3,76
Sofia	Bulgaria	36	2	4,57	4,53
Beijing	China	57	1	3,155	3,08
Tel Aviv	Israel	23	2	5,425	5,4
Mexico City	Mexico	44	1	3,905	3,85
Bucharest	Romania	51	4	4,25	4,2
Córdoba	Argentina	36	5	5,175	5,15
Bangkok	Thailand	42	3	4,51	4,47
Brasilia	Brazil	25	8	6,355	6,36
Jerusalem	Israel	23	9	6,675	6,68
Monterrey	Mexico	44	1	3,795	3,74
Guangzhou	China	57	0	2,55	2,46
Sao Paulo	Brazil	25	5	5,785	5,77
Cape Town	South Africa	67	1	2,745	2,66
Asuncion	Paraguay	67	1	2,315	2,22
Rio de Janeiro	Brazil	25	5	6	5,99
Istanbul	Turkey	77	0	1,435	1,32
Lima	Peru	51	0	2,575	2,49
Doha	Qatar	41	5	4,88	4,85
Bogota	Colombia	36	0	3,245	3,17
Durban	South Africa	67	1	2,815	2,73
Guadalajara	Mexico	44	1	3,725	3,66
Johannesburg	South Africa	67	1	2,42	2,33
Tunis	Tunisia	51	1	3,215	3,14
Quito	Ecuador	57	0	2,585	2,5
Shenzhen	China	57	0	2,515	2,43

Kuwait City	Kuwait	41	5	5,02	4,99
Moscow	Russia	44	1	4,08	4,03
Belgrade	Serbia	30	2	5,025	4,99
Chengdu	China	57	0	2,655	2,57
St Petersburg	Russia	44	2	4,19	4,14
Manila	Philippines	67	0	1,6	1,49
Kiev	Ukraine	33	2	4,8	4,76
Casablanca	Morocco	65	0	2,27	2,18
Ho Chi Minh City	Vietnam	71	0	1,605	1,49
Jakarta	Indonesia	83	0	0,945	0,82
Chongqing	China	57	1	2,765	2,68
Riyadh	Saudi Arabia	71	1	2,14	2,04
Ankara	Turkey	77	0	1,575	1,46
Hanoi	Vietnam	71	0	1,46	1,35
Mumbai	India	97	0	0,285	0,14
Shenyang	China	57	0	2,405	2,31
Bangalore	India	97	1	1	0,88
New Delhi	India	97	0	0,145	0
La Paz	Bolivia	71	1	2,285	2,19
Cairo	Egypt	80	0	1,24	1,12

XI.- Magnetism. Identity. Reputation

City	Country	CITY REPTRACK	COUNTRY REPTRAK	REPTRACK	REP-NOR
Zurich	Switzerland	78,5	81,3	81,3	9,88
Vienna	Austria	80,9	75,6	80,9	9,79
Berlin	Germany	72	68,5	72	7,71
Amsterdam	Netherlands	75,5	76,7	76,7	8,81
Munich	Germany	78,2	68,5	78,2	9,16
Geneva	Switzerland		81,3	81,3	9,88
Vancouver	Canada	76,4	79,2	79,2	9,39
Dusseldorf	Germany		68,5	68,5	6,89
Sydney	Australia	81,5	79,6	81,5	9,93
Toronto	Canada	77,6	79,2	79,2	9,39
Melbourne	Australia	77,7	79,6	79,6	9,49
Bern	Switzerland		81,3	81,3	9,88
San Francisco	United States	75,9	56,4	75,9	8,62
Copenhagen	Denmark	81	77,7	81	9,81
Boston	United States	71,7	56,4	71,7	7,64
Paris	France	73,3	69,3	73,3	8,01
Ottawa	Canada		79,2	79,2	9,39
London	United Kingdom	76,4	72	76,4	8,74
Frankfurt	Germany	75,5	68,5	75,5	8,53
Stockholm	Sweden	80,8	81,7	81,7	9,98
New York City	United States	75	56,4	75	8,41
Auckland	New Zealand		79,7	79,7	9,51
Singapore	Singapore	73,1	68,5	73,1	7,97
Adelaide	Australia		79,6	79,6	9,49
Canberra	Australia		79,6	79,6	9,49
Hamburg	Germany		68,5	68,5	6,89
Montreal	Canada	78,2	79,2	79,2	9,39
Washington, D.C.	United States	69,2	56,4	69,2	7,06
Tokyo	Japan	81,8	77,9	81,8	10,00
Basel	Switzerland		81,3	81,3	9,88
Oslo	Norway		81,1	81,1	9,84
Wellington	New Zealand		79,7	79,7	9,51
Chicago	United States	65,7	56,4	65,7	6,24
Helsinki	Finland	77,7	81,6	81,6	9,95
Luxembourg	Luxembourg		73	73	7,94
Seattle	United States	72,9	56,4	72,9	7,92
Brussels	Belgium	72,1	72,6	72,6	7,85

Dublin	Ireland	76,1	76,1	76,1	8,67
Stuttgart	Germany		68,5	68,5	6,89
Barcelona	Spain	76,5	73,1	76,5	8,76
Los Angeles	United States	69,6	56,4	69,6	7,15
Milan	Italy	77,1	75	77,1	8,90
Madrid	Spain	76,1	73,1	76,1	8,67
Baltimore	United States		56,4	56,4	4,07
Seoul	South Korea	66,1	58,5	66,1	6,33
Philadelphia	United States		56,4	56,4	4,07
Dallas	United States		56,4	56,4	4,07
Lyon	France		69,3	69,3	7,08
Edinburgh	United Kingdom	75,9	72	75,9	8,62
Linz	Austria		75,6	75,6	8,55
Lisbon	Portugal		71,9	71,9	7,69
Phoenix	United States		56,4	56,4	4,07
Houston	United States		56,4	56,4	4,07
Rome	Italy	79,2	75	79,2	9,39
Yokohama	Japan		77,9	77,9	9,09
Cologne	Germany		68,5	68,5	6,89
Florence	Italy		75	75	8,41
Prague	Czech Republic	74,4	65,6	74,4	8,27
Málaga	Spain		73,1	73,1	7,97
Hong Kong	Hong Kong	69,7	64	69,7	7,17
Birmingham	United Kingdom		72	72	7,71
Liverpool	United Kingdom		72	72	7,71
Atlanta	United States	65,3	56,4	65,3	6,14
Miami	United States	71,3	56,4	71,3	7,55
Eindhoven	Netherlands		76,7	76,7	8,81
Rotterdam	Netherlands		76,7	76,7	8,81
Manchester	United Kingdom	70,7	72	72	7,71
Marseille	France		69,3	69,3	7,08
Nice	France		69,3	69,3	7,08
Osaka	Japan		77,9	77,9	9,09
Valencia	Spain		73,1	73,1	7,97
Antwerp	Belgium		72,6	72,6	7,85
Warsaw	Poland		59,5	59,5	4,79
Dubai	United Arab Emirates	68,6	55,9	68,6	6,92
Taipei	Taiwan		62,6	62,6	5,51
Tallinn	Estonia		63	63	5,61
Abu Dhabi	United Arab Emirates		55,9	55,9	3,95
Budapest	Hungary	69,4	62	69,4	7,10

Ljubljana	Slovenia		64	64	5,84
Vilnius	Lithuania		63	63	5,61
Bilbao	Spain		73,1	73,1	7,97
Bratislava	Slovakia		64	64	5,84
Gothenburg	Sweden		81,7	81,7	9,98
Riga	Latvia		62	62	5,37
Buenos Aires	Argentina		60,2	60,2	4,95
Kuala Lumpur	Malaysia		59,7	59,7	4,84
Montevideo	Uruguay		59	59	4,67
Santiago	Chile		60,2	60,2	4,95
Athens	Greece	71,5	64,7	71,5	7,59
Shanghai	China	64,7	47,7	64,7	6,00
Zagreb	Croatia		62	62	5,37
Porto	Portugal		71,9	71,9	7,69
Panama City	Panama		60	60	4,91
Wroclaw	Poland		59,5	59,5	4,79
Medellín	Colombia		45,3	45,3	1,47
Sofia	Bulgaria		62	62	5,37
Beijing	China		47,7	47,7	2,03
Tel Aviv	Israel		54,1	54,1	3,53
Mexico City	Mexico	52,6	52,4	52,6	3,18
Bucharest	Romania		48,5	48,5	2,22
Córdoba	Argentina		60,2	60,2	4,95
Bangkok	Thailand	63,5	63,8	63,8	5,79
Brasilia	Brazil		57,5	57,5	4,32
Jerusalem	Israel	62,6	54,1	62,6	5,51
Monterrey	Mexico		52,4	52,4	3,13
Guangzhou	China		47,7	47,7	2,03
Sao Paulo	Brazil		57,5	57,5	4,32
Cape Town	South Africa		54,6	54,6	3,64
Asuncion	Paraguay		59	59	4,67
Rio de Janeiro	Brazil	61,7	57,5	61,7	5,30
Istanbul	Turkey	57,8	48,9	57,8	4,39
Lima	Peru		60	60	4,91
Doha	Qatar		51,5	51,5	2,92
Bogota	Colombia		45,3	45,3	1,47
Durban	South Africa		54,6	54,6	3,64
Guadalajara	Mexico		52,4	52,4	3,13
Johannesburg	South Africa		54,6	54,6	3,64
Tunis	Tunisia		45,1	45,1	1,43
Quito	Ecuador		59	59	4,67
Shenzhen	China		47,7	47,7	2,03

Kuwait City	Kuwait		56	56	3,97
Moscow	Russia	51,3	38,1	51,3	2,87
Belgrade	Serbia		62	62	5,37
Chengdu	China		47,7	47,7	2,03
St Petersburg	Russia	66,2	38,1	66,2	6,36
Manila	Philippines		55,3	55,3	3,81
Kiev	Ukraine		39	39	0,00
Casablanca	Morocco		45,1	45,1	1,43
Ho Chi Minh City	Vietnam		55,6	55,6	3,88
Jakarta	Indonesia		57,6	57,6	4,35
Chongqing	China		47,7	47,7	2,03
Riyadh	Saudi Arabia		40,5	40,5	0,35
Ankara	Turkey		48,9	48,9	2,31
Hanoi	Vietnam		55,6	55,6	3,88
Mumbai	India		56,3	56,3	4,04
Shenyang	China		47,7	47,7	2,03
Bangalore	India		56,3	56,3	4,04
New Delhi	India	54,7	56,3	56,3	4,04
La Paz	Bolivia		59	59	4,67
Cairo	Egypt	51,6	35	51,6	2,94

XII.- Magnetism. Identity. Branding. Projected Image.

City	Country	Movies	SPORTS	MAIN EVENTS	BRANDING	BRAND_NOR
Zurich	Switzerland	8	1	0	1,56	1,46
Vienna	Austria	207	0	1	3,50	3,43
Berlin	Germany	500	1	1	4,68	4,64
Amsterdam	Netherlands	45	1	1	3,69	3,63
Munich	Germany	49	1	2	4,99	4,96
Geneva	Switzerland	3	0	0	0,22	0,09
Vancouver	Canada	459	0	1	3,66	3,6
Dusseldorf	Germany	7	0	0	0,49	0,37
Sydney	Australia	200	0	2	4,73	4,69
Toronto	Canada	459	1	1	4,66	4,62
Melbourne	Australia	300	2	2	6,84	6,84
Bern	Switzerland	7	0	0	0,49	0,37
San Francisco	United States	5.039	0	1	3,75	3,69
Copenhagen	Denmark	32	0	0	1,31	1,21
Boston	United States	116	2	0	4,11	4,05
Paris	France	261	4	1	7,54	7,55
Ottawa	Canada	27	0	0	1,17	1,06
London	United Kingdom	548	5	2	9,95	10
Frankfurt	Germany	15	0	1	2,06	1,97
Stockholm	Sweden	33	0	2	3,85	3,79
New York City	United States	1.080	4	2	8,97	9
Auckland	New Zealand	10	0	0	0,65	0,53
Singapore	Singapore	73	1	0	2,84	2,76
Adelaide	Australia	150	0	0	2,21	2,13
Canberra	Australia	3	0	0	0,22	0,09
Hamburg	Germany	98	0	0	1,94	1,85
Montreal	Canada	136	1	2	5,70	5,67
Washington, D.C.	United States	297	2	0	4,32	4,27
Tokyo	Japan	255	1	1	4,52	4,47
Basel	Switzerland	1	1	0	1,13	1,02
Oslo	Norway	1	0	2	2,63	2,55
Wellington	New Zealand	50	0	0	1,58	1,48
Chicago	United States	330	2	1	5,63	5,6
Helsinki	Finland	22	0	1	2,31	2,23
Luxembourg	Luxembourg	5	0	0	0,32	0,2
Seattle	United States	102	0	1	3,27	3,2

Brussels	Belgium	21	0	1	2,29	2,21
Dublin	Ireland	64	1	1	4,00	3,94
Stuttgart	Germany	7	0	0	0,49	0,37
Barcelona	Spain	51	3	2	7,10	7,1
Los Angeles	United States	1.125	2	2	6,98	6,98
Milan	Italy	94	3	1	6,16	6,14
Madrid	Spain	65	4	0	5,76	5,74
Baltimore	United States	63	0	0	1,71	1,61
Seoul	South Korea	70	0	2	4,32	4,27
Philadelphia	United States	102	1	0	3,02	2,94
Dallas	United States	32	1	0	2,31	2,23
Lyon	France	16	1	0	1,86	1,77
Edinburgh	United Kingdom	32	0	1	2,56	2,48
Linz	Austria	1	0	0	0,13	0
Lisbon	Portugal	23	2	0	3,08	3,01
Phoenix	United States	21	1	0	2,04	1,95
Houston	United States	100	1	0	2,96	2,89
Rome	Italy	50	3	1	5,83	5,81
Yokohama	Japan	12	0	0	0,70	0,59
Cologne	Germany	64	0	0	1,75	1,65
Florence	Italy	36	0	0	1,37	1,27
Prague	Czech Republic	46	0	0	1,46	1,36
Málaga	Spain	3	0	0	0,22	0,09
Hong Kong	Hong Kong	81	0	0	1,85	1,76
Birmingham	United Kingdom	10	0	0	0,65	0,53
Liverpool	United Kingdom	49	1	0	2,49	2,41
Atlanta	United States	59	1	1	3,94	3,88
Miami	United States	129	2	0	4,18	4,13
Eindhoven	Netherlands	1	1	0	1,13	1,02
Rotterdam	Netherlands	7	0	0	0,49	0,37
Manchester	United Kingdom	21	2	0	3,04	2,97
Marseille	France	45	2	0	3,44	3,38
Nice	France	7	0	1	1,74	1,64
Osaka	Japan	19	0	1	2,19	2,1
Valencia	Spain	5	1	1	2,57	2,49
Antwerp	Belgium	11	0	0	0,67	0,55
Warsaw	Poland	32	0	0	1,31	1,21

Dubai	United Arab Emirates	26	1	0	2,15	2,06
Taipei	Taiwan	57	0	0	1,67	1,58
Tallinn	Estonia	9	1	0	1,59	1,49
Abu Dhabi	United Arab Emirates	8	1	0	1,56	1,46
Budapest	Hungary	33	1	0	2,35	2,27
Ljubljana	Slovenia	14	0	0	0,76	0,64
Vilnius	Lithuania	17	0	0	0,92	0,81
Bilbao	Spain	113	1	0	3,09	3,02
Bratislava	Slovakia	10	0	0	0,65	0,53
Gothenburg	Sweden	6	0	0	0,36	0,24
Riga	Latvia	6	0	0	0,36	0,24
Buenos Aires	Argentina	109	1	0	3,05	2,98
Kuala Lumpur	Malaysia	2	0	0	0,16	0,04
Montevideo	Uruguay	15	0	0	0,81	0,7
Santiago	Chile	41	0	0	1,39	1,28
Athens	Greece	20	2	1	4,22	4,17
Shanghai	China	123	1	1	4,41	4,36
Zagreb	Croatia	54	0	0	1,66	1,56
Porto	Portugal	1	1	1	2,38	2,29
Panama City	Panama	16	0	0	0,86	0,75
Wroclaw	Poland	32	0	0	1,31	1,21
Medellín	Colombia	53	0	0	1,64	1,54
Sofia	Bulgaria	50	0	0	1,58	1,48
Beijing	China	98	1	1	4,19	4,14
Tel Aviv	Israel	17	1	0	1,92	1,83
Mexico City	Mexico	25	1	2	4,62	4,57
Bucharest	Romania	14	0	0	0,76	0,64
Córdoba	Argentina	66	0	0	1,80	1,7
Bangkok	Thailand	26	0	1	2,40	2,32
Brasilia	Brazil	7	0	0	0,49	0,37
Jerusalem	Israel	45	0	0	1,44	1,34
Monterrey	Mexico	307	0	0	2,36	2,27
Guangzhou	China	8	0	0	0,56	0,44
Sao Paulo	Brazil	32	1	0	2,31	2,23
Cape Town	South Africa	9	0	0	0,59	0,48
Asuncion	Paraguay	86	0	0	1,87	1,78
Rio de Janeiro	Brazil	32	0	2	3,81	3,76
Istanbul	Turkey	94	2	0	3,91	3,85
Lima	Peru	31	0	0	1,19	1,08
Doha	Qatar	2	0	0	0,16	0,04
Bogota	Colombia	53	0	0	1,64	1,54

Durban	South Africa	123	0	0	2,16	2,07
Guadalajara	Mexico	1	0	0	0,13	0
Johannesburg	South Africa	123	0	0	2,16	2,07
Tunis	Tunisia	15	0	0	0,81	0,7
Quito	Ecuador	16	0	0	0,86	0,75
Shenzhen	China	4	0	0	0,25	0,13
Kuwait City	Kuwait	1	0	0	0,13	0
Moscow	Russia	106	1	1	4,28	4,23
Belgrade	Serbia	21	1	0	2,04	1,95
Chengdu	China	7	0	0	0,49	0,37
St Petersburg	Russia	25	1	0	2,12	2,03
Manila	Philippines	17	0	0	0,92	0,81
Kiev	Ukraine	5	1	0	1,32	1,22
Casablanca	Morocco	5	0	0	0,32	0,2
Ho Chi Minh City	Vietnam	50	0	0	1,58	1,48
Jakarta	Indonesia	66	0	0	1,80	1,7
Chongqing	China	13	0	0	0,72	0,61
Riyadh	Saudi Arabia	12	0	0	0,70	0,59
Ankara	Turkey	4	0	0	0,25	0,13
Hanoi	Vietnam	50	0	0	1,58	1,48
Mumbai	India	283	0	0	2,30	2,22
Shenyang	China	1	0	0	0,13	0
Bangalore	India	102	0	0	2,02	1,92
New Delhi	India	110	0	0	2,07	1,98
La Paz	Bolivia	20	0	0	0,97	0,86
Cairo	Egypt	8	0	0	0,56	0,44

XIII.- Magnetism. Identity. Summary

City	Country	HIS TORY	GOVER NANCE	REPU TATION	SPACE DENS	CLI MATE	GEO RISK	GEO ECONO MICS	GASTRO NOMY	EX-IMAGE	IDEN TITY	IDEN TITY INDEX
Zurich	Switzerland	8	9,12	9,88	4,18	5	8,58	8,7	9,96	1,46	6,68	8,33
Vienna	Austria	8	8,7	9,79	5,2	5,98	7,92	9,11	9,05	3,43	7,14	8,99
Berlin	Germany	6	9,06	7,71	1,39	4,81	8,28	8,12	7,88	4,64	6,05	7,42
Amsterdam	Netherlands	6	9,57	8,81	1,33	5,45	4,27	8,83	9,72	3,63	6,12	7,52
Munich	Germany	4	8,98	9,16	1,91	5,1	8,28	8,12	8,68	4,96	5,97	7,30
Geneva	Switzerland	6	9,12	9,88	1,65	6,38	8,58	8,7	9,93	0,09	6,03	7,39
Vancouver	Canada	0	9,7	9,39	2,36	5,64	7,79	3,34	6,65	3,6	4,59	5,31
Dusseldorf	Germany	4	8,98	6,89	1,22	5,35	8,28	8,12	7,18	0,37	4,95	5,83
Sydney	Australia	4	9,62	9,93	4,34	7,84	6,6	0,63	7,67	4,69	5,85	7,13
Toronto	Canada	2	9,7	9,39	1,16	5,07	7,79	2,66	6,32	4,62	4,85	5,69
Melbourne	Australia	3	9,54	9,49	0,57	7,54	6,6	0,63	6,97	6,84	5,46	6,57
Bern	Switzerland	6	9,12	9,88	3,59	4,69	8,58	8,7	10	0,37	6,02	7,38
San Francisco	United States	2	8,52	8,62	1,01	9,39	7,19	4,05	7,85	3,69	5,33	6,38
Copenhagen	Denmark	4	9,64	9,81	1,69	4,32	8,1	8,21	9,31	1,21	5,44	6,54
Boston	United States	3	8,43	7,64	0,37	7,53	7,19	2,66	6,46	4,05	4,93	5,80
Paris	France	9	8,18	8,01	1,07	6,55	8,32	8,54	9,56	7,55	7,39	9,35
Ottawa	Canada	2	9,7	9,39	2,08	3,99	7,79	2,42	6,43	1,06	4,23	4,79
London	United Kingdom	9	8,9	8,74	3,96	4,76	7,57	8,49	8,86	10	7,84	10,00
Frankfurt	Germany	5	8,98	8,53	3,01	5,07	8,28	8,12	8,5	1,97	5,76	7,00
Stockholm	Sweden	5	9,64	9,98	4,18	3,95	8,46	8,71	9,01	3,79	6,29	7,76
New York City	United States	5	8,43	8,41	2,34	8,34	7,19	2,66	7,89	9	6,54	8,13
Auckland	New Zealand	3	9,28	9,51	1,09	7,53	6,45	0,04	5,99	0,53	4,42	5,07
Singapore	Singapore	3	7,86	7,97	6,76	1,83	8,21	1,07	6,95	2,76	4,41	5,05
Adelaide	Australia	2	9,54	9,49	1,75	7,98	6,6	0,63	8,25	2,13	4,8	5,62
Canberra	Australia	0	9,54	9,49	1,87	7,89	6,6	0,63	9,27	0,09	4,14	4,66
Hamburg	Germany	7	8,98	6,89	1,86	4,6	8,28	8,12	8,72	1,85	5,8	7,06
Montreal	Canada	4	9,7	9,39	1,35	3,92	7,79	2,66	6,28	5,67	5,25	6,26
Washington, D.C.	United States	2	8,43	7,06	1,22	9,18	7,19	3,74	7,49	4,27	5,2	6,19
Tokyo	Japan	6	9,36	10,00	1,12	6,22	2,77	8,99	7,23	4,47	6,25	7,71
Basel	Switzerland	5	9,12	9,88	1,37	5,23	8,58	8,7	9,85	1,02	5,77	7,01
Oslo	Norway	4	10	9,84	6,9	3,59	8,35	8,63	8,46	2,55	6,1	7,49
Wellington	New Zealand	3	9,28	9,51	3,21	7	6,45	0,04	7,2	1,48	4,76	5,56
Chicago	United States	2	8,43	6,24	0,34	7	7,19	3,96	7,59	5,6	4,93	5,80

Helsinki	Finland	2	9,67	9,95	3,72	3,1	8,67	4,89	7,84	2,23	4,85	5,69
Luxembourg	Luxembourg	7	8,76	7,94	1,08	4,41	8,33	8,37	9,71	0,2	5,61	6,78
Seattle	United States	0	8,43	7,92	1,05	6,99	7,19	3,34	6,39	3,2	4,28	4,87
Brussels	Belgium	7	7,79	7,85	1,76	5,49	7,98	8,66	9,67	2,21	6,04	7,40
Dublin	Ireland	7	9,43	8,67	2,7	5,4	6,7	7,18	9,02	3,94	6,39	7,91
Stuttgart	Germany	5	8,98	6,89	1,42	4,74	8,28	8,12	8,79	0,37	5,16	6,13
Barcelona	Spain	8	8,14	8,76	1,84	8,4	7,44	7,69	8,13	7,1	7,35	9,29
Los Angeles	United States	2	8,43	7,15	3,28	8,68	7,19	4,05	5,62	6,98	5,68	6,88
Milan	Italy	9	7,17	8,90	2,62	6,22	6,53	8,61	8,47	6,14	7,13	8,98
Madrid	Spain	8	8,16	8,67	3,93	8,95	7,44	7,69	8,06	5,74	7,42	9,39
Baltimore	United States	1	8,43	4,07	0,27	8,17	7,19	3,74	5,73	1,61	3,96	4,40
Seoul	South Korea	9	8,75	6,33	4,29	6,32	7,75	9,27	5,51	4,27	6,92	8,67
Philadelphia	United States	4	8,43	4,07	0,63	8,5	7,19	2,66	5,22	2,94	4,72	5,50
Dallas	United States	0	8,15	4,07	0,34	8,1	7,19	2,54	5,04	2,23	3,67	3,99
Lyon	France	8	8,18	7,08	1,84	6,53	8,32	8,54	9,52	1,77	6,3	7,78
Edinburgh	United Kingdom	7	8,9	8,62	2,12	4,62	7,57	8,49	9,04	2,48	6,11	7,50
Linz	Austria	7	8,7	8,55	2,13	6,06	7,92	9,11	8,24	0	5,97	7,30
Lisbon	Portugal	6	7,96	7,69	2,12	9,22	7,45	5,4	7,7	3,01	6,11	7,50
Phoenix	United States	0	8,43	4,07	0,78	6,74	7,19	4,54	5,44	1,95	3,72	4,06
Houston	United States	0	8,43	4,07	0,86	6,52	7,19	2,54	5,88	2,89	3,66	3,97
Rome	Italy	10	6,94	9,39	4,04	8,73	6,53	8,61	8,07	5,81	7,81	9,96
Yokohama	Japan	0	9,21	9,09	1,89	6,31	2,77	8,99	7,23	0,59	4,45	5,11
Cologne	Germany	6	8,98	6,89	2,45	5,26	8,28	8,12	8,39	1,65	5,71	6,93
Florence	Italy	9	6,94	8,41	1,65	8,82	6,53	8,61	9,17	1,27	6,66	8,30
Prague	Czech Republic	7	6,37	8,27	2,58	4,43	7,82	10	7,26	1,36	5,74	6,97
Málaga	Spain	7	8,14	7,97	2,05	8,17	7,44	7,69	7,33	0,09	5,96	7,29
Hong Kong	Hong Kong	8	6,82	7,17	10	1,66	5,5	6,54	6,08	1,76	5,75	6,99
Birmingham	United Kingdom	5	8,9	7,71	1,53	4,36	7,57	8,49	6,85	0,53	5,12	6,08
Liverpool	United Kingdom	6	8,9	7,71	1,58	5,02	7,57	8,49	7,47	2,41	5,73	6,96
Atlanta	United States	0	8,43	6,14	0,72	7,86	7,19	4,95	5,29	3,88	4,41	5,05
Miami	United States	1	8,43	7,55	0,6	5,09	7,19	2,71	6,72	4,13	4,21	4,76
Eindhoven	Netherlands	4	9,57	8,81	3,1	4,9	4,27	8,83	9,76	1,02	5,42	6,51
Rotterdam	Netherlands	6	9,57	8,81	1,37	5,59	4,27	8,83	8,74	0,37	5,6	6,77
Manchester	United Kingdom	8	8,9	7,71	2,55	5,42	7,57	8,49	7,25	2,97	6,36	7,87
Marseille	France	7	8,18	7,08	2,39	8,89	8,32	8,54	8,54	3,38	6,7	8,36

Nice	France	7	8,18	7,08	2,34	9,06	8,32	8,54	9,82	1,64	6,53	8,11
Osaka	Japan	0	9,21	9,09	2,14	6,59	2,77	8,99	7,81	2,1	4,78	5,59
Valencia	Spain	8	8,14	7,97	1,94	7,32	7,44	7,69	8,35	2,49	6,44	7,98
Antwerp	Belgium	5	7,79	7,85	1,08	5,57	7,98	8,66	9,64	0,55	5,34	6,39
Warsaw	Poland	5	5,6	4,79	1,97	4,06	7,84	8,94	6,87	1,21	4,66	5,41
Dubai	United Arab Emirates	4	3,85	6,92	0	5,21	7,27	0,46	4,48	2,06	3,6	3,88
Taipei	Taiwan	2	7,91	5,51	1,43	1,9	5,5	6,54	2,9	1,58	3,48	3,71
Tallinn	Estonia	6	6,52	5,61	1,13	3,61	8,59	4,66	5,92	1,49	4,48	5,15
Abu Dhabi	United Arab Emirates	1	3,85	3,95	0,1	5,1	7,27	0,46	6,09	1,46	2,69	2,57
Budapest	Hungary	8	5,6	7,10	1,35	5,68	6,23	9,11	6,72	2,27	5,76	7,00
Ljubljana	Slovenia	8	6,24	5,84	0,51	4,23	7,53	6,1	5,13	0,64	4,83	5,66
Vilnius	Lithuania	5	6,24	5,61	4,33	3,15	8,39	5,69	4,24	0,81	4,41	5,05
Bilbao	Spain	6	8,16	7,97	3,73	6,36	7,44	7,69	9,3	3,02	6,2	7,63
Bratislava	Slovakia	5	5,99	5,84	2,06	5,75	7,65	9,11	6,4	0,53	4,94	5,82
Gothenburg	Sweden	2	9,64	9,98	1,89	5,17	8,46	8,71	9,12	0,24	5,11	6,06
Riga	Latvia	6	6,22	5,37	1,3	3,47	7,87	4,66	5,21	0,24	4,17	4,71
Buenos Aires	Argentina	5	5,69	4,95	1,27	8,1	7,38	0,42	4,86	2,98	4,51	5,20
Kuala Lumpur	Malaysia	0	5,33	4,84	0,18	1,66	4,06	1,07	3,41	0,04	1,77	1,25
Montevideo	Uruguay	1	6,67	4,67	1,28	9,55	0,07	1,45	4,75	0,7	3,39	3,58
Santiago	Chile	2	6,48	4,95	1,61	7,75	0,12	0,41	3,92	1,28	3,3	3,45
Athens	Greece	10	6,19	7,59	2,23	7,25	4,65	2,62	6,67	4,17	6,14	7,55
Shanghai	China	8	2,33	6,00	2,23	6,93	5,5	9,44	4,25	4,36	5,78	7,03
Zagreb	Croatia	4	5,57	5,37	2,17	6,31	7,03	6,65	6,79	1,56	4,65	5,40
Porto	Portugal	7	7,96	7,69	1,16	8,75	7,45	5,4	7,81	2,29	6,04	7,40
Panama City	Panama	3	5,73	4,91	2,08	5	3,99	0,17	5,22	0,75	3,21	3,32
Wroclaw	Poland	7	5,6	4,79	1,97	4,16	7,84	8,94	6,47	1,21	5,05	5,98
Medellín	Colombia	2	3,82	1,47	4,14	4,27	4,89	0,17	3,76	1,54	2,66	2,53
Sofia	Bulgaria	8	5,9	5,37	2,84	5,66	6,93	6,93	4,53	1,48	5,35	6,41
Beijing	China	7	2,33	2,03	1,17	7,7	5,5	6,58	3,08	4,14	4,82	5,64
Tel Aviv	Israel	2	6,61	3,53	2,72	8,17	7,62	0,98	5,4	1,83	3,94	4,38
Mexico City	Mexico	6	3,94	3,18	1,89	8,08	5,36	1,8	3,85	4,57	4,64	5,38
Bucharest	Romania	5	5,51	2,22	2,58	6,38	5,66	5,78	4,2	0,64	4,16	4,69
Córdoba	Argentina	4	5,69	4,95	2,06	8,38	7,38	0,42	5,15	1,7	4,25	4,82
Bangkok	Thailand	1	3,57	5,79	1,13	3,75	4,98	0,57	4,47	2,32	2,69	2,57
Brasilia	Brazil	3	4,4	4,32	4	5,47	6,35	0,97	6,36	0,37	3,48	3,71
Jerusalem	Israel	9	6,61	5,51	1,65	10	7,62	0,31	6,68	1,34	5,62	6,80
Monterrey	Mexico	4	3,94	3,13	1,33	4,86	5,36	1,8	3,74	2,27	3,34	3,51
Guangzhou	China	6	2,33	2,03	2,23	3,01	5,5	6,54	2,46	0,44	3,43	3,64
Sao Paulo	Brazil	4	4,4	4,32	3,37	5,35	6,35	1,01	5,77	2,23	3,85	4,25
Cape Town	South Africa	4	4,38	3,64	2,94	8,85	5,04	0,11	2,66	0,48	3,69	4,01
Asuncion	Paraguay	2	3,21	4,67	1,2	5,98	7,55	1,32	2,22	1,78	3,09	3,15

Rio de Janeiro	Brazil	5	4,4	5,30	3,73	5,54	6,35	1,99	5,99	3,76	4,55	5,25
Istanbul	Turkey	9	3,08	4,39	2,01	8,33	6,14	2,72	1,32	3,85	5,22	6,22
Lima	Peru	5	3,86	4,91	3,39	4,02	4,84	0,11	2,49	1,08	3,36	3,54
Doha	Qatar	1	4,16	2,92	0,81	4,46	10	0,02	4,85	0,04	2,41	2,17
Bogota	Colombia	4	3,82	1,47	4,4	6,99	4,89	0,17	3,17	1,54	3,47	3,70
Durban	South Africa	0	4,38	3,64	1,53	6,52	5,04	0,11	2,73	2,07	2,64	2,50
Guadalajara	Mexico	4	3,94	3,13	0,93	7,23	5,36	0,51	3,66	0	3,19	3,29
Johannesburg	South Africa	2	4,38	3,64	2,53	9,84	5,04	0,11	2,33	2,07	3,62	3,91
Tunis	Tunisia	9	3,31	1,43	0,85	8,08	5,58	3,91	3,14	0,7	4,5	5,18
Quito	Ecuador	5	3,27	4,67	1,26	7,46	3,35	0,27	2,5	0,75	3,47	3,70
Shenzhen	China	3	2,33	2,03	5,26	2,65	5,5	6,54	2,43	0,13	3,03	3,06
Kuwait City	Kuwait	2	2,75	3,97	2,36	3,99	6,6	0	4,99	0	2,49	2,28
Moscow	Russia	7	2,32	2,87	1,73	1,78	7,39	3,96	4,03	4,23	3,96	4,40
Belgrade	Serbia	7	5,44	5,37	1,33	7,16	6,05	6,95	4,99	1,95	5,23	6,24
Chengdu	China	9	2,33	2,03	5,19	5,87	5,5	6,1	2,57	0,37	4,7	5,47
St Petersburg	Russia	4	2,32	6,36	1,09	1,85	7,39	3,96	4,14	2,03	3,33	3,50
Manila	Philippines	6	4,02	3,81	3,24	1,43	0	6,54	1,49	0,81	3,37	3,55
Kiev	Ukraine	7	4,35	0,00	1,05	3,94	8,09	4,58	4,76	1,22	3,81	4,19
Casablanca	Morocco	7	2,14	1,43	3,93	8,22	5,51	0,77	2,18	0,2	3,87	4,27
Ho Chi Minh City	Vietnam	1	1,21	3,88	1,39	1,92	1,86	0,73	1,49	1,48	1,6	1,00
Jakarta	Indonesia	5	3,27	4,35	2,86	4,48	1,64	0,74	0,82	1,7	3,17	3,26
Chongqing	China	9	2,33	2,03	2,32	5	5,5	6,1	2,68	0,61	4,33	4,94
Riyadh	Saudi Arabia	1	1,03	0,35	0,59	3,59	9,41	0,28	2,04	0,59	1,62	1,03
Ankara	Turkey	7	3,08	2,31	1,54	6,71	6,14	0,36	1,46	0,13	3,54	3,80
Hanoi	Vietnam	7	1,21	3,88	2,14	1,86	1,86	6,32	1,35	1,48	3,42	3,63
Mumbai	India	5	4,08	4,04	6,38	0	4,74	1,14	0,14	2,22	3,14	3,22
Shenyang	China	9	2,33	2,03	0,97	5,26	5,5	6,58	2,31	0	4,17	4,71
Bangalore	India	2	4,08	4,04	2,58	6,06	4,74	1,14	0,88	1,92	3,06	3,11
New Delhi	India	0	3,65	4,04	4,45	5,31	4,74	1,14	0	1,98	2,66	2,53
La Paz	Bolivia	2	2,18	4,67	2,08	5,56	6,26	0,06	2,19	0,86	2,68	2,56
Cairo	Egypt	8	0	2,94	1,73	7,07	8,76	1,69	1,12	0,44	3,86	4,26

XIV.- Magnetism. Dynamism. Competitiveness.

		CREATIVITY	ECONOMIC COMPE TITIVENESS	CITIES IN MOTION	TALENT COMPE TITIVENESS		
City	Country	CREA INDEX	GCI	CIMI	GTCI-CITY	COMPE TITIVENESS	COMPE TITIVENESS NOR
Zurich	Switzerland	0,822	82,3	76,66	58,8	7,89	8,10
Vienna	Austria	0,788	76,6	78,85	52,6	7,15	7,32
Berlin	Germany	0,837	81,8	80,88	51,7	7,73	7,93
Amsterdam	Netherlands	0,889	82,4	86,7	57,3	8,39	8,63
Munich	Germany	0,837	81,8	72,71	61,9	7,91	8,12
Geneva	Switzerland	0,822	82,3	69,78	53,9	7,44	7,63
Vancouver	Canada	0,920	79,6	63,15	54,7	7,36	7,54
Dusseldorf	Germany	0,837	81,8	64,34	52,2	7,19	7,36
Sydney	Australia	0,970	78,7	75,26	61,2	8,15	8,38
Toronto	Canada	0,920	79,6	75,3	60,2	8,01	8,23
Melbourne	Australia	0,970	78,7	75,08	56,8	7,95	8,16
Bern	Switzerland	0,822	82,3	70,03	54	7,46	7,64
San Francisco	United States	0,950	83,7	75,97	68,1	8,79	9,06
Copenhagen	Denmark	0,917	81,2	81,8	59,7	8,32	8,56
Boston	United States	0,950	83,7	72,91	66,8	8,63	8,89
Paris	France	0,822	78,8	86,23	65,7	8,26	8,49
Ottawa	Canada	0,920	79,6	66,68	48,8	7,22	7,38
London	United Kingdom	0,881	81,2	100	71,7	9,36	9,66
Frankfurt	Germany	0,837	81,8	69,39	46,6	7,12	7,28
Stockholm	Sweden	0,915	81,2	77,89	57,9	8,11	8,33
New York City	United States	0,950	83,7	94,63	73,7	9,67	10,00
Auckland	New Zealand	0,949	76,7	69,1	44,6	6,98	7,14
Singapore	Singapore	0,896	84,8	82,73	71,4	9,08	9,37
Adelaide	Australia	0,970	78,7	74	55	7,83	8,04
Canberra	Australia	0,970	78,7	74	55	7,83	8,04
Hamburg	Germany	0,837	81,8	69,23	49,4	7,24	7,40
Montreal	Canada	0,920	79,6	66,82	55,8	7,53	7,72
Washington, D.C.	United States	0,950	83,7	73,14	56,2	8,17	8,40

Tokyo	Japan	0,708	82,3	84,11	65,7	8,09	8,32
Basel	Switzerland	0,822	82,3	70,39	55	7,51	7,70
Oslo	Norway	0,883	78,1	77,45	51	7,45	7,63
Wellington	New Zealand	0,949	76,7	72,82	44	7,08	7,24
Chicago	United States	0,950	83,7	75,55	60	8,42	8,67
Helsinki	Finland	0,917	80,2	74,08	54,6	7,76	7,96
Luxembourg	Luxembourg	0,696	77	62	49,4	6,18	6,28
Seattle	United States	0,950	83,7	61,96	59,6	7,94	8,16
Brussels	Belgium	0,817	76,4	64,79	51,7	6,72	6,85
Dublin	Ireland	0,845	75,1	68,19	60,1	7,19	7,36
Stuttgart	Germany	0,837	81,8	64,01	46	6,91	7,05
Barcelona	Spain	0,811	75,3	72,25	55,8	7,05	7,20
Los Angeles	United States	0,950	83,7	76,04	62,8	8,56	8,82
Milan	Italy	0,715	71,5	65,94	51,2	6,04	6,13
Madrid	Spain	0,811	75,3	73,02	56,4	7,10	7,26
Baltimore	United States	0,950	83,7	59,86	55	7,67	7,86
Seoul	South Korea	0,660	78,8	78,13	56,7	7,07	7,23
Philadelphia	United States	0,950	83,7	63,27	51,1	7,61	7,80
Dallas	United States	0,950	83,7	65,13	56,1	7,89	8,11
Lyon	France	0,822	78,8	62,56	46,3	6,60	6,72
Edinburgh	United Kingdom	0,881	81,2	65,06	50,9	7,25	7,42
Linz	Austria	0,788	76,6	55,89	50	6,26	6,37
Lisbon	Portugal	0,710	70,4	65,32	46,2	5,70	5,76
Phoenix	United States	0,950	83,7	65,73	58	8,00	8,22
Houston	United States	0,950	83,7	61,74	57,5	7,84	8,05
Rome	Italy	0,715	71,5	59,09	43,9	5,48	5,54
Yokohama	Japan	0,708	82,3	84,11	43,3	7,10	7,26
Cologne	Germany	0,837	81,8	64,19	46	6,91	7,06
Florence	Italy	0,715	71,5	49,54	43	5,12	5,15
Prague	Czech Republic	0,609	70,9	64,97	44,1	5,31	5,35
Málaga	Spain	0,811	75,3	57,59	41	5,89	5,97
Hong Kong	Hong Kong	0,715	83,1	78,76	66,4	8,03	8,24

Birmingham	United Kingdom	0,881	81,2	61,3	42,8	6,77	6,90
Liverpool	United Kingdom	0,881	81,2	53,52	50	6,82	6,97
Atlanta	United States	0,950	83,7	62	56,4	7,80	8,01
Miami	United States	0,950	83,7	66,31	55,9	7,93	8,14
Eindhoven	Netherlands	0,889	82,4	62,35	48,2	7,16	7,32
Rotterdam	Netherlands	0,889	82,4	65,38	47,4	7,23	7,39
Manchester	United Kingdom	0,881	81,2	58,05	52	7,07	7,22
Marseille	France	0,822	78,8	55,1	39,3	6,03	6,12
Nice	France	0,822	78,8	56,09	42	6,19	6,29
Osaka	Japan	0,708	82,3	60,5	51,8	6,68	6,81
Valencia	Spain	0,811	75,3	61,52	41	6,03	6,12
Antwerp	Belgium	0,817	76,4	59,84	46,2	6,30	6,41
Warsaw	Poland	0,516	68,9	60,13	50,3	4,98	5,00
Dubai	United Arab Emirates	0,800	75	52,92	49,3	6,05	6,14
Taipei	Taiwan	0,700	80,2	50,5	50,8	6,11	6,21
Tallinn	Estonia	0,625	70,9	60,96	39,8	5,03	5,06
Abu Dhabi	United Arab Emirates	0,800	75	42,12	45,5	5,51	5,57
Budapest	Hungary	0,673	65,1	59,65	40,1	4,72	4,72
Ljubljana	Slovenia	0,822	70,2	54,41	42,2	5,49	5,54
Vilnius	Lithuania	0,490	68,4	59,15	41,6	4,44	4,42
Bilbao	Spain	0,811	75,3	50,14	41,9	5,68	5,75
Bratislava	Slovakia	0,484	66,8	59,92	39,3	4,22	4,19
Gothenburg	Sweden	0,915	81,2	68,65	49,6	7,43	7,61
Riga	Latvia	0,563	67	56,27	37,6	4,29	4,26
Buenos Aires	Argentina	0,681	57,2	58,42	40,9	4,14	4,10
Kuala Lumpur	Malaysia	0,455	74,6	52,83	47	4,82	4,83
Montevideo	Uruguay	0,688	63,5	38	29,1	3,42	3,34
Santiago	Chile	0,611	70,5	60,96	41	5,01	5,04
Athens	Greece	0,484	62,6	50,71	36,4	3,46	3,38
Shanghai	China	0,462	73,9	61,78	54	5,41	5,45
Zagreb	Croatia	0,481	61,9	53,3	32,5	3,32	3,23
Porto	Portugal	0,710	70,4	54,76	45	5,29	5,33
Panama City	Panama	0,482	61,6	47,51	26	2,81	2,69
Wroclaw	Poland	0,516	68,9	53,39	49	4,69	4,69
Medellín	Colombia	0,410	62,7	40,67	26,2	2,45	2,30
Sofia	Bulgaria	0,505	64,9	46,71	36,2	3,56	3,49

Beijing	China	0,462	73,9	56,81	52,9	5,19	5,22
Tel Aviv	Israel	0,665	76,7	57,47	43,1	5,63	5,69
Mexico City	Mexico	0,407	64,9	40,79	38,5	3,15	3,05
Bucharest	Romania	0,425	64,4	51,49	41,3	3,66	3,59
Córdoba	Argentina	0,681	57,2	38,38	39	3,38	3,29
Bangkok	Thailand	0,365	68,1	51,35	47,1	4,00	3,96
Brasilia	Brazil	0,667	60,9	41,84	24,7	3,09	2,99
Jerusalem	Israel	0,665	76,7	43,27	42	5,10	5,13
Monterrey	Mexico	0,407	64,9	39	35	2,94	2,82
Guangzhou	China	0,462	73,9	48,4	39,2	4,30	4,27
Sao Paulo	Brazil	0,667	60,9	40,9	41,8	3,82	3,76
Cape Town	South Africa	0,564	62,4	30,68	27,7	2,64	2,50
Asuncion	Paraguay	0,303	53,6	37,25	24	1,21	0,98
Rio de Janeiro	Brazil	0,667	60,9	42,08	27,3	3,22	3,12
Istanbul	Turkey	0,348	62,1	45,85	40,5	3,01	2,91
Lima	Peru	0,418	61,7	38,14	30,8	2,51	2,37
Doha	Qatar	0,255	72,9	42,14	42,2	3,49	3,41
Bogota	Colombia	0,410	62,7	46,01	28,4	2,72	2,60
Durban	South Africa	0,564	62,4	29	26	2,51	2,36
Guadalajara	Mexico	0,407	64,9	39	34	2,89	2,78
Johannesburg	South Africa	0,564	62,4	25,95	27,3	2,46	2,32
Tunis	Tunisia	0,260	56,4	31,36	22,3	1,01	0,77
Quito	Ecuador	0,532	55,7	38,19	25,9	2,20	2,04
Shenzhen	China	0,462	73,9	45,28	42,4	4,33	4,31
Kuwait City	Kuwait	0,351	65,1	35,61	31,1	2,49	2,34
Moscow	Russia	0,579	66,7	55,91	47,7	4,75	4,76
Belgrade	Serbia	0,484	60,9	44,86	34,6	3,06	2,95
Chengdu	China	0,462	73,9	48	35,4	4,11	4,08
St Petersburg	Russia	0,579	66,7	44,12	35,2	3,80	3,74
Manila	Philippines	0,487	61,9	27,73	33,5	2,52	2,37
Kiev	Ukraine	0,518	57	49,11	26,3	2,64	2,51
Casablanca	Morocco	0,178	60	32,31	31,1	1,44	1,23
Ho Chi Minh City	Vietnam	0,377	61,5	43,49	34,2	2,70	2,57
Jakarta	Indonesia	0,202	64,6	35,96	35,3	2,18	2,01
Chongqing	China	0,462	73,9	48	35	4,10	4,06
Riyadh	Saudi Arabia	0,362	70	27,71	36,8	2,88	2,76
Ankara	Turkey	0,348	62,1	39,61	28,1	2,25	2,09
Hanoi	Vietnam	0,377	61,5	42,08	23,4	2,17	2,01
Mumbai	India	0,292	61,4	28,36	42,1	2,27	2,11
Shenyang	China	0,462	73,9	48	34	4,05	4,01

Bangalore	India	0,292	61,4	32,65	38	2,23	2,07
New Delhi	India	0,292	61,4	26,52	30,6	1,69	1,50
La Paz	Bolivia	0,500	51,8	35,12	23	1,57	1,37
Cairo	Egypt	0,196	54,5	26,74	17,4	0,29	0,00

XV.- Magnetism. Dynamism. Expat Social Experience.

City	Country	Life Style - Quality	People Around	Relationship - Social Life	Life Style - Quality NOR	People Around NOR	Relationship - Social Life NOR	Expat Experience	Expat Experience NOR
Zurich	Switzerland	0,57	0,50	0,25	6,85	3,08	0,63	10,55	3,52
Vienna	Austria	0,60	0,58	0,33	7,69	6,15	3,13	16,97	5,98
Berlin	Germany	0,57	0,59	0,39	6,92	6,54	5,00	18,46	6,56
Amsterdam	Netherlands	0,51	0,58	0,43	5,38	6,15	6,25	17,79	6,30
Munich	Germany	0,57	0,59	0,39	6,92	6,54	5,00	18,46	6,56
Geneva	Switzerland	0,57	0,50	0,25	6,85	3,08	0,63	10,55	3,52
Vancouver	Canada	0,59	0,63	0,49	7,44	8,08	8,13	23,64	8,54
Dusseldorf	Germany	0,57	0,59	0,39	6,92	6,54	5,00	18,46	6,56
Sydney	Australia	0,61	0,62	0,38	7,95	7,69	4,69	20,33	7,27
Toronto	Canada	0,59	0,63	0,49	7,44	8,08	8,13	23,64	8,54
Melbourne	Australia	0,61	0,62	0,38	7,95	7,69	4,69	20,33	7,27
Bern	Switzerland	0,57	0,50	0,25	6,85	3,08	0,63	10,55	3,52
San Francisco	United States	0,49	0,52	0,33	4,87	3,85	3,13	11,84	4,01
Copenhagen	Denmark	0,57	0,51	0,35	6,92	3,46	3,75	14,13	4,89
Boston	United States	0,49	0,52	0,33	4,87	3,85	3,13	11,84	4,01
Paris	France	0,65	0,57	0,44	8,97	5,77	6,56	21,31	7,65
Ottawa	Canada	0,59	0,63	0,49	7,44	8,08	8,13	23,64	8,54
London	United Kingdom	0,44	0,51	0,34	3,59	3,46	3,44	10,49	3,49
Frankfurt	Germany	0,57	0,59	0,39	6,92	6,54	5,00	18,46	6,56
Stockholm	Sweden	0,57	0,51	0,35	6,92	3,46	3,75	14,13	4,89
New York City	United States	0,49	0,52	0,33	4,87	3,85	3,13	11,84	4,01
Auckland	New Zealand	0,59	0,68	0,47	7,44	10,00	7,50	24,94	9,04
Singapore	Singapore	0,57	0,67	0,45	6,92	9,62	6,88	23,41	8,46
Adelaide	Australia	0,61	0,62	0,38	7,95	7,69	4,69	20,33	7,27
Canberra	Australia	0,61	0,62	0,38	7,95	7,69	4,69	20,33	7,27
Hamburg	Germany	0,57	0,59	0,39	6,92	6,54	5,00	18,46	6,56
Montreal	Canada	0,59	0,63	0,49	7,44	8,08	8,13	23,64	8,54
Washington, D.C.	United States	0,49	0,52	0,33	4,87	3,85	3,13	11,84	4,01
Tokyo	Japan	0,56	0,62	0,30	6,67	7,69	2,19	16,55	5,82
Basel	Switzerland	0,57	0,50	0,25	6,85	3,08	0,63	10,55	3,52
Oslo	Norway	0,60	0,60	0,35	7,69	6,92	3,75	18,37	6,52
Wellington	New Zealand	0,59	0,68	0,47	7,44	10,00	7,50	24,94	9,04
Chicago	United States	0,49	0,52	0,33	4,87	3,85	3,13	11,84	4,01

Helsinki	Finland	0,57	0,51	0,35	6,92	3,46	3,75	14,13	4,89
Luxembourg	Luxembourg	0,57	0,59	0,39	6,92	6,54	5,00	18,46	6,56
Seattle	United States	0,49	0,52	0,33	4,87	3,85	3,13	11,84	4,01
Brussels	Belgium	0,47	0,46	0,34	4,36	1,54	3,44	9,33	3,05
Dublin	Ireland	0,44	0,56	0,38	3,59	5,38	4,69	13,66	4,71
Stuttgart	Germany	0,57	0,59	0,39	6,92	6,54	5,00	18,46	6,56
Barcelona	Spain	0,69	0,65	0,46	10,00	8,85	7,19	26,03	9,46
Los Angeles	United States	0,49	0,52	0,33	4,87	3,85	3,13	11,84	4,01
Milan	Italy	0,57	0,56	0,35	6,92	5,38	3,75	16,06	5,63
Madrid	Spain	0,69	0,67	0,48	10,00	9,62	7,81	27,43	10,00
Baltimore	United States	0,49	0,52	0,33	4,87	3,85	3,13	11,84	4,01
Seoul	South Korea	0,50	0,61	0,28	5,13	7,31	1,56	14,00	4,84
Philadelphia	United States	0,49	0,52	0,33	4,87	3,85	3,13	11,84	4,01
Dallas	United States	0,49	0,52	0,33	4,87	3,85	3,13	11,84	4,01
Lyon	France	0,65	0,57	0,44	8,97	5,77	6,56	21,31	7,65
Edinburgh	United Kingdom	0,44	0,51	0,34	3,59	3,46	3,44	10,49	3,49
Linz	Austria	0,60	0,58	0,33	7,69	6,15	3,13	16,97	5,98
Lisbon	Portugal	0,65	0,67	0,51	8,97	9,62	8,75	27,34	9,97
Phoenix	United States	0,49	0,52	0,33	4,87	3,85	3,13	11,84	4,01
Houston	United States	0,49	0,52	0,33	4,87	3,85	3,13	11,84	4,01
Rome	Italy	0,57	0,56	0,35	6,92	5,38	3,75	16,06	5,63
Yokohama	Japan	0,56	0,62	0,30	6,67	7,69	2,19	16,55	5,82
Cologne	Germany	0,57	0,59	0,39	6,92	6,54	5,00	18,46	6,56
Florence	Italy	0,57	0,56	0,35	6,92	5,38	3,75	16,06	5,63
Prague	Czech Republic	0,54	0,59	0,35	6,15	6,54	3,75	16,44	5,78
Málaga	Spain	0,69	0,66	0,48	10,00	9,23	7,81	27,04	9,85
Hong Kong	Hong Kong	0,46	0,60	0,45	4,10	6,92	6,88	17,90	6,34
Birmingham	United Kingdom	0,44	0,51	0,34	3,59	3,46	3,44	10,49	3,49
Liverpool	United Kingdom	0,44	0,51	0,34	3,59	3,46	3,44	10,49	3,49
Atlanta	United States	0,49	0,52	0,33	4,87	3,85	3,13	11,84	4,01
Miami	United States	0,49	0,52	0,33	4,87	3,85	3,13	11,84	4,01
Eindhoven	Netherlands	0,51	0,58	0,43	5,38	6,15	6,25	17,79	6,30
Rotterdam	Netherlands	0,51	0,58	0,43	5,38	6,15	6,25	17,79	6,30
Manchester	United Kingdom	0,44	0,51	0,34	3,59	3,46	3,44	10,49	3,49
Marseille	France	0,65	0,57	0,44	8,97	5,77	6,56	21,31	7,65
Nice	France	0,65	0,57	0,44	8,97	5,77	6,56	21,31	7,65
Osaka	Japan	0,56	0,62	0,30	6,67	7,69	2,19	16,55	5,82
Valencia	Spain	0,69	0,66	0,47	10,00	9,23	7,50	26,73	9,73

Antwerp	Belgium	0,47	0,46	0,34	4,36	1,54	3,44	9,33	3,05
Warsaw	Poland	0,47	0,53	0,27	4,36	4,23	1,25	9,84	3,24
Dubai	United Arab Emirates	0,47	0,57	0,41	4,36	5,77	5,63	15,75	5,52
Taipei	Taiwan	0,47	0,62	0,43	4,36	7,69	6,25	18,30	6,49
Tallinn	Estonia	0,47	0,53	0,27	4,36	4,23	1,25	9,84	3,24
Abu Dhabi	United Arab Emirates	0,47	0,57	0,41	4,36	5,77	5,63	15,75	5,52
Budapest	Hungary	0,47	0,53	0,27	4,36	4,23	1,25	9,84	3,24
Ljubljana	Slovenia	0,47	0,53	0,27	4,36	4,23	1,25	9,84	3,24
Vilnius	Lithuania	0,47	0,53	0,27	4,36	4,23	1,25	9,84	3,24
Bilbao	Spain	0,69	0,67	0,47	10,00	9,62	7,50	27,12	9,88
Bratislava	Slovakia	0,47	0,53	0,27	4,36	4,23	1,25	9,84	3,24
Gothenburg	Sweden	0,57	0,51	0,35	6,92	3,46	3,75	14,13	4,89
Riga	Latvia	0,47	0,53	0,27	4,36	4,23	1,25	9,84	3,24
Buenos Aires	Argentina	0,46	0,52	0,44	4,10	3,85	6,56	14,51	5,04
Kuala Lumpur	Malaysia	0,45	0,53	0,42	3,85	4,23	5,94	14,01	4,85
Montevideo	Uruguay	0,39	0,42	0,33	2,31	0,00	3,13	5,43	1,55
Santiago	Chile	0,46	0,52	0,44	4,10	3,85	6,56	14,51	5,04
Athens	Greece	0,57	0,56	0,35	6,92	5,38	3,75	16,06	5,63
Shanghai	China	0,34	0,46	0,30	1,03	1,54	2,19	4,75	1,29
Zagreb	Croatia	0,47	0,53	0,27	4,36	4,23	1,25	9,84	3,24
Porto	Portugal	0,65	0,67	0,51	8,97	9,62	8,75	27,34	9,97
Panama City	Panama	0,46	0,52	0,44	4,10	3,85	6,56	14,51	5,04
Wroclaw	Poland	0,47	0,53	0,27	4,36	4,23	1,25	9,84	3,24
Medellín	Colombia	0,59	0,59	0,51	7,44	6,54	8,75	22,72	8,19
Sofia	Bulgaria	0,47	0,53	0,27	4,36	4,23	1,25	9,84	3,24
Beijing	China	0,34	0,46	0,30	1,03	1,54	2,19	4,75	1,29
Tel Aviv	Israel	0,57	0,56	0,35	6,92	5,38	3,75	16,06	5,63
Mexico City	Mexico	0,59	0,59	0,51	7,44	6,54	8,75	22,72	8,19
Bucharest	Romania	0,47	0,53	0,27	4,36	4,23	1,25	9,84	3,24
Córdoba	Argentina	0,46	0,52	0,44	4,10	3,85	6,56	14,51	5,04
Bangkok	Thailand	0,55	0,51	0,45	6,41	3,46	6,88	16,75	5,90
Brasilia	Brazil	0,44	0,49	0,47	3,59	2,69	7,50	13,78	4,76
Jerusalem	Israel	0,57	0,56	0,35	6,92	5,38	3,75	16,06	5,63
Monterrey	Mexico	0,59	0,59	0,51	7,44	6,54	8,75	22,72	8,19
Guangzhou	China	0,34	0,46	0,30	1,03	1,54	2,19	4,75	1,29
Sao Paulo	Brazil	0,44	0,49	0,47	3,59	2,69	7,50	13,78	4,76
Cape Town	South Africa	0,51	0,46	0,44	5,38	1,54	6,56	13,49	4,64
Asuncion	Paraguay	0,39	0,42	0,33	2,31	0,00	3,13	5,43	1,55
Rio de Janeiro	Brazil	0,44	0,49	0,47	3,59	2,69	7,50	13,78	4,76
Istanbul	Turkey	0,56	0,60	0,41	6,67	6,92	5,63	19,21	6,85

Lima	Peru	0,39	0,42	0,33	2,31	0,00	3,13	5,43	1,55
Doha	Qatar	0,32	0,50	0,29	0,51	3,08	1,88	5,46	1,56
Bogota	Colombia	0,59	0,59	0,51	7,44	6,54	8,75	22,72	8,19
Durban	South Africa	0,51	0,46	0,44	5,38	1,54	6,56	13,49	4,64
Guadalajara	Mexico	0,59	0,59	0,51	7,44	6,54	8,75	22,72	8,19
Johannesburg	South Africa	0,51	0,46	0,44	5,38	1,54	6,56	13,49	4,64
Tunis	Tunisia	0,34	0,47	0,34	1,03	1,92	3,44	6,39	1,92
Quito	Ecuador	0,39	0,42	0,33	2,31	0,00	3,13	5,43	1,55
Shenzhen	China	0,34	0,46	0,30	1,03	1,54	2,19	4,75	1,29
Kuwait City	Kuwait	0,30	0,44	0,25	0,00	0,77	0,63	1,39	0,00
Moscow	Russia	0,41	0,56	0,35	2,82	5,38	3,75	11,96	4,06
Belgrade	Serbia	0,47	0,53	0,27	4,36	4,23	1,25	9,84	3,24
Chengdu	China	0,34	0,46	0,30	1,03	1,54	2,19	4,75	1,29
St Petersburg	Russia	0,41	0,56	0,35	2,82	5,38	3,75	11,96	4,06
Manila	Philippines	0,43	0,56	0,55	3,33	5,38	10,00	18,72	6,65
Kiev	Ukraine	0,41	0,56	0,35	2,82	5,38	3,75	11,96	4,06
Casablanca	Morocco	0,34	0,47	0,34	1,03	1,92	3,44	6,39	1,92
Ho Chi Minh City	Vietnam	0,39	0,51	0,37	2,31	3,46	4,38	10,14	3,36
Jakarta	Indonesia	0,42	0,54	0,41	3,08	4,62	5,63	13,32	4,58
Chongqing	China	0,34	0,46	0,30	1,03	1,54	2,19	4,75	1,29
Riyadh	Saudi Arabia	0,34	0,45	0,23	1,03	1,15	0,00	2,18	0,30
Ankara	Turkey	0,56	0,60	0,41	6,67	6,92	5,63	19,21	6,85
Hanoi	Vietnam	0,39	0,51	0,37	2,31	3,46	4,38	10,14	3,36
Mumbai	India	0,51	0,58	0,48	5,38	6,15	7,81	19,35	6,90
Shenyang	China	0,34	0,46	0,30	1,03	1,54	2,19	4,75	1,29
Bangalore	India	0,51	0,58	0,48	5,38	6,15	7,81	19,35	6,90
New Delhi	India	0,51	0,58	0,48	5,38	6,15	7,81	19,35	6,90
La Paz	Bolivia	0,39	0,42	0,33	2,31	0,00	3,13	5,43	1,55
Cairo	Egypt	0,34	0,47	0,34	1,03	1,92	3,44	6,39	1,92

XVI.- Magnetism. Dynamism. Ethics. Well-being.

City	Country	Happiness	World Giving Index SCORE %	Civic Engagement	Work-Life Balance	ETHICS	ETHICS NOR
Zurich	Switzerland	7541	45	3,4	8,4	7,64	8,20
Vienna	Austria	6998	45	4,8	6,8	7,11	7,57
Berlin	Germany	7076	43	5,3	8,4	7,54	8,08
Amsterdam	Netherlands	7449	53	7,8	9,5	9,16	10,00
Munich	Germany	7076	43	5,3	8,4	7,54	8,08
Geneva	Switzerland	7541	45	3,4	8,4	7,64	8,20
Vancouver	Canada	7232	55	6,8	7,3	8,36	9,05
Dusseldorf	Germany	7076	43	5,3	8,4	7,54	8,08
Sydney	Australia	7133	56	8,9	5,6	8,43	9,14
Toronto	Canada	7298	55	6,8	7,3	8,42	9,13
Melbourne	Australia	7296	56	8,9	5,6	8,58	9,32
Bern	Switzerland	7541	45	3,4	8,4	7,64	8,20
San Francisco	United States	6940	58	7	6	8,00	8,63
Copenhagen	Denmark	7530	44	7	9	8,52	9,24
Boston	United States	7091	58	7	6	8,14	8,79
Paris	France	6635	30	5,8	8,7	6,68	7,06
Ottawa	Canada	7232	55	6,8	7,3	8,36	9,05
London	United Kingdom	6782	54	7,2	6,4	7,79	8,38
Frankfurt	Germany	7076	43	5,3	8,4	7,54	8,08
Stockholm	Sweden	7373	40	6,8	8,4	8,01	8,64
New York City	United States	6964	58	7	6	8,02	8,65
Auckland	New Zealand	7232	57	7,3	5,9	8,27	8,95
Singapore	Singapore	6498	35	0	5	4,71	4,71
Adelaide	Australia	7133	56	8,9	5,6	8,43	9,14
Canberra	Australia	7133	56	8,9	5,6	8,43	9,14
Hamburg	Germany	7076	43	5,3	8,4	7,54	8,08
Montreal	Canada	7232	55	6,8	7,3	8,36	9,05
Washington, D.C.	United States	7185	58	7	6	8,23	8,90
Tokyo	Japan	5989	23	1,9	4,6	4,00	3,87
Basel	Switzerland	7541	45	3,4	8,4	7,64	8,20
Oslo	Norway	7464	41	6,4	8,5	8,08	8,71
Wellington	New Zealand	7553	57	7,3	5,9	8,58	9,31
Chicago	United States	7033	58	7	6	8,09	8,73

Helsinki	Finland	7828	41	5,2	8	8,04	8,68
Luxembourg	Luxembourg	7238	40	6,9	8	7,82	8,41
Seattle	United States	6940	58	7	6	8,00	8,63
Brussels	Belgium	6674	36	7,4	8,4	7,30	7,79
Dublin	Ireland	7096	56	3,1	7,9	7,58	8,12
Stuttgart	Germany	7076	43	5,3	8,4	7,54	8,08
Barcelona	Spain	6380	32	4,7	8,8	6,31	6,62
Los Angeles	United States	6956	58	7	6	8,02	8,64
Milan	Italy	6387	33	6,6	9,4	6,92	7,34
Madrid	Spain	6500	32	4,7	8,8	6,42	6,75
Baltimore	United States	6940	58	7	6	8,00	8,63
Seoul	South Korea	5947	32	7,8	4,1	5,61	5,79
Philadelphia	United States	7004	58	7	6	8,06	8,70
Dallas	United States	7155	58	7	6	8,20	8,87
Lyon	France	6635	30	5,8	8,7	6,68	7,06
Edinburgh	United Kingdom	6782	54	7,2	6,4	7,79	8,38
Linz	Austria	6998	45	4,8	6,8	7,11	7,57
Lisbon	Portugal	5660	25	2,5	7	4,43	4,38
Phoenix	United States	6940	58	7	6	8,00	8,63
Houston	United States	7110	58	7	6	8,16	8,82
Rome	Italy	6387	33	6,6	9,4	6,92	7,34
Yokohama	Japan	5871	23	1,9	4,6	3,89	3,74
Cologne	Germany	7076	43	5,3	8,4	7,54	8,08
Florence	Italy	6387	33	6,6	9,4	6,92	7,34
Prague	Czech Republic	6620	22	3,4	7,6	5,51	5,67
Málaga	Spain	6401	32	4,7	8,8	6,33	6,64
Hong Kong	Hong Kong	5444	35	0,2	2	3,13	2,84
Birmingham	United Kingdom	6782	54	7,2	6,4	7,79	8,38
Liverpool	United Kingdom	6782	54	7,2	6,4	7,79	8,38
Atlanta	United States	7031	58	7	6	8,09	8,73
Miami	United States	7028	58	7	6	8,08	8,72
Eindhoven	Netherlands	7449	53	7,8	9,5	9,16	10,00
Rotterdam	Netherlands	7449	53	7,8	9,5	9,16	10,00
Manchester	United Kingdom	6782	54	7,2	6,4	7,79	8,38
Marseille	France	6635	30	5,8	8,7	6,68	7,06
Nice	France	6635	30	5,8	8,7	6,68	7,06
Osaka	Japan	5871	23	1,9	4,6	3,89	3,74
Valencia	Spain	6401	32	4,7	8,8	6,33	6,64
Antwerp	Belgium	6674	36	7,4	8,4	7,30	7,79

Warsaw	Poland	6186	25	4,9	6,8	5,42	5,56
Dubai	United Arab Emirates	6687	45	0,5	5	5,47	5,62
Taipei	Taiwan	6517	35	0	1	3,88	3,73
Tallinn	Estonia	5679	25	6	7,9	5,42	5,56
Abu Dhabi	United Arab Emirates	6808	45	0,5	5	5,59	5,76
Budapest	Hungary	5642	23	3,4	8	4,73	4,74
Ljubljana	Slovenia	6178	38	4,2	7,4	6,00	6,25
Vilnius	Lithuania	6163	19	3,8	8,6	5,24	5,35
Bilbao	Spain	6401	32	4,7	8,8	6,33	6,64
Bratislava	Slovakia	6383	25	6,1	7,9	6,10	6,37
Gothenburg	Sweden	7080	40	6,8	8,4	7,74	8,31
Riga	Latvia	6175	22	4,3	6,9	5,15	5,24
Buenos Aires	Argentina	6324	28	1	5,5	4,54	4,51
Kuala Lumpur	Malaysia	5384	39	1	0,3	3,09	2,79
Montevideo	Uruguay	6455	30	0,7	3	4,16	4,07
Santiago	Chile	6770	37	1	5	5,28	5,40
Athens	Greece	5345	16	4,1	7,1	4,08	3,97
Shanghai	China	5936	16	0	0	2,22	1,76
Zagreb	Croatia	5536	21	3,4	6,5	4,22	4,13
Porto	Portugal	5660	25	2,5	7	4,43	4,38
Panama City	Panama	6662	35	2	3	4,89	4,93
Wroclaw	Poland	6186	25	4,9	6,8	5,42	5,56
Medellín	Colombia	6163	35	2	0,9	3,98	3,85
Sofia	Bulgaria	5563	19	3,4	6,5	4,15	4,05
Beijing	China	5228	16	0	0	1,56	0,97
Tel Aviv	Israel	7461	39	6,5	4,6	7,18	7,65
Mexico City	Mexico	6693	28	6,9	1,1	5,29	5,40
Bucharest	Romania	5974	24	2,4	6,5	4,55	4,52
Córdoba	Argentina	5975	28	1	5,5	4,21	4,13
Bangkok	Thailand	6330	42	0,3	2	4,32	4,25
Brasilia	Brazil	6376	28	6,6	6,6	6,08	6,34
Jerusalem	Israel	6943	39	6,5	4,6	6,69	7,07
Monterrey	Mexico	6465	28	6,9	1,1	5,07	5,15
Guangzhou	China	5761	16	0	0	2,06	1,57
Sao Paulo	Brazil	6383	28	6,6	6,6	6,09	6,35
Cape Town	South Africa	5265	36	4,7	5,5	4,76	4,77
Asuncion	Paraguay	6012	32	0,7	0,6	3,34	3,09
Rio de Janeiro	Brazil	6376	28	6,6	6,6	6,08	6,34
Istanbul	Turkey	5440	18	5,9	3,1	3,83	3,67
Lima	Peru	6204	28	1	0,9	3,46	3,23

Doha	Qatar	6260	41	0,5	5	4,88	4,92
Bogota	Colombia	6612	35	2	0,9	4,40	4,35
Durban	South Africa	4814	36	4,7	5,5	4,33	4,27
Guadalajara	Mexico	6465	28	6,9	1,1	5,07	5,15
Johannesburg	South Africa	5361	36	4,7	5,5	4,85	4,88
Tunis	Tunisia	4392	24	0,5	0,5	1,37	0,75
Quito	Ecuador	6437	24	0,7	0,6	3,36	3,11
Shenzhen	China	5124	16	0	0	1,46	0,85
Kuwait City	Kuwait	6307	41	0,5	5	4,93	4,97
Moscow	Russia	6028	21	2,3	8,3	4,81	4,84
Belgrade	Serbia	6071	19	3,4	6,5	4,62	4,61
Chengdu	China	5124	16	0	0	1,46	0,85
St Petersburg	Russia	5994	21	2,3	8,3	4,78	4,80
Manila	Philippines	5810	39	1	0,7	3,57	3,36
Kiev	Ukraine	5051	24	2	8,1	3,93	3,78
Casablanca	Morocco	5180	26	0	0,5	2,09	1,61
Ho Chi Minh City	Vietnam	5155	26	0,5	1	2,29	1,84
Jakarta	Indonesia	5286	50	1	3	4,09	3,98
Chongqing	China	5124	16	0	0	1,46	0,85
Riyadh	Saudi Arabia	6270	34	0,5	3	4,14	4,04
Ankara	Turkey	5749	18	5,9	3,1	4,12	4,02
Hanoi	Vietnam	5196	26	0,5	1	2,32	1,88
Mumbai	India	3573	26	0,7	0,5	0,74	0,00
Shenyang	China	5124	16	0	0	1,46	0,85
Bangalore	India	3573	26	0,7	0,5	0,74	0,00
New Delhi	India	4011	26	0,7	0,5	1,15	0,49
La Paz	Bolivia	6165	31	0,7	0,6	3,43	3,20
Cairo	Egypt	4088	23	0,5	0,5	1,04	0,35

XVII.- Magnetism. Dynamism. Equality. Gender.

City	Country	Female Graduates	FEM GRD NOR	Gender Development Gap	GDG NOR	Leadership opportunities for women	LOW NOR	GENDER	GENDER NOR
Zurich	Switzerland	48,89	0,64	84,16	7,70	73,38	7,08	5,78	5,98
Vienna	Austria	54,93	3,64	78,51	6,87	51,12	4,65	5,51	5,66
Berlin	Germany	50,71	1,54	77,05	6,66	75,48	7,31	5,55	5,70
Amsterdam	Netherlands	56,61	4,48	76,96	6,65	66,14	6,29	6,02	6,26
Munich	Germany	50,71	1,54	77,05	6,66	75,48	7,31	5,55	5,70
Geneva	Switzerland	48,89	0,64	84,16	7,70	73,38	7,08	5,78	5,98
Vancouver	Canada	57,56	4,95	83,76	7,64	77,74	7,56	6,95	7,36
Dusseldorf	Germany	50,71	1,54	77,05	6,66	75,48	7,31	5,55	5,70
Sydney	Australia	57,86	5,10	79,88	7,07	76,09	7,38	6,66	7,02
Toronto	Canada	57,56	4,95	83,76	7,64	77,74	7,56	6,95	7,36
Melbourne	Australia	57,86	5,10	79,88	7,07	76,09	7,38	6,66	7,02
Bern	Switzerland	48,89	0,64	84,16	7,70	73,38	7,08	5,78	5,98
San Francisco	United States	58,41	5,38	86,07	7,97	88,53	8,74	7,52	8,04
Copenhagen	Denmark	56,36	4,36	81,67	7,33	80,45	7,86	6,72	7,09
Boston	United States	58,41	5,38	86,07	7,97	88,53	8,74	7,52	8,04
Paris	France	56,11	4,23	84,34	7,72	27,93	2,10	5,44	5,58
Ottawa	Canada	57,56	4,95	83,76	7,64	77,74	7,56	6,95	7,36
London	United Kingdom	57,22	4,78	74,76	6,33	60,33	5,65	5,77	5,97
Frankfurt	Germany	50,71	1,54	77,05	6,66	75,48	7,31	5,55	5,70
Stockholm	Sweden	62,34	7,33	86,01	7,97	88,55	8,75	8,00	8,62
New York City	United States	58,41	5,38	86,07	7,97	88,53	8,74	7,52	8,04
Auckland	New Zealand	57,25	4,80	76,68	6,61	74,80	7,24	6,31	6,61
Singapore	Singapore	52,18	2,27	82,49	7,45	88,39	8,73	6,48	6,81
Adelaide	Australia	57,86	5,10	79,88	7,07	76,09	7,38	6,66	7,02
Canberra	Australia	57,86	5,10	79,88	7,07	76,09	7,38	6,66	7,02
Hamburg	Germany	50,71	1,54	77,05	6,66	75,48	7,31	5,55	5,70
Montreal	Canada	57,56	4,95	83,76	7,64	77,74	7,56	6,95	7,36
Washington, D.C.	United States	58,41	5,38	86,07	7,97	88,53	8,74	7,52	8,04
Tokyo	Japan	49,56	0,97	80,04	7,10	43,77	3,84	4,75	4,76
Basel	Switzerland	48,89	0,64	84,16	7,70	73,38	7,08	5,78	5,98
Oslo	Norway	58,87	5,60	85,84	7,94	87,85	8,67	7,54	8,07

Wellington	New Zealand	57,25	4,80	76,68	6,61	74,80	7,24	6,31	6,61
Chicago	United States	58,41	5,38	86,07	7,97	88,53	8,74	7,52	8,04
Helsinki	Finland	59,34	5,84	89,01	8,40	100,00	10,00	8,16	8,80
Luxembourg	Luxembourg	51,78	2,08	77,99	6,80	77,64	7,55	5,81	6,01
Seattle	United States	58,41	5,38	86,07	7,97	88,53	8,74	7,52	8,04
Brussels	Belgium	59,64	5,99	78,52	6,88	57,13	5,30	6,26	6,55
Dublin	Ireland	51,88	2,13	81,59	7,32	61,92	5,83	5,65	5,82
Stuttgart	Germany	50,71	1,54	77,05	6,66	75,48	7,31	5,55	5,70
Barcelona	Spain	55,90	4,13	81,37	7,29	21,13	1,36	5,02	5,07
Los Angeles	United States	58,41	5,38	86,07	7,97	88,53	8,74	7,52	8,04
Milan	Italy	58,51	5,43	77,11	6,67	13,15	0,49	4,81	4,83
Madrid	Spain	55,90	4,13	81,37	7,29	21,13	1,36	5,02	5,07
Baltimore	United States	58,41	5,38	86,07	7,97	88,53	8,74	7,52	8,04
Seoul	South Korea	51,07	1,72	64,69	4,86	27,79	2,09	3,38	3,13
Philadelphia	United States	58,41	5,38	86,07	7,97	88,53	8,74	7,52	8,04
Dallas	United States	58,41	5,38	86,07	7,97	88,53	8,74	7,52	8,04
Lyon	France	56,11	4,23	84,34	7,72	27,93	2,10	5,44	5,58
Edinburgh	United Kingdom	57,22	4,78	74,76	6,33	60,33	5,65	5,77	5,97
Linz	Austria	54,93	3,64	78,51	6,87	51,12	4,65	5,51	5,66
Lisbon	Portugal	58,67	5,51	82,95	7,52	42,67	3,72	6,07	6,32
Phoenix	United States	58,41	5,38	86,07	7,97	88,53	8,74	7,52	8,04
Houston	United States	58,41	5,38	86,07	7,97	88,53	8,74	7,52	8,04
Rome	Italy	58,51	5,43	77,11	6,67	13,15	0,49	4,81	4,83
Yokohama	Japan	49,56	0,97	80,04	7,10	43,77	3,84	4,75	4,76
Cologne	Germany	50,71	1,54	77,05	6,66	75,48	7,31	5,55	5,70
Florence	Italy	58,51	5,43	77,11	6,67	13,15	0,49	4,81	4,83
Prague	Czech Republic	61,46	6,89	83,74	7,63	63,12	5,96	7,03	7,46
Málaga	Spain	55,90	4,13	81,37	7,29	21,13	1,36	5,02	5,07
Hong Kong	Hong Kong	53,00	2,68	72,88	6,06	51,79	4,72	4,88	4,91
Birmingham	United Kingdom	57,22	4,78	74,76	6,33	60,33	5,65	5,77	5,97
Liverpool	United Kingdom	57,22	4,78	74,76	6,33	60,33	5,65	5,77	5,97

Atlanta	United States	58,41	5,38	86,07	7,97	88,53	8,74	7,52	8,04
Miami	United States	58,41	5,38	86,07	7,97	88,53	8,74	7,52	8,04
Eindhoven	Netherlands	56,61	4,48	76,96	6,65	66,14	6,29	6,02	6,26
Rotterdam	Netherlands	56,61	4,48	76,96	6,65	71,33	6,86	6,16	6,43
Manchester	United Kingdom	57,22	4,78	74,76	6,33	60,33	5,65	5,77	5,97
Marseille	France	56,11	4,23	84,34	7,72	27,93	2,10	5,44	5,58
Nice	France	56,11	4,23	84,34	7,72	27,93	2,10	5,44	5,58
Osaka	Japan	49,56	0,97	80,04	7,10	43,77	3,84	4,75	4,76
Valencia	Spain	55,90	4,13	81,37	7,29	21,13	1,36	5,02	5,07
Antwerp	Belgium	59,64	5,99	57,83	3,87	57,13	5,30	4,76	4,76
Warsaw	Poland	65,68	8,99	91,11	8,71	37,33	3,13	7,39	7,88
Dubai	United Arab Emirates	55,15	3,75	77,56	6,74	81,98	8,03	6,31	6,61
Taipei	Taiwan	53,00	2,68	72,88	6,06	51,79	4,72	4,88	4,91
Tallinn	Estonia	64,01	8,16	95,64	9,37	72,63	7,00	8,47	9,18
Abu Dhabi	United Arab Emirates	55,15	3,75	77,56	6,74	81,98	8,03	6,31	6,61
Budapest	Hungary	61,34	6,83	83,61	7,62	23,68	1,64	5,93	6,15
Ljubljana	Slovenia	59,45	5,89	85,54	7,90	60,67	5,69	6,84	7,24
Vilnius	Lithuania	62,44	7,38	98,07	9,72	66,70	6,35	8,29	8,96
Bilbao	Spain	55,90	4,13	81,37	7,29	21,13	1,36	5,02	5,07
Bratislava	Slovakia	62,57	7,45	51,81	2,99	41,88	3,63	4,27	4,18
Gothenburg	Sweden	62,34	7,33	86,01	7,97	88,55	8,75	8,00	8,62
Riga	Latvia	65,64	8,97	99,48	9,92	80,32	7,84	9,17	10,00
Buenos Aires	Argentina	65,35	8,83	87,72	8,21	29,11	2,23	6,87	7,28
Kuala Lumpur	Malaysia	57,88	5,11	80,18	7,12	81,78	8,00	6,84	7,23
Montevideo	Uruguay	64,12	8,22	93,77	9,09	37,68	3,17	7,39	7,90
Santiago	Chile	56,97	4,66	75,18	6,39	26,16	1,91	4,84	4,86
Athens	Greece	59,26	5,80	75,99	6,51	30,82	2,42	5,31	5,42
Shanghai	China	52,38	2,37	72,88	6,06	51,79	4,72	4,80	4,81
Zagreb	Croatia	59,84	6,09	85,74	7,93	19,00	1,13	5,77	5,96
Porto	Portugal	58,67	5,51	82,95	7,52	42,67	3,72	6,07	6,32
Panama City	Panama	66,40	9,35	84,80	7,79	43,63	3,82	7,19	7,65
Wroclaw	Poland	65,68	8,99	91,11	8,71	37,33	3,13	7,39	7,88
Medellín	Colombia	55,89	4,12	87,81	8,23	28,83	2,20	5,69	5,88
Sofia	Bulgaria	61,21	6,77	85,37	7,87	42,36	3,69	6,55	6,89
Beijing	China	52,38	2,37	72,88	6,06	51,79	4,72	4,80	4,81
Tel Aviv	Israel	59,00	5,67	79,83	7,07	55,72	5,15	6,24	6,52
Mexico City	Mexico	53,56	2,96	72,44	5,99	15,85	0,78	3,93	3,78

Bucharest	Romania	58,55	5,45	83,37	7,58	66,57	6,34	6,74	7,11
Córdoba	Argentina	65,35	8,83	87,72	8,21	29,11	2,23	6,87	7,28
Bangkok	Thailand	56,03	4,19	87,52	8,18	69,23	6,63	6,80	7,19
Brasilia	Brazil	60,71	6,52	86,13	7,98	16,88	0,89	5,84	6,05
Jerusalem	Israel	59,00	5,67	79,83	7,07	55,72	5,15	6,24	6,52
Monterrey	Mexico	53,56	2,96	72,44	5,99	15,85	0,78	3,93	3,78
Guangzhou	China	52,38	2,37	72,88	6,06	51,79	4,72	4,80	4,81
Sao Paulo	Brazil	60,71	6,52	86,13	7,98	16,88	0,89	5,84	6,05
Cape Town	South Africa	61,00	6,67	83,05	7,53	33,00	2,66	6,10	6,36
Asuncion	Paraguay	50,00	1,19	78,80	6,92	15,48	0,74	3,94	3,79
Rio de Janeiro	Brazil	60,71	6,52	86,13	7,98	16,88	0,89	5,84	6,05
Istanbul	Turkey	49,54	0,96	61,08	4,34	22,98	1,56	2,80	2,44
Lima	Peru	57,03	4,69	71,04	5,79	21,71	1,42	4,42	4,36
Doha	Qatar	66,38	9,34	100,00	10,00	70,43	6,76	9,03	9,83
Bogota	Colombia	55,89	4,12	87,81	8,23	28,83	2,20	5,69	5,88
Durban	South Africa	61,00	6,67	83,05	7,53	33,00	2,66	6,10	6,36
Guadalajara	Mexico	53,56	2,96	72,44	5,99	15,85	0,78	3,93	3,78
Johannesburg	South Africa	61,00	6,67	83,05	7,53	33,00	2,66	6,10	6,36
Tunis	Tunisia	67,70	10,00	52,39	3,07	43,28	3,79	4,98	5,03
Quito	Ecuador	57,66	5,00	81,14	7,26	28,96	2,22	5,43	5,57
Shenzhen	China	52,38	2,37	72,88	6,06	51,79	4,72	4,80	4,81
Kuwait City	Kuwait	58,28	5,31	85,35	7,87	45,72	4,05	6,28	6,57
Moscow	Russia	53,00	2,68	95,83	9,39	61,00	5,73	6,80	7,19
Belgrade	Serbia	58,41	5,38	80,44	7,15	41,46	3,59	5,82	6,02
Chengdu	China	52,38	2,37	72,88	6,06	51,79	4,72	4,80	4,81
St Petersburg	Russia	53,00	2,68	95,83	9,39	61,00	5,73	6,80	7,19
Manila	Philippines	58,61	5,48	88,99	8,40	93,55	9,29	7,89	8,49
Kiev	Ukraine	53,31	2,84	86,42	8,02	58,09	5,41	6,07	6,33
Casablanca	Morocco	47,61	0,00	31,25	0,00	35,99	2,99	0,75	0,00
Ho Chi Minh City	Vietnam	53,84	3,10	90,98	8,69	36,78	3,07	5,89	6,11
Jakarta	Indonesia	58,87	5,60	64,75	4,87	66,94	6,38	5,43	5,56
Chongqing	China	52,38	2,37	72,88	6,06	51,79	4,72	4,80	4,81
Riyadh	Saudi Arabia	53,11	2,74	45,13	2,02	40,98	3,53	2,58	2,17
Ankara	Turkey	49,54	0,96	61,08	4,34	22,98	1,56	2,80	2,44
Hanoi	Vietnam	53,84	3,10	90,78	8,66	36,78	3,07	5,87	6,09
Mumbai	India	51,70	2,04	32,29	0,15	50,83	4,61	1,74	1,18
Shenyang	China	52,38	2,37	72,88	6,06	51,79	4,72	4,80	4,81
Bangalore	India	51,70	2,04	32,29	0,15	50,83	4,61	1,74	1,18

New Delhi	India	51,70	2,04	32,29	0,15	50,83	4,61	1,74	1,18
La Paz	Bolivia	50,00	1,19	63,47	4,69	8,72	0,00	2,64	2,25
Cairo	Egypt	53,63	3,00	43,31	1,75	53,29	4,88	2,85	2,49

XVIII.- Magnetism. Dynamism. Equality. Tolerance.

City	Country	Tolerance Minorities	TOLMIN NOR	Tolerance Immigrants	TOLMIG NOR	TOLERANCE	TOLERANCE NOR
Zurich	Switzerland	74,44	7,44	71,23	7,12	7,28	7,31
Vienna	Austria	61,11	6,11	68,49	6,85	6,48	6,37
Berlin	Germany	60,00	6,00	79,45	7,95	6,97	6,94
Amsterdam	Netherlands	64,44	6,44	83,56	8,36	7,40	7,44
Munich	Germany	60,00	6,00	79,45	7,95	6,97	6,94
Geneva	Switzerland	74,44	7,44	71,23	7,12	7,28	7,31
Vancouver	Canada	80,00	8,00	100,00	10,00	9,00	9,31
Dusseldorf	Germany	60,00	6,00	79,45	7,95	6,97	6,94
Sydney	Australia	74,44	7,44	95,89	9,59	8,52	8,75
Toronto	Canada	80,00	8,00	100,00	10,00	9,00	9,31
Melbourne	Australia	74,44	7,44	95,89	9,59	8,52	8,75
Bern	Switzerland	74,44	7,44	71,23	7,12	7,28	7,31
San Francisco	United States	43,33	4,33	83,56	8,36	6,34	6,21
Copenhagen	Denmark	63,33	6,33	91,78	9,18	7,76	7,86
Boston	United States	43,33	4,33	83,56	8,36	6,34	6,21
Paris	France	33,33	3,33	67,12	6,71	5,02	4,67
Ottawa	Canada	80,00	8,00	100,00	10,00	9,00	9,31
London	United Kingdom	40,00	4,00	84,93	8,49	6,25	6,10
Frankfurt	Germany	60,00	6,00	79,45	7,95	6,97	6,94
Stockholm	Sweden	92,22	9,22	86,30	8,63	8,93	9,23
New York City	United States	43,33	4,33	83,56	8,36	6,34	6,21
Auckland	New Zealand	75,56	7,56	98,63	9,86	8,71	8,97
Singapore	Singapore	88,89	8,89	79,45	7,95	8,42	8,63
Adelaide	Australia	74,44	7,44	95,89	9,59	8,52	8,75
Canberra	Australia	74,44	7,44	95,89	9,59	8,52	8,75
Hamburg	Germany	60,00	6,00	79,45	7,95	6,97	6,94
Montreal	Canada	80,00	8,00	100,00	10,00	9,00	9,31
Washington, D.C.	United States	43,33	4,33	83,56	8,36	6,34	6,21
Tokyo	Japan	76,67	7,67	50,68	5,07	6,37	6,24
Basel	Switzerland	74,44	7,44	71,23	7,12	7,28	7,31
Oslo	Norway	74,44	7,44	97,26	9,73	8,59	8,83
Wellington	New Zealand	75,56	7,56	98,63	9,86	8,71	8,97
Chicago	United States	43,33	4,33	83,56	8,36	6,34	6,21
Helsinki	Finland	97,78	9,78	84,93	8,49	9,14	9,47
Luxembourg	Luxembourg	81,11	8,11	90,41	9,04	8,58	8,82

Seattle	United States	43,33	4,33	83,56	8,36	6,34	6,21
Brussels	Belgium	58,89	5,89	69,86	6,99	6,44	6,32
Dublin	Ireland	100,00	10,00	91,78	9,18	9,59	10,00
Stuttgart	Germany	60,00	6,00	79,45	7,95	6,97	6,94
Barcelona	Spain	43,33	4,33	87,67	8,77	6,55	6,45
Los Angeles	United States	43,33	4,33	83,56	8,36	6,34	6,21
Milan	Italy	56,67	5,67	64,38	6,44	6,05	5,87
Madrid	Spain	43,33	4,33	87,67	8,77	6,55	6,45
Baltimore	United States	43,33	4,33	83,56	8,36	6,34	6,21
Seoul	South Korea	81,11	8,11	47,95	4,80	6,45	6,34
Philadelphia	United States	43,33	4,33	83,56	8,36	6,34	6,21
Dallas	United States	43,33	4,33	83,56	8,36	6,34	6,21
Lyon	France	33,33	3,33	67,12	6,71	5,02	4,67
Edinburgh	United Kingdom	40,00	4,00	84,93	8,49	6,25	6,10
Linz	Austria	61,11	6,11	68,49	6,85	6,48	6,37
Lisbon	Portugal	90,00	9,00	95,89	9,59	9,29	9,66
Phoenix	United States	43,33	4,33	83,56	8,36	6,34	6,21
Houston	United States	43,33	4,33	83,56	8,36	6,34	6,21
Rome	Italy	56,67	5,67	64,38	6,44	6,05	5,87
Yokohama	Japan	76,67	7,67	50,68	5,07	6,37	6,24
Cologne	Germany	60,00	6,00	79,45	7,95	6,97	6,94
Florence	Italy	56,67	5,67	64,38	6,44	6,05	5,87
Prague	Czech Republic	57,78	5,78	15,07	1,51	3,64	3,05
Málaga	Spain	43,33	4,33	87,67	8,77	6,55	6,45
Hong Kong	Hong Kong	32,00	3,20	35,62	3,56	3,38	2,75
Birmingham	United Kingdom	40,00	4,00	84,93	8,49	6,25	6,10
Liverpool	United Kingdom	40,00	4,00	84,93	8,49	6,25	6,10
Atlanta	United States	43,33	4,33	83,56	8,36	6,34	6,21
Miami	United States	43,33	4,33	83,56	8,36	6,34	6,21
Eindhoven	Netherlands	64,44	6,44	83,56	8,36	7,40	7,44
Rotterdam	Netherlands	64,44	6,44	83,10	8,31	7,38	7,42
Manchester	United Kingdom	40,00	4,00	84,93	8,49	6,25	6,10
Marseille	France	33,33	3,33	67,12	6,71	5,02	4,67
Nice	France	33,33	3,33	67,12	6,71	5,02	4,67
Osaka	Japan	76,67	7,67	50,68	5,07	6,37	6,24
Valencia	Spain	43,33	4,33	87,67	8,77	6,55	6,45
Antwerp	Belgium	58,89	5,89	69,86	6,99	6,44	6,32
Warsaw	Poland	42,22	4,22	21,92	2,19	3,21	2,55

Dubai	United Arab Emirates	80,00	8,00	95,89	9,59	8,79	9,07
Taipei	Taiwan	32,00	3,20	35,62	3,56	3,38	2,75
Tallinn	Estonia	26,67	2,67	15,07	1,51	2,09	1,24
Abu Dhabi	United Arab Emirates	80,00	8,00	95,89	9,59	8,79	9,07
Budapest	Hungary	64,44	6,44	0,00	0,00	3,22	2,56
Ljubljana	Slovenia	64,44	6,44	32,88	3,29	4,87	4,48
Vilnius	Lithuania	68,89	6,89	27,40	2,74	4,81	4,42
Bilbao	Spain	43,33	4,33	87,67	8,77	6,55	6,45
Bratislava	Slovakia	41,11	4,11	24,66	2,47	3,29	2,64
Gothenburg	Sweden	92,22	9,22	86,30	8,63	8,93	9,23
Riga	Latvia	16,67	1,67	12,33	1,23	1,45	0,49
Buenos Aires	Argentina	62,22	6,22	79,45	7,95	7,08	7,07
Kuala Lumpur	Malaysia	44,44	4,44	9,59	0,96	2,70	1,96
Montevideo	Uruguay	86,67	8,67	79,45	7,95	8,31	8,50
Santiago	Chile	77,78	7,78	72,60	7,26	7,52	7,58
Athens	Greece	57,78	5,78	41,10	4,11	4,94	4,57
Shanghai	China	30,00	3,00	35,62	3,56	3,28	2,63
Zagreb	Croatia	53,33	5,33	13,70	1,37	3,35	2,71
Porto	Portugal	90,00	9,00	95,89	9,59	9,29	9,66
Panama City	Panama	48,89	4,89	56,16	5,62	5,25	4,93
Wroclaw	Poland	42,22	4,22	21,92	2,19	3,21	2,55
Medellín	Colombia	32,22	3,22	57,53	5,75	4,49	4,04
Sofia	Bulgaria	57,78	5,78	9,59	0,96	3,37	2,73
Beijing	China	30,00	3,00	35,62	3,56	3,28	2,63
Tel Aviv	Israel	0,00	0,00	20,55	2,06	1,03	0,00
Mexico City	Mexico	37,78	3,78	47,95	4,80	4,29	3,81
Bucharest	Romania	42,22	4,22	17,81	1,78	3,00	2,31
Córdoba	Argentina	62,22	6,22	79,45	7,95	7,08	7,07
Bangkok	Thailand	23,33	2,33	23,29	2,33	2,33	1,52
Brasilia	Brazil	33,33	3,33	69,86	6,99	5,16	4,83
Jerusalem	Israel	0,00	0,00	20,55	2,06	1,03	0,00
Monterrey	Mexico	37,78	3,78	47,95	4,80	4,29	3,81
Guangzhou	China	30,00	3,00	35,62	3,56	3,28	2,63
Sao Paulo	Brazil	33,33	3,33	69,86	6,99	5,16	4,83
Cape Town	South Africa	43,33	4,33	65,75	6,58	5,45	5,17
Asuncion	Paraguay	53,33	5,33	75,34	7,53	6,43	6,31
Rio de Janeiro	Brazil	33,33	3,33	69,86	6,99	5,16	4,83
Istanbul	Turkey	0,00	0,00	52,05	5,21	2,60	1,84
Lima	Peru	22,22	2,22	67,12	6,71	4,47	4,02
Doha	Qatar	66,67	6,67	86,30	8,63	7,65	7,73

Bogota	Colombia	32,22	3,22	57,53	5,75	4,49	4,04
Durban	South Africa	43,33	4,33	65,75	6,58	5,45	5,17
Guadalajara	Mexico	37,78	3,78	47,95	4,80	4,29	3,81
Johannesburg	South Africa	43,33	4,33	65,75	6,58	5,45	5,17
Tunis	Tunisia	32,22	3,22	45,21	4,52	3,87	3,32
Quito	Ecuador	36,67	3,67	54,79	5,48	4,57	4,14
Shenzhen	China	30,00	3,00	35,62	3,56	3,28	2,63
Kuwait City	Kuwait	65,56	6,56	75,34	7,53	7,05	7,03
Moscow	Russia	15,56	1,56	41,10	4,11	2,83	2,11
Belgrade	Serbia	25,56	2,56	58,90	5,89	4,22	3,73
Chengdu	China	30,00	3,00	35,62	3,56	3,28	2,63
St Petersburg	Russia	15,56	1,56	41,10	4,11	2,83	2,11
Manila	Philippines	23,33	2,33	60,27	6,03	4,18	3,68
Kiev	Ukraine	43,33	4,33	28,77	2,88	3,61	3,01
Casablanca	Morocco	16,67	1,67	39,73	3,97	2,82	2,09
Ho Chi Minh City	Vietnam	46,67	4,67	38,36	3,84	4,25	3,77
Jakarta	Indonesia	30,00	3,00	20,55	2,06	2,53	1,75
Chongqing	China	30,00	3,00	35,62	3,56	3,28	2,63
Riyadh	Saudi Arabia	17,78	1,78	83,56	8,36	5,07	4,72
Ankara	Turkey	0,00	0,00	52,05	5,21	2,60	1,84
Hanoi	Vietnam	46,67	4,67	38,36	3,84	4,25	3,77
Mumbai	India	22,22	2,22	47,95	4,80	3,51	2,90
Shenyang	China	30,00	3,00	35,62	3,56	3,28	2,63
Bangalore	India	22,22	2,22	47,95	4,80	3,51	2,90
New Delhi	India	22,22	2,22	47,95	4,80	3,51	2,90
La Paz	Bolivia	51,11	5,11	57,53	5,75	5,43	5,14
Cairo	Egypt	12,22	1,22	31,51	3,15	2,19	1,35

XIX.- Magnetism. Dynamism. Equality Summary.

City	Country	GINI INDEX	GENDER	Tolerance	Poverty	Equality	Equality NOR
Zurich	Switzerland	32,7	5,98	7,31	6,6	7,49	7,14
Vienna	Austria	29,7	5,66	6,37	3	7,57	7,27
Berlin	Germany	31,9	5,7	6,94	16,7	6,81	6,06
Amsterdam	Netherlands	28,5	6,26	7,44	8,8	7,74	7,54
Munich	Germany	31,9	5,7	6,94	16,7	6,81	6,06
Geneva	Switzerland	32,7	5,98	7,31	6,6	7,49	7,14
Vancouver	Canada	33,8	7,36	9,31	9,4	8,11	8,13
Dusseldorf	Germany	31,9	5,7	6,94	16,7	6,81	6,06
Sydney	Australia	34,4	7,02	8,75	9,5	7,84	7,70
Toronto	Canada	33,8	7,36	9,31	9,4	8,11	8,13
Melbourne	Australia	34,4	7,02	8,75	9,5	7,84	7,70
Bern	Switzerland	32,7	5,98	7,31	6,6	7,49	7,14
San Francisco	United States	41,4	8,04	6,21	15,1	6,69	5,86
Copenhagen	Denmark	28,7	7,09	7,86	13,4	7,78	7,61
Boston	United States	41,4	8,04	6,21	15,1	6,69	5,86
Paris	France	31,6	5,58	4,67	14,2	6,38	5,35
Ottawa	Canada	33,8	7,36	9,31	9,4	8,11	8,13
London	United Kingdom	34,8	5,97	6,1	15	6,58	5,68
Frankfurt	Germany	31,9	5,7	6,94	16,7	6,81	6,06
Stockholm	Sweden	28,8	8,62	9,23	15	8,41	8,61
New York City	United States	41,4	8,04	6,21	15,1	6,69	5,86
Auckland	New Zealand	36,2	6,61	8,97	9,5	7,67	7,43
Singapore	Singapore	45,8	6,81	8,63	11	6,94	6,25
Adelaide	Australia	34,4	7,02	8,75	9,5	7,84	7,70
Canberra	Australia	34,4	7,02	8,75	9,5	7,84	7,70
Hamburg	Germany	31,9	5,7	6,94	16,7	6,81	6,06
Montreal	Canada	33,8	7,36	9,31	9,4	8,11	8,13
Washington, D.C.	United States	41,4	8,04	6,21	15,1	6,69	5,86
Tokyo	Japan	32,9	4,76	6,24	16,1	6,37	5,35
Basel	Switzerland	32,7	5,98	7,31	6,6	7,49	7,14

Oslo	Norway	27	8,07	8,83	3	8,96	9,49
Wellington	New Zealand	36,2	6,61	8,97	9,5	7,67	7,43
Chicago	United States	41,4	8,04	6,21	15,1	6,69	5,86
Helsinki	Finland	27,4	8,8	9,47	3	9,28	10,00
Luxembourg	Luxembourg	34,9	6,01	8,82	14,2	7,31	6,85
Seattle	United States	41,4	8,04	6,21	15,1	6,69	5,86
Brussels	Belgium	27,4	6,55	6,32	15,1	7,25	6,76
Dublin	Ireland	39	5,82	10	8,2	7,63	7,36
Stuttgart	Germany	31,9	5,7	6,94	16,7	6,81	6,06
Barcelona	Spain	34,7	5,07	6,45	21,1	6,11	4,92
Los Angeles	United States	41,4	8,04	6,21	15,1	6,69	5,86
Milan	Italy	35,9	4,83	5,87	29,9	5,33	3,68
Madrid	Spain	34,7	5,07	6,45	21,1	6,11	4,92
Baltimore	United States	41,4	8,04	6,21	15,1	6,69	5,86
Seoul	South Korea	34,1	3,13	6,34	14,4	6,01	4,77
Philadelphia	United States	41,4	8,04	6,21	15,1	6,69	5,86
Dallas	United States	41,4	8,04	6,21	15,1	6,69	5,86
Lyon	France	31,6	5,58	4,67	14,2	6,38	5,35
Edinburgh	United Kingdom	34,8	5,97	6,1	15	6,58	5,68
Linz	Austria	29,7	5,66	6,37	3	7,57	7,27
Lisbon	Portugal	33,8	6,32	9,66	19	7,40	6,99
Phoenix	United States	41,4	8,04	6,21	15,1	6,69	5,86
Houston	United States	41,4	8,04	6,21	15,1	6,69	5,86
Rome	Italy	35,9	4,83	5,87	29,9	5,33	3,68
Yokohama	Japan	32,9	4,76	6,24	16,1	6,37	5,35
Cologne	Germany	31,9	5,7	6,94	16,7	6,81	6,06
Florence	Italy	35,9	4,83	5,87	29,9	5,33	3,68
Prague	Czech Republic	24,9	7,46	3,05	9,7	7,12	6,55
Málaga	Spain	34,7	5,07	6,45	21,1	6,11	4,92
Hong Kong	Hong Kong	53,9	4,91	2,75	19,9	3,97	1,51
Birmingham	United Kingdom	34,8	5,97	6,1	15	6,58	5,68

Liverpool	United Kingdom	34,8	5,97	6,1	15	6,58	5,68
Atlanta	United States	41,4	8,04	6,21	15,1	6,69	5,86
Miami	United States	41,4	8,04	6,21	15,1	6,69	5,86
Eindhoven	Netherlands	28,5	6,26	7,44	8,8	7,74	7,54
Rotterdam	Netherlands	28,5	6,43	7,42	8,8	7,78	7,60
Manchester	United Kingdom	34,8	5,97	6,1	15	6,58	5,68
Marseille	France	31,6	5,58	4,67	14,2	6,38	5,35
Nice	France	31,6	5,58	4,67	14,2	6,38	5,35
Osaka	Japan	32,9	4,76	6,24	16,1	6,37	5,35
Valencia	Spain	34,7	5,07	6,45	21,1	6,11	4,92
Antwerp	Belgium	27,4	4,76	6,32	15,1	6,80	6,04
Warsaw	Poland	29,7	7,88	2,55	17,6	6,35	5,32
Dubai	United Arab Emirates	62	6,61	9,07	19,5	5,48	3,92
Taipei	Taiwan	33,6	4,91	2,75	1,5	6,31	5,25
Tallinn	Estonia	30,4	9,18	1,24	21,1	6,11	4,93
Abu Dhabi	United Arab Emirates	62	6,61	9,07	19,5	5,48	3,92
Budapest	Hungary	30,6	6,15	2,56	14,9	6,02	4,78
Ljubljana	Slovenia	24,2	7,24	4,48	13,9	7,24	6,73
Vilnius	Lithuania	37,3	8,96	4,42	22,2	6,34	5,30
Bilbao	Spain	34,7	5,07	6,45	21,1	6,11	4,92
Bratislava	Slovakia	25,2	4,18	2,64	12,3	6,04	4,81
Gothenburg	Sweden	28,8	8,62	9,23	15	8,41	8,61
Riga	Latvia	34,5	10	0,49	25,5	5,62	4,14
Buenos Aires	Argentina	41,4	7,28	7,07	25,7	6,13	4,95
Kuala Lumpur	Malaysia	41	7,23	1,96	3,8	6,09	4,89
Montevideo	Uruguay	39,7	7,9	8,5	9,7	7,64	7,38
Santiago	Chile	44,4	4,86	7,58	14,4	6,09	4,89
Athens	Greece	34,4	5,42	4,57	36	4,91	3,01
Shanghai	China	38,5	4,81	2,63	3,3	5,84	4,49
Zagreb	Croatia	30,4	5,96	2,71	19,5	5,76	4,37
Porto	Portugal	33,8	6,32	9,66	19	7,40	6,99
Panama City	Panama	49,2	7,65	4,93	23	5,33	3,68
Wroclaw	Poland	29,7	7,88	2,55	17,6	6,35	5,32
Medellín	Colombia	50,4	5,88	4,04	28	4,31	2,05
Sofia	Bulgaria	37	6,89	2,73	23,4	5,36	3,72
Beijing	China	38,5	4,81	2,63	3,3	5,84	4,49
Tel Aviv	Israel	39	6,52	0	22	4,53	2,40

Mexico City	Mexico	45,4	3,78	3,81	46,2	3,03	0,00
Bucharest	Romania	36	7,11	2,31	22,4	5,43	3,83
Córdoba	Argentina	41,4	7,28	7,07	25,7	6,13	4,95
Bangkok	Thailand	36,4	7,19	1,52	7,2	6,07	4,87
Brasilia	Brazil	53,9	6,05	4,83	4,2	5,66	4,20
Jerusalem	Israel	42,8	6,52	0	22	4,29	2,01
Monterrey	Mexico	45,4	3,78	3,81	46,2	3,03	0,00
Guangzhou	China	38,5	4,81	2,63	3,3	5,84	4,49
Sao Paulo	Brazil	53,9	6,05	4,83	4,2	5,66	4,20
Cape Town	South Africa	63	6,36	5,17	16,6	4,54	2,41
Asuncion	Paraguay	46,2	3,79	6,31	22,2	4,95	3,07
Rio de Janeiro	Brazil	53,9	6,05	4,83	4,2	5,66	4,20
Istanbul	Turkey	41,9	2,44	1,84	21,9	3,79	1,21
Lima	Peru	42,8	4,36	4,02	22,7	4,71	2,69
Doha	Qatar	41,7	9,83	7,73	19,5	7,26	6,76
Bogota	Colombia	50,4	5,88	4,04	28	4,31	2,05
Durban	South Africa	63	6,36	5,17	16,6	4,54	2,41
Guadalajara	Mexico	45,4	3,78	3,81	46,2	3,03	0,00
Johannesburg	South Africa	63	6,36	5,17	16,6	4,54	2,41
Tunis	Tunisia	32,8	5,03	3,32	15,5	5,75	4,35
Quito	Ecuador	45,4	5,57	4,14	21,5	4,94	3,06
Shenzhen	China	38,5	4,81	2,63	3,3	5,84	4,49
Kuwait City	Kuwait	62	6,57	7,03	19,5	4,96	3,08
Moscow	Russia	37,5	7,19	2,11	13,3	5,81	4,45
Belgrade	Serbia	36,8	6,02	3,73	8,9	6,21	5,09
Chengdu	China	38,5	4,81	2,63	3,3	5,84	4,49
St Petersburg	Russia	37,5	7,19	2,11	13,3	5,81	4,45
Manila	Philippines	44,4	8,49	3,68	21,6	5,62	4,14
Kiev	Ukraine	26,1	6,33	3,01	3,8	7,08	6,49
Casablanca	Morocco	39,5	0	2,09	15	3,78	1,20
Ho Chi Minh City	Vietnam	35,7	6,11	3,77	8	6,37	5,34
Jakarta	Indonesia	36,8	5,56	1,75	11,7	5,45	3,86
Chongqing	China	38,5	4,81	2,63	3,3	5,84	4,49
Riyadh	Saudi Arabia	45,9	2,17	4,72	19,5	4,32	2,06
Ankara	Turkey	41,9	2,44	1,84	21,9	3,79	1,21
Hanoi	Vietnam	35,7	6,09	3,77	8	6,36	5,33
Mumbai	India	37,8	1,18	2,9	21,9	4,00	1,56
Shenyang	China	38,5	4,81	2,63	3,3	5,84	4,49
Bangalore	India	37,8	1,18	2,9	21,9	4,00	1,56
New Delhi	India	37,8	1,18	2,9	21,9	4,00	1,56

La Paz	Bolivia	42,2	2,25	5,14	38,6	3,61	0,93
Cairo	Egypt	31,5	2,49	1,35	27,8	4,02	1,58

XX.- Magnetism. Dynamism. Summary

City	Country	SOC ACTIVITY NOR	Expat Experience NOR	ETHICS NOR	Equality	DYNAMISM	DYNAMISM INDEX
Zurich	Switzerland	8,10	3,52	8,20	7,14	6,74	7,891
Vienna	Austria	7,32	5,98	7,57	7,27	7,03	8,241
Berlin	Germany	7,93	6,56	8,08	6,06	7,15	8,386
Amsterdam	Netherlands	8,63	6,30	10,00	7,54	8,12	9,532
Munich	Germany	8,12	6,56	8,08	6,06	7,20	8,442
Geneva	Switzerland	7,63	3,52	8,20	7,14	6,62	7,748
Vancouver	Canada	7,54	8,54	9,05	8,13	8,32	9,770
Dusseldorf	Germany	7,36	6,56	8,08	6,06	7,01	8,215
Sydney	Australia	8,38	7,27	9,14	7,70	8,12	9,537
Toronto	Canada	8,23	8,54	9,13	8,13	8,51	10,000
Melbourne	Australia	8,16	7,27	9,32	7,70	8,11	9,527
Bern	Switzerland	7,64	3,52	8,20	7,14	6,62	7,752
San Francisco	United States	9,06	4,01	8,63	5,86	6,89	8,072
Copenhagen	Denmark	8,56	4,89	9,24	7,61	7,58	8,889
Boston	United States	8,89	4,01	8,79	5,86	6,89	8,071
Paris	France	8,49	7,65	7,06	5,35	7,14	8,366
Ottawa	Canada	7,38	8,54	9,05	8,13	8,28	9,725
London	United Kingdom	9,66	3,49	8,38	5,68	6,80	7,967
Frankfurt	Germany	7,28	6,56	8,08	6,06	6,99	8,190
Stockholm	Sweden	8,33	4,89	8,64	8,61	7,62	8,939
New York City	United States	10,00	4,01	8,65	5,86	7,13	8,359
Auckland	New Zealand	7,14	9,04	8,95	7,43	8,14	9,562
Singapore	Singapore	9,37	8,46	4,71	6,25	7,20	8,438
Adelaide	Australia	8,04	7,27	9,14	7,70	8,04	9,436
Canberra	Australia	8,04	7,27	9,14	7,70	8,04	9,436
Hamburg	Germany	7,40	6,56	8,08	6,06	7,02	8,228
Montreal	Canada	7,72	8,54	9,05	8,13	8,36	9,825
Washington, D.C.	United States	8,40	4,01	8,90	5,86	6,79	7,955
Tokyo	Japan	8,32	5,82	3,87	5,35	5,84	6,817
Basel	Switzerland	7,70	3,52	8,20	7,14	6,64	7,770
Oslo	Norway	7,63	6,52	8,71	9,49	8,09	9,500
Wellington	New Zealand	7,24	9,04	9,31	7,43	8,26	9,700
Chicago	United States	8,67	4,01	8,73	5,86	6,82	7,984
Helsinki	Finland	7,96	4,89	8,68	10,00	7,88	9,255

Luxembourg	Luxembourg	6,28	6,56	8,41	6,85	7,02	8,230
Seattle	United States	8,16	4,01	8,63	5,86	6,67	7,802
Brussels	Belgium	6,85	3,05	7,79	6,76	6,11	7,141
Dublin	Ireland	7,36	4,71	8,12	7,36	6,89	8,067
Stuttgart	Germany	7,05	6,56	8,08	6,06	6,94	8,124
Barcelona	Spain	7,20	9,46	6,62	4,92	7,05	8,263
Los Angeles	United States	8,82	4,01	8,64	5,86	6,83	8,003
Milan	Italy	6,13	5,63	7,34	3,68	5,70	6,646
Madrid	Spain	7,26	10,00	6,75	4,92	7,23	8,480
Baltimore	United States	7,86	4,01	8,63	5,86	6,59	7,714
Seoul	South Korea	7,23	4,84	5,79	4,77	5,66	6,598
Philadelphia	United States	7,80	4,01	8,70	5,86	6,59	7,717
Dallas	United States	8,11	4,01	8,87	5,86	6,71	7,858
Lyon	France	6,72	7,65	7,06	5,35	6,70	7,838
Edinburgh	United Kingdom	7,42	3,49	8,38	5,68	6,24	7,299
Linz	Austria	6,37	5,98	7,57	7,27	6,80	7,958
Lisbon	Portugal	5,76	9,97	4,38	6,99	6,77	7,933
Phoenix	United States	8,22	4,01	8,63	5,86	6,68	7,820
Houston	United States	8,05	4,01	8,82	5,86	6,69	7,826
Rome	Italy	5,54	5,63	7,34	3,68	5,55	6,469
Yokohama	Japan	7,26	5,82	3,74	5,35	5,54	6,462
Cologne	Germany	7,06	6,56	8,08	6,06	6,94	8,126
Florence	Italy	5,15	5,63	7,34	3,68	5,45	6,354
Prague	Czech Republic	5,35	5,78	5,67	6,55	5,84	6,816
Málaga	Spain	5,97	9,85	6,64	4,92	6,85	8,020
Hong Kong	Hong Kong	8,24	6,34	2,84	1,51	4,73	5,497
Birmingham	United Kingdom	6,90	3,49	8,38	5,68	6,11	7,144
Liverpool	United Kingdom	6,97	3,49	8,38	5,68	6,13	7,162
Atlanta	United States	8,01	4,01	8,73	5,86	6,65	7,787
Miami	United States	8,14	4,01	8,72	5,86	6,68	7,826
Eindhoven	Netherlands	7,32	6,30	10,00	7,54	7,79	9,143
Rotterdam	Netherlands	7,39	6,30	10,00	7,60	7,82	9,182
Manchester	United Kingdom	7,22	3,49	8,38	5,68	6,19	7,239
Marseille	France	6,12	7,65	7,06	5,35	6,55	7,659
Nice	France	6,29	7,65	7,06	5,35	6,59	7,708
Osaka	Japan	6,81	5,82	3,74	5,35	5,43	6,329
Valencia	Spain	6,12	9,73	6,64	4,92	6,85	8,026
Antwerp	Belgium	6,41	3,05	7,79	6,04	5,82	6,797

Warsaw	Poland	5,00	3,24	5,56	5,32	4,78	5,552
Dubai	United Arab Emirates	6,14	5,52	5,62	3,92	5,30	6,172
Taipei	Taiwan	6,21	6,49	3,73	5,25	5,42	6,317
Tallinn	Estonia	5,06	3,24	5,56	4,93	4,70	5,455
Abu Dhabi	United Arab Emirates	5,57	5,52	5,76	3,92	5,19	6,042
Budapest	Hungary	4,72	3,24	4,74	4,78	4,37	5,063
Ljubljana	Slovenia	5,54	3,24	6,25	6,73	5,44	6,342
Vilnius	Lithuania	4,42	3,24	5,35	5,30	4,58	5,314
Bilbao	Spain	5,75	9,88	6,64	4,92	6,80	7,961
Bratislava	Slovakia	4,19	3,24	6,37	4,81	4,65	5,404
Gothenburg	Sweden	7,61	4,89	8,31	8,61	7,36	8,626
Riga	Latvia	4,26	3,24	5,24	4,14	4,22	4,887
Buenos Aires	Argentina	4,10	5,04	4,51	4,95	4,65	5,401
Kuala Lumpur	Malaysia	4,83	4,85	2,79	4,89	4,34	5,028
Montevideo	Uruguay	3,34	1,55	4,07	7,38	4,09	4,725
Santiago	Chile	5,04	5,04	5,40	4,89	5,09	5,924
Athens	Greece	3,38	5,63	3,97	3,01	4,00	4,622
Shanghai	China	5,45	1,29	1,76	4,49	3,25	3,728
Zagreb	Croatia	3,23	3,24	4,13	4,37	3,74	4,316
Porto	Portugal	5,33	9,97	4,38	6,99	6,67	7,803
Panama City	Panama	2,69	5,04	4,93	3,68	4,09	4,725
Wroclaw	Poland	4,69	3,24	5,56	5,32	4,70	5,461
Medellín	Colombia	2,30	8,19	3,85	2,05	4,10	4,738
Sofia	Bulgaria	3,49	3,24	4,05	3,72	3,62	4,175
Beijing	China	5,22	1,29	0,97	4,49	2,99	3,423
Tel Aviv	Israel	5,69	5,63	7,65	2,40	5,34	6,225
Mexico City	Mexico	3,05	8,19	5,40	0,00	4,16	4,816
Bucharest	Romania	3,59	3,24	4,52	3,83	3,80	4,381
Córdoba	Argentina	3,29	5,04	4,13	4,95	4,35	5,043
Bangkok	Thailand	3,96	5,90	4,25	4,87	4,74	5,510
Brasilia	Brazil	2,99	4,76	6,34	4,20	4,57	5,306
Jerusalem	Israel	5,13	5,63	7,07	2,01	4,96	5,768
Monterrey	Mexico	2,82	8,19	5,15	0,00	4,04	4,672
Guangzhou	China	4,27	1,29	1,57	4,49	2,91	3,317
Sao Paulo	Brazil	3,76	4,76	6,35	4,20	4,77	5,540
Cape Town	South Africa	2,50	4,64	4,77	2,41	3,58	4,126
Asuncion	Paraguay	0,98	1,55	3,09	3,07	2,17	2,443
Rio de Janeiro	Brazil	3,12	4,76	6,34	4,20	4,61	5,346
Istanbul	Turkey	2,91	6,85	3,67	1,21	3,66	4,215
Lima	Peru	2,37	1,55	3,23	2,69	2,46	2,787
Doha	Qatar	3,41	1,56	4,92	6,76	4,16	4,819

Bogota	Colombia	2,60	8,19	4,35	2,05	4,30	4,976
Durban	South Africa	2,36	4,64	4,27	2,41	3,42	3,934
Guadalajara	Mexico	2,78	8,19	5,15	0,00	4,03	4,658
Johannesburg	South Africa	2,32	4,64	4,88	2,41	3,56	4,102
Tunis	Tunisia	0,77	1,92	0,75	4,35	1,95	2,173
Quito	Ecuador	2,04	1,55	3,11	3,06	2,44	2,763
Shenzhen	China	4,31	1,29	0,85	4,49	2,74	3,117
Kuwait City	Kuwait	2,34	0,00	4,97	3,08	2,60	2,953
Moscow	Russia	4,76	4,06	4,84	4,45	4,52	5,247
Belgrade	Serbia	2,95	3,24	4,61	5,09	3,98	4,594
Chengdu	China	4,08	1,29	0,85	4,49	2,68	3,047
St Petersburg	Russia	3,74	4,06	4,80	4,45	4,26	4,933
Manila	Philippines	2,37	6,65	3,36	4,14	4,13	4,781
Kiev	Ukraine	2,51	4,06	3,78	6,49	4,21	4,874
Casablanca	Morocco	1,23	1,92	1,61	1,20	1,49	1,629
Ho Chi Minh City	Vietnam	2,57	3,36	1,84	5,34	3,28	3,761
Jakarta	Indonesia	2,01	4,58	3,98	3,86	3,61	4,156
Chongqing	China	4,06	1,29	0,85	4,49	2,67	3,041
Riyadh	Saudi Arabia	2,76	0,30	4,04	2,06	2,29	2,583
Ankara	Turkey	2,09	6,85	4,02	1,21	3,54	4,076
Hanoi	Vietnam	2,01	3,36	1,88	5,33	3,15	3,605
Mumbai	India	2,11	6,90	0,00	1,56	2,64	3,001
Shenyang	China	4,01	1,29	0,85	4,49	2,66	3,027
Bangalore	India	2,07	6,90	0,00	1,56	2,63	2,989
New Delhi	India	1,50	6,90	0,49	1,56	2,61	2,965
La Paz	Bolivia	1,37	1,55	3,20	0,93	1,76	1,956
Cairo	Egypt	0,00	1,92	0,35	1,58	0,96	1,000

XXI.- Magnetism. Strategy. Human Capital

City	Country	Avg Age Per Country	AGE AVG	RK HUMAN CAP	HUMAN CAP	TOT HUMAN CAP	TOT HUMAN CAP NOR
Zurich	Switzerland	42,4	2,06	35	7,98	6,8	7,39
Vienna	Austria	44	1,39	23	8,69	7,23	7,96
Berlin	Germany	47,1	0,08	5	9,76	7,82	8,74
Amsterdam	Netherlands	42,6	1,97	36	7,92	6,73	7,29
Munich	Germany	47,1	0,08	63	6,31	5,06	5,08
Geneva	Switzerland	42,4	2,06	85	5	4,41	4,22
Vancouver	Canada	42,2	2,14	83	5,12	4,52	4,36
Dusseldorf	Germany	47,1	0,08	88	4,82	3,87	3,5
Sydney	Australia	38,7	3,61	29	8,33	7,39	8,17
Toronto	Canada	42,2	2,14	30	8,27	7,04	7,71
Melbourne	Australia	38,7	3,61	33	8,1	7,2	7,92
Bern	Switzerland	42,4	2,06	67	6,07	5,27	5,36
San Francisco	United States	38,1	3,87	11	9,4	8,29	9,36
Copenhagen	Denmark	42,2	2,14	28	8,39	7,14	7,84
Boston	United States	38,1	3,87	4	9,82	8,63	9,81
Paris	France	41,4	2,48	6	9,7	8,26	9,32
Ottawa	Canada	42,2	2,14	43	7,5	6,43	6,9
London	United Kingdom	40,5	2,86	1	10	8,57	9,73
Frankfurt	Germany	47,1	0,08	45	7,38	5,92	6,22
Stockholm	Sweden	41,2	2,56	58	6,61	5,8	6,06
New York City	United States	38,1	3,87	3	9,88	8,68	9,88
Auckland	New Zealand	37,9	3,95	95	4,4	4,31	4,08
Singapore	Singapore	34,6	5,34	44	7,44	7,02	7,68
Adelaide	Australia	38,7	3,61	33	8,1	7,2	7,92
Canberra	Australia	38,7	3,61	33	8,1	7,2	7,92
Hamburg	Germany	47,1	0,08	32	8,15	6,54	7,04
Montreal	Canada	42,2	2,14	50	7,08	6,09	6,45
Washington, D.C.	United States	38,1	3,87	8	9,58	8,44	9,56
Tokyo	Japan	47,3	0	9	9,52	7,62	8,47
Basel	Switzerland	42,4	2,06	54	6,85	5,89	6,18
Oslo	Norway	39,2	3,4	71	5,83	5,34	5,45
Wellington	New Zealand	37,9	3,95	68	6,01	5,6	5,8
Chicago	United States	38,1	3,87	10	9,46	8,34	9,43
Helsinki	Finland	42,5	2,02	55	6,79	5,84	6,11

Luxembourg	Luxembourg	39,3	3,36	73	5,71	5,24	5,32
Seattle	United States	38,1	3,87	51	7,02	6,39	6,84
Brussels	Belgium	41,4	2,48	112	3,39	3,21	2,63
Dublin	Ireland	36,8	4,41	105	3,81	3,93	3,58
Stuttgart	Germany	47,1	0,08	70	5,89	4,73	4,64
Barcelona	Spain	42,7	1,93	46	7,32	6,24	6,64
Los Angeles	United States	38,1	3,87	2	9,94	8,73	9,95
Milan	Italy	45,5	0,76	34	8,04	6,58	7,1
Madrid	Spain	42,7	1,93	41	7,62	6,48	6,96
Baltimore	United States	38,1	3,87	56	6,73	6,16	6,54
Seoul	South Korea	41,8	2,31	14	9,23	7,85	8,78
Philadelphia	United States	38,1	3,87	16	9,11	8,06	9,06
Dallas	United States	38,1	3,87	12	9,35	8,25	9,31
Lyon	France	41,4	2,48	52	6,96	6,06	6,41
Edinburgh	United Kingdom	40,5	2,86	24	8,63	7,48	8,29
Linz	Austria	44	1,39	80	5,3	4,52	4,36
Lisbon	Portugal	42,2	2,14	77	5,48	4,81	4,75
Phoenix	United States	38,1	3,87	13	9,29	8,21	9,26
Houston	United States	38,1	3,87	40	7,68	6,92	7,55
Rome	Italy	45,5	0,76	48	7,2	5,91	6,21
Yokohama	Japan	47,3	0	9	9,52	7,62	8,47
Cologne	Germany	47,1	0,08	61	6,43	5,16	5,21
Florence	Italy	45,5	0,76	59	6,55	5,39	5,52
Prague	Czech Republic	42,1	2,18	57	6,67	5,77	6,02
Málaga	Spain	42,7	1,93	101	4,05	3,63	3,18
Hong Kong	Hong Kong	44,4	1,22	17	9,05	7,48	8,29
Birmingham	United Kingdom	40,5	2,86	38	7,8	6,81	7,4
Liverpool	United Kingdom	40,5	2,86	65	6,19	5,52	5,69
Atlanta	United States	38,1	3,87	40	7,68	6,92	7,55
Miami	United States	38,1	3,87	18	8,99	7,97	8,94
Eindhoven	Netherlands	42,6	1,97	82	5,18	4,54	4,39
Rotterdam	Netherlands	42,6	1,97	62	6,37	5,49	5,65
Manchester	United Kingdom	40,5	2,86	19	8,93	7,72	8,61
Marseille	France	41,4	2,48	94	4,46	4,06	3,75
Nice	France	41,4	2,48	73	5,71	5,06	5,08
Osaka	Japan	47,3	0	72	5,77	4,62	4,5
Valencia	Spain	42,7	1,93	109	3,57	3,24	2,67
Antwerp	Belgium	41,4	2,48	108	3,63	3,4	2,88
Warsaw	Poland	40,7	2,77	79	5,36	4,84	4,79

Dubai	United Arab Emirates	30,3	7,14	145	1,43	2,57	1,78
Taipei	Taiwan	40,7	2,77	20	8,87	7,65	8,51
Tallinn	Estonia	42,7	1,93	47	7,26	6,19	6,58
Abu Dhabi	United Arab Emirates	30,3	7,14	157	0,71	2	1,02
Budapest	Hungary	42,3	2,1	42	7,56	6,47	6,95
Ljubljana	Slovenia	44,5	1,18	100	4,11	3,52	3,04
Vilnius	Lithuania	43,7	1,51	22	8,75	7,3	8,05
Bilbao	Spain	42,7	1,93	117	3,1	2,87	2,18
Bratislava	Slovakia	40,5	2,86	49	7,14	6,28	6,7
Gothenburg	Sweden	41,2	2,56	75	5,6	4,99	4,99
Riga	Latvia	43,6	1,55	74	5,65	4,83	4,77
Buenos Aires	Argentina	31,7	6,55	66	6,13	6,21	6,6
Kuala Lumpur	Malaysia	28,5	7,9	116	3,15	4,1	3,81
Montevideo	Uruguay	35	5,17	131	2,26	2,84	2,14
Santiago	Chile	34,4	5,42	93	4,52	4,7	4,6
Athens	Greece	44,5	1,18	78	5,42	4,57	4,43
Shanghai	China	37,4	4,16	27	8,45	7,59	8,44
Zagreb	Croatia	43	1,81	110	3,51	3,17	2,57
Porto	Portugal	42,2	2,14	125	2,62	2,52	1,71
Panama City	Panama	29,2	7,61	146	1,37	2,62	1,84
Wroclaw	Poland	40,7	2,77	89	4,76	4,36	4,15
Medellín	Colombia	30	7,27	132	2,2	3,21	2,63
Sofia	Bulgaria	42,7	1,93	76	5,54	4,82	4,76
Beijing	China	37,4	4,16	64	6,25	5,83	6,1
Tel Aviv	Israel	29,9	7,31	126	2,56	3,51	3,02
Mexico City	Mexico	28,3	7,98	60	6,49	6,79	7,37
Bucharest	Romania	41,1	2,61	102	3,99	3,71	3,29
Córdoba	Argentina	31,7	6,55	120	2,92	3,65	3,21
Bangkok	Thailand	37,7	4,03	133	2,14	2,52	1,71
Brasilia	Brazil	32	6,43	151	1,07	2,14	1,21
Jerusalem	Israel	29,9	7,31	136	1,96	3,03	2,39
Monterrey	Mexico	28,3	7,98	66	6,13	6,5	6,99
Guangzhou	China	37,4	4,16	128	2,44	2,78	2,06
Sao Paulo	Brazil	32	6,43	129	2,38	3,19	2,6
Cape Town	South Africa	27,1	8,49	142	1,61	2,99	2,33
Asuncion	Paraguay	28,2	8,03	119	2,98	3,99	3,66
Rio de Janeiro	Brazil	32	6,43	114	3,27	3,9	3,54
Istanbul	Turkey	30,9	6,89	124	2,68	3,52	3,04
Lima	Peru	28	8,11	122	2,8	3,86	3,49
Doha	Qatar	33,2	5,92	168	0,06	1,23	0

Bogota	Colombia	30	7,27	106	3,75	4,45	4,27
Durban	South Africa	27,1	8,49	142	1,61	2,99	2,33
Guadalajara	Mexico	28,3	7,98	120	2,92	3,93	3,58
Johannesburg	South Africa	27,1	8,49	143	1,55	2,94	2,27
Tunis	Tunisia	31,6	6,6	152	1,01	2,13	1,19
Quito	Ecuador	27,7	8,24	130	2,32	3,5	3,01
Shenzhen	China	37,4	4,16	137	1,9	2,35	1,49
Kuwait City	Kuwait	29,3	7,56	161	0,48	1,9	0,89
Moscow	Russia	39,6	3,24	7	9,64	8,36	9,46
Belgrade	Serbia	42,6	1,97	107	3,69	3,35	2,81
Chengdu	China	37,4	4,16	137	1,9	2,35	1,49
St Petersburg	Russia	39,6	3,24	39	7,74	6,84	7,44
Manila	Philippines	23,5	10	148	1,25	3	2,35
Kiev	Ukraine	40,6	2,82	103	3,93	3,71	3,29
Casablanca	Morocco	29,3	7,56	165	0,24	1,7	0,62
Ho Chi Minh City	Vietnam	30,5	7,06	154	0,89	2,12	1,18
Jakarta	Indonesia	30,2	7,18	15	9,17	8,77	10
Chongqing	China	37,4	4,16	137	1,9	2,35	1,49
Riyadh	Saudi Arabia	27,5	8,32	169	0	1,66	0,57
Ankara	Turkey	30,9	6,89	113	3,33	4,04	3,73
Hanoi	Vietnam	30,5	7,06	154	0,89	2,12	1,18
Mumbai	India	27,9	8,15	162	0,42	1,97	0,98
Shenyang	China	37,4	4,16	137	1,9	2,35	1,49
Bangalore	India	27,9	8,15	134	2,08	3,29	2,73
New Delhi	India	27,9	8,15	159	0,6	2,11	1,17
La Paz	Bolivia	24,3	9,66	155	0,83	2,6	1,82
Cairo	Egypt	23,9	9,83	144	1,49	3,16	2,56

XXII.- Magnetism. Strategy. SmartCity Plan (Webs/SmartCity Plan Docs)

City	Country	City Webpage	Smart Cities Links	**Consulted**
Zurich	Switzerland	http://www.stadt-zuerich.ch/	https://www.stadt-zuerich.ch/portal	19 Jan 2018
Vienna	Austria	https://www.wien.gv.at/	https://smartcity.wien.gv.at/site/en/	20 Jan 2018
Berlin	Germany	http://www.berlin.de/en/	https://www.berlin-partner.de/en/the-berlin-location/smart-city-berlin/	20 Jan 2018
Amsterdam	Netherlands	http://www.amsterdam.nl/	https://amsterdamsmartcity.com	20 Jan 2018
Munich	Germany	http://www.muenchen.de/	http://smarter-together.eu/cities/munich/	20 Jan 2018
Geneva	Switzerland	http://ville-geneve.ch/	http://dievolkswirtschaft.ch/fr/2016/06/maudet-07-2016/	20 Jan 2018
Vancouver	Canada	http://vancouver.ca/	http://vancouver.ca/your-government/smart-cities-canada.aspx	20 Jan 2018
Dusseldorf	Germany	http://www.duesseldorf.de/	https://www.digihub.de/	20 Jan 2018
Sydney	Australia	http://www.cityofsydney.nsw.gov.au/	http://www.sydney.org.au/?portfolio=sydney-as-a-global-talent-hub	20 Jan 2018
Toronto	Canada	http://www.toronto.ca/	https://www.weforum.org/agenda/2017/10/google-parent-alphabet-is-building-a-model-smart-city-district-but-will-people-want-to-live-there/	20 Jan 2018
Melbourne	Australia	http://www.melbourne.vic.gov.au/Pages/home.aspx	http://www.melbourne.vic.gov.au/about-melbourne/melbourne-profile/smart-city/Pages/smart-city.aspx	25-feb-18
Bern	Switzerland	https://www.bern.com/de/	**NONE**	8-apr-18
San Francisco	United States	http://sfgov.org/	http://smartcitysf.com	8-apr-18
Copenhagen	Denmark	https://international.kk.dk/	http://www.copcap.com/set-up-a-business/key-sectors/smart-city	8-apr-18
Boston	United States	https://www.boston.gov	http://www.smartcity.press/boston-smart-city-initiatives-and-ideas/	8-apr-18
Paris	France	https://www.paris.fr/	http://vincent.callebaut.org/object/150105_parissmartcity2050/parissmartcity2050/projects/user	8-apr-18
Ottawa	Canada	https://ottawa.ca/en	https://ottawa.ca/en/business/business-resources/economic-development-initiatives/innovation-pilot-program	8-apr-18
London	United Kingdom	https://www.cityoflondon.gov.uk/Pages/default.aspx	https://www.london.gov.uk/what-we-do/business-and-economy/science-and-technology/smart-london	8-apr-18

Frankfurt	Germany	https://www.frankfurt.de/sixcms/detail.php?id=stadtfrankfurt_eval01.c.317693.en	http://www.dw.com/en/frankfurt-shoots-for-100-percent-renewables/a-36467796	8-apr-18
Stockholm	Sweden	http://international.stockholm.se/	http://international.stockholm.se/city-development/the-smart-city/	8-apr-18
New York City	United States	http://www1.nyc.gov/	https://www1.nyc.gov/site/forward/innovations/smartnyc.page	21-may-18
Auckland	New Zealand	https://www.aucklandcouncil.govt.nz/Pages/default.aspx	https://www.linz.govt.nz/about-linz/what-were-doing/projects/smart-cities	7-Aug-18
Singapore	Singapore	https://www.gov.sg/	https://www.smartnation.sg	7-Aug-18
Adelaide	Australia	https://www.cityofadelaide.com.au/	https://www.cityofadelaide.com.au/city-business/why-adelaide/adelaide-smart-city/	7-Aug-18
Canberra	Australia	https://www.nca.gov.au/	https://www.cmtedd.act.gov.au/smart-cities/home	8-Aug-18
Hamburg	Germany	https://www.hamburg.de/	http://hamburgsmartcity.com	8-Aug-18
Montreal	Canada	http://ville.montreal.qc.ca/portal/page?_pageid=5977,86481579&_dad=portal&_schema=PORTAL	http://villeintelligente.montreal.ca/en	8-Aug-18
Washington, D.C.	United States	https://dc.gov/	https://smarter.dc.gov	8-Aug-18
Tokyo	Japan	http://www.metro.tokyo.jp/ENGLISH/index.htm	http://cdnsite.eu-japan.eu/sites/default/files/publications/docs/smart2020tokyo_final.pdf	8-Aug-18
Basel	Switzerland	http://www.staatskanzlei.bs.ch/rathaus.html	http://www.smartcity-schweiz.ch/de/smart-city-forschungs-aktivitaeten/project-description/	8-Aug-18
Oslo	Norway	http://www.oslo.kommune.no/	https://www.oslo.kommune.no/english/politics-and-administration/smart-oslo/#gref	9-Aug-18
Wellington	New Zealand	http://www.wellingtonnz.com/	https://wellington.govt.nz/your-council/structure-and-vision/vision-2040/towards-2040-smart-capital	9-Aug-18
Chicago	United States	http://www.cityofchicago.org/	http://www.ioti.com/smart-cities/why-chicago-smart-city-king	9-Aug-18
Helsinki	Finland	http://www.hel.fi/hki/Helsinki/en/Etusivu	https://www.helsinkismart.fi	9-Aug-18
Luxembourg	Luxembourg	http://www.luxembourg.public.lu/en/	https://www.list.lu/en/cooperations/innovation-programmes/smart-cities/	9-Aug-18
Seattle	United States	http://www.seattle.gov/	https://www.seattle.gov/tech/initiatives/smart-cities	9-Aug-18
Brussels	Belgium	http://be.brussels/brussels?set_language=en	https://smartcity.brussels/home	9-Aug-18
Dublin	Ireland	http://www.dublincity.ie/	http://smartdublin.ie	12-feb-18

Stuttgart	Germany	http://www.stuttgart.de/	http://www.stuttgart.de/img/mdb/publ/27285/122128.pdf	9-Aug-18
Barcelona	Spain	https://ajuntament.barcelona.cat/es/	https://ajuntament.barcelona.cat/digital/ca	9-Aug-18
Los Angeles	United States	https://www.lacity.org/	http://www.esri.com/smart-communities/los-angeles	9-Aug-18
Milan	Italy	http://www.comune.milano.it/wps/portal/ist/en	http://www.milanosmartcity.org/joomla/images/sampledata/programma/SmartCity/milano%20smart%20city%20-%20guidelines.pdf	12-feb-18
Madrid	Spain	http://www.madrid.es/portales/munimadrid/en/Home?vgnextfmt=default&vgnextchannel=1ccd566813946010VgnVCM100000dc0ca8c0RCRD&idioma=en&idiomaPrevio=en&combo=1	http://www.madrid.es/portales/munimadrid/es/Inicio/Actualidad/Noticias/Madrid-impulsa-su-modelo-Smart-City?vgnextfmt=default&vgnextoid=a5d4ca08566a1410VgnVCM1000000b205a0aRCRD&vgnextchannel=a12149fa40ec9410VgnVCM100000171f5a0aRCRD	10-Aug-18
Baltimore	United States	http://www.baltimorecity.gov/	https://www.transportation.gov/sites/dot.gov/files/docs/MD%20Baltimore.pdf	10-Aug-18
Seoul	South Korea	http://english.seoul.go.kr/	https://www.clc.gov.sg/docs/default-source/commentaries/smart-city.pdf	10-Aug-18
Philadelphia	United States	http://www.phila.gov/pages/default.aspx	https://philly.curbed.com/2017/10/18/16490980/philadelphia-smart-city-roadmap	10-Aug-18
Dallas	United States	http://www.dallascityhall.com/	http://www3.dallascityhall.com/smart-cities/	10-Aug-18
Lyon	France	http://www.lyon.fr/page/websites-in-english-about-lyon-france.html	http://www.business.greaterlyon.com/smart-city-lyon-process-47.html	10-Aug-18
Edinburgh	United Kingdom	https://www.edinburgh.gov.uk/	http://www.smartcities.info/edinburgh	10-Aug-18
Linz	Austria	http://www.linz.at/	http://www.smartcities.at/city-projects/smart-cities-en-us/linz2050-en-us/	10-Aug-18
Lisbon	Portugal	http://www.cm-lisboa.pt/	http://www.eurocities.eu/eurocities/allcontent/EUROCITIES-smart-cities-Lisbon-Sharing-Cities-WSPO-AA2BLW	10-Aug-18
Phoenix	United States	http://www.phoenix.gov/	https://futurism.com/bill-gates-smart-city-arizona/	10-Aug-18
Houston	United States	http://www.houstontx.gov/	https://www.sdmmag.com/articles/94241-houston-leads-the-way-for-smart-secure-and-sustainable-cities	10-Aug-18
Rome	Italy	http://www.comune.roma.it/	http://ses.jrc.ec.europa.eu/smart-grid-city-rome	12-feb-18
Yokohama	Japan	http://www.city.yokohama.lg.jp/lang/en/	http://www.c40.org/awards/2016-awards/profiles/89	10-Aug-18
Cologne	Germany	http://www.stadt-koeln.de/	http://www.smartcity-cologne.de	10-Aug-18

Florence	Italy	http://www.comune.firenze.it/	http://www.majorcities.eu/wp-content/uploads/2017/06/1.-Alessandra-Barbieri_mcegiugno2017.pdf	12-feb-18
Prague	Czech Republic	http://www.praha.eu/jnp/en/index.html	http://prahafondy.ami.cz/userfiles/File/budoucnost2014plus/Smart_Prague/SMART_Prague_2014_01-27_en.pdf	10-Aug-18
Málaga	Spain	http://www.malaga.eu/	https://www.esmartcity.es/2014/07/24/smart-city-malaga-eficiencia-energetica-y-laboratorio-urbano	10-Aug-18
Hong Kong	Hong Kong	https://www.gov.hk/	https://www.smartcity.gov.hk	10-Aug-18
Birmingham	United Kingdom	http://www.birmingham.gov.uk/	https://birminghamsmartcity.wordpress.com	11-Aug-18
Liverpool	United Kingdom	http://www.liverpool.gov.uk/	https://www.liverpoollep.org/wp-content/uploads/2015/06/wpid-lcr-innovation-plan-draft2014.pdf	11-Aug-18
Atlanta	United States	http://atlantaga.gov/	http://smartatl.atlantaga.gov	11-Aug-18
Miami	United States	http://miamigov.com/	https://www.digitaltrends.com/cool-tech/miami-civiq-smart-city/	11-Aug-18
Eindhoven	Netherlands	http://www.eindhoven.nl/	https://inform.tmforum.org/features-and-analysis/2017/04/city-eindhoven-creates-continuous-smart-city-innovations/	11-Aug-18
Rotterdam	Netherlands	http://www.rotterdam.nl/	https://www.theneweconomy.com/business/rotterdam-leads-the-way-for-europes-new-smart-cities	11-Aug-18
Manchester	United Kingdom	http://www.manchester.gov.uk/	http://www.manchester.gov.uk/smartercity	11-Aug-18
Marseille	France	http://www.marseille.fr/sitevdm/jsp/site/Portal.jsp?page_id=687	http://international.marseille.fr/smart-city	11-Aug-18
Nice	France	https://www.nice.fr/fr/	http://en.meet-in-nice.com/nice-smart-city	11-Aug-18
Osaka	Japan	http://www.city.osaka.lg.jp/	https://www.rvo.nl/sites/default/files/Smart%20Cities%20Japan.pdf	11-Aug-18
Valencia	Spain	http://www.valencia.es/	http://vlci.inndeavalencia.com/?lang=es	11-Aug-18
Antwerp	Belgium	http://www.antwerpen.be/	https://www.imec-int.com/en/articles/imec-collaborates-with-city-of-antwerp-and-flanders-to-establish-smart-city-living-lab	12-Aug-18
Warsaw	Poland	http://www.um.warszawa.pl/en	https://www.citiesdigest.com/2017/07/12/smart-city-warsaw/	12-Aug-18
Dubai	United Arab Emirates	http://www.dm.gov.ae/wps/portal/MyHomeEn	http://www.smartdubai.ae	12-Aug-18
Taipei	Taiwan	http://english.gov.taipei/	https://smartcity.taipei/events/place_planning	12-Aug-18
Tallinn	Estonia	http://tallinn.ee/eng	http://www.greencruiseport.eu/files/public/download/events/tallinn/1.%20Digitalized%20and%20smart%2	12-Aug-18

			0city%20–%20Tallinn%20–%20Toomas%20Sepp,%20Head%20of%20City%20Office,%20City%20of%20Tallinn.pdf	
Abu Dhabi	United Arab Emirates	http://www.abudhabi.ae/	http://middleeast-business.com/transforming-abu-dhabi-smart-city/	12-Aug-18
Budapest	Hungary	http://budapest.hu/sites/english/Lapok/default.aspx	http://smartcitybudapest.eu	13-Aug-18
Ljubljana	Slovenia	http://www.ljubljana.si/	https://www.visionect.com/blog/ljubljana-smart-city-success-story/	13-Aug-18
Vilnius	Lithuania	http://www.vilnius.lt/	http://www.smartcityvilnius.com/en/home.html	15-Aug-18
Bilbao	Spain	https://www.bilbao.eus/	http://www.bilbao.eus/cs/Satellite?c=BIO_Noticia_FA&cid=1279163949133&language=en&pageid=3000075248&pagename=Bilbaonet%2FBIO_Noticia_FA%2FBIO_Noticia	15-Aug-18
Bratislava	Slovakia	http://www.bratislava.sk/en	https://newsnow.tasr.sk/economy/nesrovnal-bratislava-looking-to-keep-up-with-smart-city-solutions/	15-Aug-18
Gothenburg	Sweden	https://goteborg.se/	https://international.goteborg.se/smart-cities-and-sustainable-solutions	15-Aug-18
Riga	Latvia	http://www.riga.lv/	http://www.rea.riga.lv/files/RIGA_SMART_CITY_SEAP_2014-2020_EN.pdf	16-Aug-18
Buenos Aires	Argentina	http://www.buenosaires.gob.ar/	http://smartcity.deloitte.com/client_innovations/smart-cities-of-the-world-buenos-aires/	16-Aug-18
Kuala Lumpur	Malaysia	http://www.dbkl.gov.my/	https://www.rvo.nl/sites/default/files/Smart%20Cities%20Malaysia.pdf	16-Aug-18
Montevideo	Uruguay	http://www.montevideo.gub.uy/	http://www.montevideo.gub.uy/ciudades-inteligentes-para-la-inclusion-y-la-sostenibilidad	16-Aug-18
Santiago	Chile	http://www.gobiernosantiago.cl/	http://www.smartcitysantiago.cl	16-Aug-18
Athens	Greece	http://www.cityofathens.gr/en/	http://www.ekathimerini.com/219609/article/ekathimerini/community/athens-joins-the-international-club-of-smart-cities	16-Aug-18
Shanghai	China	http://www.shanghai.gov.cn/	https://www.shine.cn/archive/business/economy/Shanghais-future-as-a-connected-smart-city/shdaily.shtml	16-Aug-18
Zagreb	Croatia	http://zagreb.hr/	http://www.smartcities.at/assets/Uploads/02-Mirjana-Zubak-City-of-Zagreb.pdf	16-Aug-18
Porto	Portugal	http://www.cm-porto.pt/	http://www.porto.pt/noticias/porto-ambiciona-tornar-se-um-player-mundial-como-cidade-inteligente	16-Aug-18
Panama City	Panama	http://mupa.gob.pa/	http://laestrella.com.pa/economia/panama-cada-cerca-convertirse-smart-city/24012978	16-Aug-18

Wroclaw	Poland	http://www.wroclaw.pl/	https://www.wroclaw.pl/smartcity/	16-Aug-18
Medellín	Colombia	https://www.medellin.gov.co/irj/portal/medellin	https://www.nationalgeographic.com/travel/destinations/south-america/colombia/smart-cities-medellin-colombia/	16-Aug-18
Sofia	Bulgaria	https://www.sofia.bg/en/web/sofia-municipality/	http://smarter-together.eu/cities/sofia/	16-Aug-18
Beijing	China	http://www.ebeijing.gov.cn/	http://www.chinadaily.com.cn/business/tech/2017-07/31/content_30306275.htm	16-Aug-18
Tel Aviv	Israel	http://tel-aviv.gov.il/eng/Pages/HomePage.aspx	https://www.tel-aviv.gov.il/en/WorkAndStudy/Documents/Tel-Aviv%20Smart%20City%20(pdf%20booklet).pdf	17-Aug-18
Mexico City	Mexico	http://www.cdmx.gob.mx/	http://en.mxcity.mx/2016/12/2016-smart-cities-list/	17-Aug-18
Bucharest	Romania	http://pmb.ro/	http://bucharestsmartcity.ro	17-Aug-18
Córdoba	Argentina	http://www.cba.gov.ar/	https://www.cordoba.gob.ar/2018/02/09/la-ciudad-cordoba-ganadora-del-plan-ciudades-inteligentes-economia-colaborativa-grandes-aglomerados-urbanos-la-argentina-cippec/	17-Aug-18
Bangkok	Thailand	http://www.bangkok.go.th/	https://smartcitiesworld.net/news/news/bangkok-to-build-people-centric-city-within-a-city-1546	17-Aug-18
Brasilia	Brazil	http://www.planopiloto.df.gov.br/	https://www.jornalopcao.com.br/ultimas-noticias/gustavo-mendanha-apresenta-projeto-cidade-inteligente-ao-ministro-gilberto-kassab-96097/	17-Aug-18
Jerusalem	Israel	https://www.jerusalem.muni.il/en/Pages/default.aspx	http://www.jewishpress.com/news/israel/jerusalem/jerusalem-soon-to-be-first-smart-city-in-israel/2017/05/25/	17-Aug-18
Monterrey	Mexico	http://www.monterrey.gob.mx/	http://www.elfinanciero.com.mx/monterrey/guadalupe-consolida-objetivos-como-smart-city.html	17-Aug-18
Guangzhou	China	http://english.gz.gov.cn/	http://europe.chinadaily.com.cn/epaper/2017-06/09/content_29681033.htm	17-Aug-18
Sao Paulo	Brazil	http://www.prefeitura.sp.gov.br/	http://www.zdnet.com/article/sao-paulo-mayor-outlines-smart-city-plan/	17-Aug-18
Cape Town	South Africa	http://www.capetown.gov.za/	https://talkiot.co.za/2016/11/09/cape-town-is-emerging-as-one-of-the-worlds-smart-cities/	17-Aug-18
Asuncion	Paraguay	http://www.mca.gov.py/	http://www.asuncion.gov.py/intendencia/asuncion-ciudad-inteligente-es-un-potencial-para-hungria	17-Aug-18

Rio de Janeiro	Brazil	http://prefeitura.rio/	https://medium.com/sidewalk-talk/4-lessons-from-rios-flawed-smart-cities-initiative-31cbf4e54b72	17-Aug-18
Istanbul	Turkey	http://www.istanbul.gov.tr/	https://www.dailysabah.com/technology/2017/05/15/smart-cities-project-to-increase-the-life-quality-of-15-million-istanbulites	17-Aug-18
Lima	Peru	http://www.munlima.gob.pe/	https://www.nationalgeographic.com/travel/features/smart-cities/lima-peru-innovation/	17-Aug-18
Doha	Qatar	http://portal.www.gov.qa/wps/portal	http://telecoms.com/480420/who-cares-about-london-doha-is-where-its-at-for-smart-cities-orange/	17-Aug-18
Bogota	Colombia	http://www.bogota.gov.co/	http://www.portafolio.co/economia/bogota-le-apunta-a-ser-una-smart-city-504040	17-Aug-18
Durban	South Africa	http://www.durban.gov.za/	http://www.durban.gov.za/Resource_Centre/Press_Releases/Pages/Durban-Wins-IBM-Smart-City-Challenge-Grant.aspx	17-Aug-18
Guadalajara	Mexico	http://www.guadalajara.gob.mx/	https://guadalajara.gob.mx/comunicados/guadalajara-es-un-referente-ciudad-inteligente-tercera-conferencia-internacional-smart	17-Aug-18
Johannesburg	South Africa	http://www.joburg.org.za/	https://joburg.org.za/gds2040/pdfs/smartcity/smart_utility.pdf	17-Aug-18
Tunis	Tunisia	http://www.commune-tunis.gov.tn/publish/content/default.asp?lang=fr	http://www.smarttunisia.tn	17-Aug-18
Quito	Ecuador	http://www.quito.gob.ec/	http://www.elcomercio.com/guaifai/quito-smartcity-tecnologia-servicio-ranking.html	17-Aug-18
Shenzhen	China	http://english.sz.gov.cn/	http://www.shenzhen100.com.cn/2025-welcome-smart-city/	17-Aug-18
Kuwait City	Kuwait	https://www.e.gov.kw/sites/kgoEnglish/Pages/HomePage.aspx	http://www.arabianbusiness.com/work-on-kuwait-s-4bn-smart-city-start-in-2019-670197.html	17-Aug-18
Moscow	Russia	https://www.mos.ru/en/	https://www.forbes.com/sites/nikolaikuznetsov/2017/11/15/moscow-is-on-its-way-to-becoming-a-smart-city-and-fintech-powerhouse/#242996b2983d	17-Aug-18
Belgrade	Serbia	http://www.beograd.rs/	http://www.urbanlandmanagement.rs/en/projects/despotovac/	17-Aug-18
Chengdu	China	http://www.chengdu.gov.cn/	http://www.telegraph.co.uk/news/world/china-watch/business/chengdu-global-partners/	17-Aug-18
St Petersburg	Russia	http://gov.spb.ru/	https://iq.hse.ru/en/news/195419959.html	17-Aug-18
Manila	Philippines	http://manila.gov.ph/	http://www.philstar.com/real-estate/2017/07/07/1717043/worlds-biggest-smart-city-rise-philippines	17-Aug-18

Kiev	Ukraine	https://kyivcity.gov.ua/	https://joinup.ec.europa.eu/news/kyiv-smart-city-how-kiev-wan	17-Aug-18
Casablanca	Morocco	http://www.casablancacity.ma/	http://www.casaprestations.ma/fr/	17-Aug-18
Ho Chi Minh City	Vietnam	http://www.hochiminhcity.gov.vn/	https://www.opengovasia.com/articles/smart-city-plans-unveiled-for-ho-chi-minh-city-in-vietnam	17-Aug-18
Jakarta	Indonesia	http://www.jakarta.go.id/	http://smartcity.jakarta.go.id	17-Aug-18
Chongqing	China	http://en.cq.gov.cn/	https://appadvice.com/app/explore-chongqing-smart-city-guide/1208962813	17-Aug-18
Riyadh	Saudi Arabia	https://www.alriyadh.gov.sa/en/	http://www.constructionweekonline.com/article-36202-saudi-riyadh-approves-56bn-smart-city-projects/	17-Aug-18
Ankara	Turkey	http://www.ankara.gov.tr/	http://realestatenewsturkey.com/ankara-selected-as-pilot-smart-city/	17-Aug-18
Hanoi	Vietnam	http://www.english.hanoi.gov.vn/	http://hanoitimes.com.vn/hanoinews/2017/06/81e0b2ef/4-billion-deal-to-develop-a-smart-city-in-the-north-of-hanoi-signed/	17-Aug-18
Mumbai	India	http://www.mcgm.gov.in/	http://indianexpress.com/article/india/last-list-of-smart-cities-to-be-unveiled-mumbai-not-on-it/	17-Aug-18
Shenyang	China	http://www.shenyang.gov.cn/	http://www.chinaisgood.com/wn/8/egefj.html	17-Aug-18
Bangalore	India	http://www.bbmp.gov.in/	https://timesofindia.indiatimes.com/city/bengaluru/bengaluru-makes-it-to-smart-city-list-set-to-spend-rs-1700-cr/articleshow/59296398.cms	17-Aug-18
New Delhi	India	http://www.ndmc.gov.in/	http://www.smartcitiesprojects.com/?s=new+delhi	17-Aug-18
La Paz	Bolivia	http://www.lapaz.bo/	http://www.paginasiete.bo/especial01/2017/7/16/paz-ciudad-inteligente-construccion-144675.html	17-Aug-18
Cairo	Egypt	http://www.cairo.gov.eg/	http://thecapitalcairo.com/smart-city.html	17-Aug-18

XXIII.- Magnetism. Strategy. SmartCity Plan Evaluation

City	Traffic	Energy Efficiency	Water	Tourism	Smart Buildings	CO2 RED-Carbon Neutral	Safety-Resilience	Social SVS	Trans parency	Citizen Enga gement	Civil Servants	Cloud	Mobile	Open data	Social Analytics	Smart City Plan
Zurich	1	2	1	1	2	0	1	0	0	0	0	0	0	2	0	10
Vienna	2	2	1	1	1	1	1	2	0	2	0	0	2	2	0	17
Berlin	2	2	0	2	0	2	2	1	2	2	0	0	1	1	1	18
Amsterdam	1	2	2	2	2	1	1	1	1	2	2	1	2	0	2	22
Munich	1	2	0	1	1	2	0	0	0	1	0	0	2	2	0	12
Geneva	2	1	0	1	1	1	0	0	0	0	0	0	1	0	0	7
Vancouver	2	1	0	0	1	1	2	1	0	1	0	2	2	2	1	16
Dusseldorf	1	1	0	1	0	1	0	0	0	1	0	0	1	1	0	7
Sydney	2	2	1	1	1	1	1	1	1	2	1	1	2	2	2	21
Toronto	2	1	2	1	0	1	2	1	2	2	1	2	2	1	0	20
Melbourne	1	2	1	1	2	2	2	1	1	2	1	1	2	2	1	22
Bern	2	1	0	1	1	1	0	0	0	0	2	0	1	0	0	9
San Francisco	2	1	0	1	0	2	2	2	2	0	1	1	2	2	2	20
Copenhagen	2	2	1	1	1	2	1	2	2	2	2	2	2	2	2	26
Boston	2	1	0	0	0	2	1	0	1	2	0	2	1	2	1	15
Paris	0	2	0	1	0	2	2	1	2	2	0	0	1	0	1	14
Ottawa	2	0	2	0	1	0	0	1	2	2	0	1	2	0	1	14
London	2	2	1	2	1	1	1	1	0	2	1	1	2	0	1	18
Frankfurt	0	2	0	2	2	1	0	1	1	1	0	0	1	0	0	11
Stockholm	1	2	1	2	2	2	0	2	2	2	2	1	2	1	2	24
New York City	1	0	2	1	0	0	2	2	1	1	1	1	2	2	2	18
Auckland	1	2	2	0	0	1	0	1	2	1	1	1	2	0	0	14
Singapore	2	0	0	0	1	0	2	2	2	2	0	0	2	2	2	17
Adelaide	2	2	2	1	0	2	2	2	1	2	1	1	1	1	0	20
Canberra	1	2	0	2	1	0	0	1	1	1	1	1	0	0	0	11
Hamburg	2	2	2	2	1	1	0	2	1	0	1	0	0	0	1	15
Montreal	1	1	1	1	0	0	2	2	1	0	1	1	0	0	1	12
Washington, D.C.	2	2	2	1	0	0	2	1	2	1	0	1	0	2	0	16
Tokyo	1	2	2	1	0	0	2	2	1	0	0	1	0	0	0	12
Basel	1	2	0	0	0	0	1	1	2	0	0	0	0	1	0	8
Oslo	2	2	2	0	2	1	0	2	1	1	0	0	2	1	2	18
Wellington	1	2	1	2	1	1	2	1	1	2	1	0	0	0	1	16
Chicago	2	2	2	2	1	1	2	1	1	0	0	1	1	2	1	19
Helsinki	2	2	1	1	1	2	2	2	1	0	2	2	2	2	1	23
Luxembourg	1	2	1	2	1	0	0	2	1	1	0	0	2	2	1	16
Seattle	2	2	1	1	0	0	2	1	1	0	1	2	2	2	1	18
Brussels	0	1	0	1	0	1	1	1	2	0	0	0	2	2	0	11

Dublin	2	1	2	1	2	0	0	1	0	2	1	0	1	2	2	17
Stuttgart	1	2	1	2	0	0	0	1	1	2	0	0	0	1	1	12
Barcelona	2	1	2	2	0	0	1	1	1	1	1	1	2	2	1	18
Los Angeles	0	2	1	2	0	0	1	0	2	1	1	0	2	2	1	15
Milan	2	1	0	2	0	1	0	2	1	2	1	1	1	2	0	16
Madrid	0	0	0	1	0	0	0	1	2	1	0	0	0	2	0	7
Baltimore	1	2	0	0	0	0	1	1	0	0	0	0	0	2	2	9
Seoul	2	1	0	2	1	0	1	2	2	2	1	0	2	2	2	20
Philadelphia	0	0	0	1	0	0	1	0	2	1	0	0	0	2	1	8
Dallas	1	1	1	2	1	0	2	0	2	1	0	0	2	2	1	16
Lyon	1	1	1	2	0	0	0	2	1	2	1	0	1	0	1	13
Edinburgh	2	2	0	2	0	0	0	2	2	1	1	1	2	2	1	18
Linz	1	1	0	2	0	0	0	1	1	1	0	0	2	0	0	9
Lisbon	2	2	0	1	1	0	1	0	0	1	0	0	0	1	0	9
Phoenix	2	1	1	0	0	0	1	2	2	2	1	1	2	2	2	19
Houston	2	1	0	1	0	0	2	1	1	1	1	1	1	2	2	16
Rome	1	2	0	1	0	0	0	0	0	1	1	0	1	0	0	7
Yokohama	1	2	1	1	1	0	1	2	1	1	0	1	1	2	1	16
Cologne	2	2	1	1	1	1	1	2	2	1	1	0	2	2	0	19
Florence	2	2	0	2	0	1	2	0	1	1	0	0	2	1	0	14
Prague	1	1	0	2	0	1	1	1	0	0	0	0	0	1	1	9
Málaga	2	2	2	2	1	1	0	0	2	1	1	0	2	2	1	19
Hong Kong	2	1	1	2	1	0	1	2	2	1	1	0	2	2	2	20
Birmingham	0	2	0	0	1	1	0	2	2	2	1	1	1	1	1	15
Liverpool	1	2	1	0	1	1	1	1	1	1	1	1	1	0	0	13
Atlanta	1	2	2	0	1	0	2	1	2	1	1	0	1	2	2	18
Miami	2	2	0	0	1	0	2	2	2	1	2	1	0	0	0	15
Eindhoven	2	2	2	0	2	0	0	2	1	2	2	1	1	2	0	19
Rotterdam	2	2	2	0	1	0	0	2	2	2	2	2	2	1	0	20
Manchester	2	2	1	1	2	1	1	2	2	2	2	1	1	2	0	22
Marseille	0	1	0	1	0	0	1	1	1	2	0	0	2	2	1	12
Nice	1	2	0	1	1	0	2	1	1	2	1	0	1	1	1	15
Osaka	1	2	1	1	2	0	1	2	1	1	1	0	0	0	0	13
Valencia	2	1	1	2	0	0	1	2	2	1	1	0	2	2	2	19
Antwerp	2	2	1	1	0	0	0	2	2	2	2	1	2	2	2	21
Warsaw	0	1	1	2	0	0	0	0	0	1	1	0	1	2	0	9
Dubai	1	2	2	1	1	0	2	1	0	1	1	0	2	2	1	17
Taipei	2	2	1	1	1	1	2	2	1	1	1	0	2	2	2	21
Tallinn	2	1	0	2	0	0	1	1	1	2	2	2	2	0	0	16
Abu Dhabi	2	1	2	2	0	0	2	2	1	1	1	0	2	0	0	16
Budapest	2	0	0	2	0	0	0	1	1	2	0	0	0	0	0	8
Ljubljana	2	1	2	2	0	0	0	2	1	2	1	0	2	0	0	15

Vilnius	1	0	0	1	0	0	1	1	1	1	0	0	2	2	0	10
Bilbao	1	1	1	2	0	0	0	2	1	2	1	0	2	2	1	16
Bratislava	0	1	0	2	0	0	0	0	1	1	0	0	0	0	0	5
Gothenburg	2	2	1	1	1	1	0	2	1	1	2	2	2	1	0	19
Riga	1	2	1	0	1	1	0	1	1	1	0	0	0	0	0	9
Buenos Aires	0	0	2	2	0	0	0	1	1	1	0	0	2	0	0	9
Kuala Lumpur	2	2	0	1	0	0	0	1	1	1	1	0	2	0	1	12
Montevideo	2	1	0	1	0	1	0	1	2	2	1	0	2	2	0	15
Santiago	1	2	0	1	1	1	2	1	2	2	0	1	2	0	0	16
Athens	0	1	0	1	0	0	1	1	1	1	1	0	1	0	0	8
Shanghai	1	1	0	1	1	1	1	1	1	1	0	0	2	0	1	12
Zagreb	1	1	0	1	2	1	1	1	2	1	0	0	0	2	1	14
Porto	2	1	1	2	0	0	1	1	2	1	0	0	2	0	0	13
Panama City	0	2	1	1	0	0	1	1	2	2	0	0	0	2	0	12
Wroclaw	2	1	0	2	0	0	2	1	2	1	1	0	2	0	1	15
Medellín	0	1	0	1	0	0	1	1	2	2	1	0	1	0	0	10
Sofia	0	2	0	0	1	0	0	1	1	1	0	0	2	2	1	11
Beijing	0	1	0	2	0	0	1	0	0	1	0	0	2	0	0	7
Tel Aviv	2	1	2	2	0	0	2	2	2	2	2	1	2	2	2	24
Mexico City	2	1	0	0	0	1	1	1	0	1	0	0	1	2	0	10
Bucharest	1	1	0	0	1	0	1	0	2	1	0	0	1	2	0	10
Córdoba	0	0	0	0	0	0	1	1	2	1	2	0	0	2	1	10
Bangkok	1	2	0	2	1	0	1	0	0	0	0	0	2	0	1	10
Brasilia	0	0	0	1	0	0	1	1	2	1	0	0	1	2	0	9
Jerusalem	1	2	1	2	0	0	1	2	1	2	1	1	2	2	0	18
Monterrey	0	0	0	1	0	0	0	0	2	1	0	0	0	2	0	6
Guangzhou	0	1	1	1	0	0	0	0	0	0	0	0	1	0	0	4
Sao Paulo	1	0	0	1	0	0	2	1	1	2	0	1	2	0	0	11
Cape Town	2	2	1	0	0	1	2	1	1	1	1	0	2	2	1	17
Asuncion	0	0	0	0	0	0	0	1	2	0	0	0	1	0	0	4
Rio de Janeiro	1	0	0	2	0	0	2	1	2	1	1	0	2	1	0	13
Istanbul	1	1	0	0	0	1	1	1	0	0	0	0	0	1	0	6
Lima	2	0	0	1	0	0	1	1	2	1	0	0	2	2	0	12
Doha	2	2	2	2	2	0	2	1	1	2	1	0	2	2	0	21
Bogota	1	0	1	1	0	0	1	1	2	2	1	0	2	2	0	14
Durban	1	2	2	1	1	0	2	1	2	1	1	0	2	0	1	17
Guadalajara	1	0	0	1	0	0	1	1	2	2	1	0	2	2	0	13
Johannesburg	1	1	0	1	0	0	2	1	1	1	0	0	1	1	0	10
Tunis	0	0	0	1	0	0	0	0	1	0	0	0	0	0	0	2
Quito	1	0	0	2	0	0	1	1	2	2	1	0	2	2	0	14
Shenzhen	1	1	2	1	1	0	1	0	0	1	0	0	2	0	0	10
Kuwait City	1	1	0	1	0	0	1	0	0	1	1	1	0	0	0	7

Moscow	2	2	0	1	1	1	2	2	0	1	0	0	2	2	1	17
Belgrade	2	2	2	1	0	0	0	1	0	1	0	0	0	0	0	9
Chengdu	1	1	0	0	0	0	0	0	0	1	0	0	0	0	0	3
St Petersburg	2	1	1	2	1	0	1	0	0	1	0	0	0	0	0	9
Manila	1	1	0	0	0	0	0	0	1	1	0	0	0	0	0	4
Kiev	1	1	0	2	1	0	1	0	0	1	0	0	1	1	1	10
Casablanca	0	1	1	2	0	0	0	1	1	1	1	0	2	2	0	12
Ho Chi Minh City	2	1	0	0	0	0	1	1	0	1	0	0	2	2	0	10
Jakarta	0	1	2	1	0	0	1	1	0	2	0	0	0	2	1	11
Chongqing	2	0	0	2	0	0	0	0	0	1	0	1	2	0	0	8
Riyadh	1	1	0	1	0	0	1	0	0	0	0	0	1	0	0	5
Ankara	1	1	0	0	0	0	1	0	0	1	0	0	0	0	0	4
Hanoi	1	1	1	1	0	0	1	0	1	1	0	0	1	0	0	8
Mumbai	0	1	1	2	0	0	1	0	1	2	0	0	2	0	0	10
Shenyang	2	1	0	2	0	1	0	0	0	1	0	0	2	0	0	9
Bangalore	1	1	1	0	0	0	1	0	0	1	0	0	2	0	0	7
New Delhi	1	1	1	1	1	0	2	1	1	1	1	0	2	2	0	15
La Paz	2	1	1	2	0	0	1	1	1	1	1	0	2	0	0	13
Cairo	1	1	1	2	0	0	1	0	1	1	1	0	0	0	0	9

XXIV.- Magnetism. Strategy. SmartCity Plan Normalized

City	Country	Plan SMARTCITY Sum of Scores	SMARTCITY Plan NOR
Zurich	Switzerland	10	3,33
Vienna	Austria	17	6,25
Berlin	Germany	18	6,67
Amsterdam	Netherlands	22	8,33
Munich	Germany	12	4,17
Geneva	Switzerland	7	2,08
Vancouver	Canada	16	5,83
Dusseldorf	Germany	7	2,08
Sydney	Australia	21	7,92
Toronto	Canada	20	7,5
Melbourne	Australia	22	8,33
Bern	Switzerland	9	2,92
San Francisco	United States	20	7,5
Copenhagen	Denmark	26	10
Boston	United States	15	5,42
Paris	France	14	5
Ottawa	Canada	14	5
London	United Kingdom	18	6,67
Frankfurt	Germany	11	3,75
Stockholm	Sweden	24	9,17
New York City	United States	18	6,67
Auckland	New Zealand	14	5
Singapore	Singapore	17	6,25
Adelaide	Australia	20	7,5
Canberra	Australia	11	3,75
Hamburg	Germany	15	5,42
Montreal	Canada	12	4,17
Washington, D.C.	United States	16	5,83
Tokyo	Japan	12	4,17
Basel	Switzerland	8	2,5
Oslo	Norway	18	6,67
Wellington	New Zealand	16	5,83
Chicago	United States	19	7,08
Helsinki	Finland	23	8,75
Luxembourg	Luxembourg	16	5,83
Seattle	United States	18	6,67
Brussels	Belgium	11	3,75

Dublin	Ireland	17	6,25
Stuttgart	Germany	12	4,17
Barcelona	Spain	18	6,67
Los Angeles	United States	15	5,42
Milan	Italy	16	5,83
Madrid	Spain	7	2,08
Baltimore	United States	9	2,92
Seoul	South Korea	20	7,5
Philadelphia	United States	8	2,5
Dallas	United States	16	5,83
Lyon	France	13	4,58
Edinburgh	United Kingdom	18	6,67
Linz	Austria	9	2,92
Lisbon	Portugal	9	2,92
Phoenix	United States	19	7,08
Houston	United States	16	5,83
Rome	Italy	7	2,08
Yokohama	Japan	16	5,83
Cologne	Germany	19	7,08
Florence	Italy	14	5
Prague	Czech Republic	9	2,92
Málaga	Spain	19	7,08
Hong Kong	Hong Kong	20	7,5
Birmingham	United Kingdom	15	5,42
Liverpool	United Kingdom	13	4,58
Atlanta	United States	18	6,67
Miami	United States	15	5,42
Eindhoven	Netherlands	19	7,08
Rotterdam	Netherlands	20	7,5
Manchester	United Kingdom	22	8,33
Marseille	France	12	4,17
Nice	France	15	5,42
Osaka	Japan	13	4,58
Valencia	Spain	19	7,08
Antwerp	Belgium	21	7,92
Warsaw	Poland	9	2,92
Dubai	United Arab Emirates	17	6,25
Taipei	Taiwan	21	7,92
Tallinn	Estonia	16	5,83
Abu Dhabi	United Arab Emirates	16	5,83
Budapest	Hungary	8	2,5

Ljubljana	Slovenia	15	5,42
Vilnius	Lithuania	10	3,33
Bilbao	Spain	16	5,83
Bratislava	Slovakia	5	1,25
Gothenburg	Sweden	19	7,08
Riga	Latvia	9	2,92
Buenos Aires	Argentina	9	2,92
Kuala Lumpur	Malaysia	12	4,17
Montevideo	Uruguay	15	5,42
Santiago	Chile	16	5,83
Athens	Greece	8	2,5
Shanghai	China	12	4,17
Zagreb	Croatia	14	5
Porto	Portugal	13	4,58
Panama City	Panama	12	4,17
Wroclaw	Poland	15	5,42
Medellín	Colombia	10	3,33
Sofia	Bulgaria	11	3,75
Beijing	China	7	2,08
Tel Aviv	Israel	24	9,17
Mexico City	Mexico	10	3,33
Bucharest	Romania	10	3,33
Córdoba	Argentina	10	3,33
Bangkok	Thailand	10	3,33
Brasilia	Brazil	9	2,92
Jerusalem	Israel	18	6,67
Monterrey	Mexico	6	1,67
Guangzhou	China	4	0,83
Sao Paulo	Brazil	11	3,75
Cape Town	South Africa	17	6,25
Asuncion	Paraguay	4	0,83
Rio de Janeiro	Brazil	13	4,58
Istanbul	Turkey	6	1,67
Lima	Peru	12	4,17
Doha	Qatar	21	7,92
Bogota	Colombia	14	5
Durban	South Africa	17	6,25
Guadalajara	Mexico	13	4,58
Johannesburg	South Africa	10	3,33
Tunis	Tunisia	2	0
Quito	Ecuador	14	5
Shenzhen	China	10	3,33

Kuwait City	Kuwait	7	2,08
Moscow	Russia	17	6,25
Belgrade	Serbia	9	2,92
Chengdu	China	3	0,42
St Petersburg	Russia	9	2,92
Manila	Philippines	4	0,83
Kiev	Ukraine	10	3,33
Casablanca	Morocco	12	4,17
Ho Chi Minh City	Vietnam	10	3,33
Jakarta	Indonesia	11	3,75
Chongqing	China	8	2,5
Riyadh	Saudi Arabia	5	1,25
Ankara	Turkey	4	0,83
Hanoi	Vietnam	8	2,5
Mumbai	India	10	3,33
Shenyang	China	9	2,92
Bangalore	India	7	2,08
New Delhi	India	15	5,42
La Paz	Bolivia	13	4,58
Cairo	Egypt	9	2,92

XXV.- Magnetism. Strategy. Innovation

City	Country	Global Innovation Index	GII NOR	R&D % GDP	R&D NOR	Innov Cities	INNO CITIES NOR	INNOV	INNO VATION NOR
Zurich	Switzerland	67,24	10,00	3,37	7,59	45	6,18	7,49	8,26
Vienna	Austria	50,94	6,55	3,16	7,17	50	7,55	7,20	7,88
Berlin	Germany	58,19	8,08	3,04	6,93	53	8,36	7,94	8,84
Amsterdam	Netherlands	61,44	8,77	2,00	4,86	49	7,27	7,04	7,68
Munich	Germany	58,19	8,08	3,04	6,93	49	7,27	7,39	8,13
Geneva	Switzerland	67,24	10,00	3,37	7,59	42	5,36	7,08	7,72
Vancouver	Canada	53,88	7,17	1,59	4,05	48	7,00	6,30	6,71
Dusseldorf	Germany	58,19	8,08	3,04	6,93	44	5,91	6,71	7,24
Sydney	Australia	50,34	6,42	1,92	4,70	53	8,36	6,96	7,57
Toronto	Canada	53,88	7,17	1,59	4,05	54	8,64	7,12	7,78
Melbourne	Australia	50,34	6,42	1,92	4,70	54	8,64	7,10	7,75
Bern	Switzerland	67,24	10,00	3,37	7,59	39	4,55	6,67	7,19
San Francisco	United States	61,73	8,83	2,80	6,46	55	8,91	8,28	9,29
Copenhagen	Denmark	58,44	8,14	3,10	7,05	46	6,45	7,02	7,65
Boston	United States	61,73	8,83	2,80	6,46	55	8,91	8,28	9,29
Paris	France	54,25	7,25	2,19	5,24	55	8,91	7,58	8,37
Ottawa	Canada	53,88	7,17	1,59	4,05	42	5,36	5,49	5,64
London	United Kingdom	61,30	8,74	1,67	4,21	57	9,45	7,96	8,88
Frankfurt	Germany	58,19	8,08	3,04	6,93	45	6,18	6,84	7,42
Stockholm	Sweden	63,65	9,24	3,31	7,47	49	7,27	7,81	8,68
New York City	United States	61,73	8,83	2,80	6,46	59	10,00	8,82	10,00
Auckland	New Zealand	49,55	6,25	1,23	3,33	42	5,36	5,08	5,11
Singapore	Singapore	58,37	8,12	2,22	5,30	55	8,91	7,81	8,68
Adelaide	Australia	50,34	6,42	1,92	4,70	41	5,09	5,33	5,43
Canberra	Australia	50,34	6,42	1,92	4,70	41	5,09	5,33	5,43
Hamburg	Germany	58,19	8,08	3,04	6,93	46	6,45	6,98	7,60
Montreal	Canada	53,88	7,17	1,59	4,05	50	7,55	6,58	7,07
Washington, D.C.	United States	61,73	8,83	2,80	6,46	52	8,09	7,87	8,75
Tokyo	Japan	54,68	7,34	3,20	7,25	58	9,73	8,51	9,59
Basel	Switzerland	67,24	10,00	3,37	7,59	41	5,09	6,94	7,55
Oslo	Norway	51,87	6,74	2,11	5,08	47	6,73	6,32	6,73
Wellington	New Zealand	49,55	6,25	1,23	3,33	42	5,36	5,08	5,11
Chicago	United States	61,73	8,83	2,80	6,46	55	8,91	8,28	9,29
Helsinki	Finland	59,83	8,43	2,76	6,38	46	6,45	6,93	7,53

Luxembourg	Luxembourg	53,47	7,08	1,25	3,37	40	4,82	5,02	5,04
Seattle	United States	61,73	8,83	2,80	6,46	53	8,36	8,00	8,93
Brussels	Belgium	50,18	6,39	2,61	6,08	45	6,18	6,21	6,58
Dublin	Ireland	56,10	7,64	1,04	2,95	46	6,45	5,88	6,15
Stuttgart	Germany	58,19	8,08	3,04	6,93	44	5,91	6,71	7,24
Barcelona	Spain	47,85	5,89	1,21	3,29	50	7,55	6,07	6,40
Los Angeles	United States	61,73	8,83	2,80	6,46	56	9,18	8,41	9,47
Milan	Italy	46,30	5,56	1,36	3,59	49	7,27	5,92	6,21
Madrid	Spain	47,85	5,89	1,21	3,29	49	7,27	5,93	6,22
Baltimore	United States	61,73	8,83	2,80	6,46	46	6,45	7,05	7,68
Seoul	South Korea	56,55	7,74	4,55	9,94	53	8,36	8,60	9,71
Philadelphia	United States	61,73	8,83	2,80	6,46	50	7,55	7,59	8,40
Dallas	United States	61,73	8,83	2,80	6,46	53	8,36	8,00	8,93
Lyon	France	54,25	7,25	2,19	5,24	44	5,91	6,08	6,41
Edinburgh	United Kingdom	61,30	8,74	1,67	4,21	43	5,64	6,06	6,38
Linz	Austria	50,94	6,55	3,16	7,17	38	4,27	5,57	5,75
Lisbon	Portugal	44,65	5,21	1,33	3,53	43	5,64	5,00	5,01
Phoenix	United States	61,73	8,83	2,80	6,46	46	6,45	7,05	7,68
Houston	United States	61,73	8,83	2,80	6,46	52	8,09	7,87	8,75
Rome	Italy	46,30	5,56	1,36	3,59	47	6,73	5,65	5,86
Yokohama	Japan	54,68	7,34	3,20	7,25	41	5,09	6,19	6,57
Cologne	Germany	58,19	8,08	3,04	6,93	43	5,64	6,57	7,06
Florence	Italy	46,30	5,56	1,36	3,59	41	5,09	4,83	4,79
Prague	Czech Republic	49,43	6,23	1,79	4,44	45	6,18	5,76	6,00
Málaga	Spain	47,85	5,89	1,21	3,29	38	4,27	4,43	4,26
Hong Kong	Hong Kong	55,54	7,52	2,15	5,16	46	6,45	6,40	6,83
Birmingham	United Kingdom	61,30	8,74	1,67	4,21	42	5,36	5,92	6,21
Liverpool	United Kingdom	61,30	8,74	1,67	4,21	42	5,36	5,92	6,21
Atlanta	United States	61,73	8,83	2,80	6,46	52	8,09	7,87	8,75
Miami	United States	61,73	8,83	2,80	6,46	51	7,82	7,73	8,57
Eindhoven	Netherlands	61,44	8,77	2,00	4,86	41	5,09	5,95	6,25
Rotterdam	Netherlands	61,44	8,77	2,00	4,86	44	5,91	6,36	6,79
Manchester	United Kingdom	61,30	8,74	1,67	4,21	46	6,45	6,46	6,92
Marseille	France	54,25	7,25	2,19	5,24	41	5,09	5,67	5,88
Nice	France	54,25	7,25	2,19	5,24	40	4,82	5,53	5,70
Osaka	Japan	54,68	7,34	3,20	7,25	42	5,36	6,33	6,74
Valencia	Spain	47,85	5,89	1,21	3,29	42	5,36	4,98	4,98
Antwerp	Belgium	50,18	6,39	2,61	6,08	39	4,55	5,39	5,51
Warsaw	Poland	41,31	4,51	1,04	2,95	42	5,36	4,55	4,41

Dubai	United Arab Emirates	42,17	4,69	0,96	2,79	49	7,27	5,51	5,67
Taipei	Taiwan	55,00	7,41	2,15	5,16	47	6,73	6,51	6,97
Tallinn	Estonia	49,97	6,34	1,32	3,51	39	4,55	4,74	4,66
Abu Dhabi	United Arab Emirates	42,17	4,69	0,96	2,79	44	5,91	4,82	4,78
Budapest	Hungary	44,51	5,18	1,35	3,57	44	5,91	5,14	5,19
Ljubljana	Slovenia	45,25	5,34	1,85	4,56	36	3,73	4,34	4,14
Vilnius	Lithuania	41,46	4,54	0,89	2,65	36	3,73	3,66	3,26
Bilbao	Spain	47,85	5,89	1,21	3,29	41	5,09	4,84	4,80
Bratislava	Slovakia	42,05	4,66	0,88	2,63	34	3,18	3,41	2,94
Gothenburg	Sweden	63,65	9,24	3,31	7,47	40	4,82	6,59	7,08
Riga	Latvia	43,23	4,91	0,51	1,90	37	4,00	3,70	3,31
Buenos Aires	Argentina	31,95	2,52	0,53	1,94	45	6,18	4,21	3,97
Kuala Lumpur	Malaysia	42,68	4,80	1,44	3,75	44	5,91	5,09	5,12
Montevideo	Uruguay	34,32	3,03	0,41	1,70	32	2,64	2,50	1,74
Santiago	Chile	36,64	3,52	0,36	1,60	41	5,09	3,82	3,47
Athens	Greece	38,90	4,00	1,14	3,15	44	5,91	4,74	4,67
Shanghai	China	54,82	7,37	2,13	5,12	49	7,27	6,76	7,30
Zagreb	Croatia	37,82	3,77	0,87	2,61	34	3,18	3,19	2,64
Porto	Portugal	44,65	5,21	1,33	3,53	41	5,09	4,73	4,66
Panama City	Panama	31,51	2,43	0,06	1,00	33	2,91	2,31	1,49
Wroclaw	Poland	41,31	4,51	1,04	2,95	37	4,00	3,86	3,52
Medellín	Colombia	33,00	2,75	0,24	1,36	41	5,09	3,57	3,14
Sofia	Bulgaria	40,35	4,30	0,77	2,41	38	4,27	3,82	3,46
Beijing	China	54,82	7,37	2,13	5,12	50	7,55	6,90	7,48
Tel Aviv	Israel	57,43	7,92	4,58	10,00	47	6,73	7,84	8,72
Mexico City	Mexico	36,06	3,39	0,49	1,86	44	5,91	4,27	4,05
Bucharest	Romania	36,76	3,54	0,50	1,88	40	4,82	3,76	3,39
Córdoba	Argentina	31,95	2,52	0,53	1,94	34	3,18	2,71	2,01
Bangkok	Thailand	38,63	3,94	0,78	2,43	45	6,18	4,68	4,59
Brasilia	Brazil	33,82	2,92	1,27	3,41	36	3,73	3,45	2,98
Jerusalem	Israel	57,43	7,92	4,58	10,00	39	4,55	6,75	7,30
Monterrey	Mexico	36,06	3,39	0,49	1,86	38	4,27	3,45	2,98
Guangzhou	China	54,82	7,37	2,13	5,12	35	3,45	4,85	4,81
Sao Paulo	Brazil	33,82	2,92	1,27	3,41	45	6,18	4,67	4,58
Cape Town	South Africa	34,04	2,97	0,82	2,51	37	4,00	3,37	2,88
Asuncion	Paraguay	27,09	1,49	0,15	1,18	26	1,00	1,17	0,00
Rio de Janeiro	Brazil	33,82	2,92	1,27	3,41	42	5,36	4,26	4,04
Istanbul	Turkey	36,95	3,58	0,96	2,79	47	6,73	4,96	4,95
Lima	Peru	32,93	2,73	0,12	1,12	37	4,00	2,96	2,34
Doha	Qatar	33,86	2,93	0,51	1,90	37	4,00	3,21	2,66

Bogota	Colombia	33,00	2,75	0,24	1,36	40	4,82	3,44	2,96
Durban	South Africa	34,04	2,97	0,82	2,51	31	2,36	2,55	1,81
Guadalajara	Mexico	36,06	3,39	0,49	1,86	35	3,45	3,04	2,45
Johannesburg	South Africa	34,04	2,97	0,82	2,51	35	3,45	3,10	2,52
Tunis	Tunisia	32,83	2,71	0,60	2,08	26	1,00	1,70	0,69
Quito	Ecuador	26,56	1,38	0,44	1,76	30	2,09	1,83	0,86
Shenzhen	China	54,82	7,37	2,13	5,12	46	6,45	6,35	6,77
Kuwait City	Kuwait	34,55	3,07	0,08	1,04	36	3,73	2,89	2,25
Moscow	Russia	37,62	3,72	1,11	3,09	48	7,00	5,20	5,27
Belgrade	Serbia	35,71	3,32	0,93	2,73	36	3,73	3,38	2,89
Chengdu	China	54,82	7,37	2,13	5,12	37	4,00	5,12	5,17
St Petersburg	Russia	37,62	3,72	1,11	3,09	42	5,36	4,39	4,20
Manila	Philippines	36,18	3,42	0,14	1,16	39	4,55	3,42	2,94
Kiev	Ukraine	37,40	3,68	0,45	1,78	35	3,45	3,09	2,51
Casablanca	Morocco	31,63	2,46	0,71	2,29	31	2,36	2,37	1,57
Ho Chi Minh City	Vietnam	38,84	3,98	0,53	1,94	36	3,73	3,34	2,84
Jakarta	Indonesia	29,72	2,05	0,24	1,36	42	5,36	3,53	3,09
Chongqing	China	54,82	7,37	2,13	5,12	39	4,55	5,40	5,52
Riyadh	Saudi Arabia	32,93	2,73	0,82	2,51	38	4,27	3,45	2,98
Ankara	Turkey	36,95	3,58	0,96	2,79	38	4,27	3,73	3,35
Hanoi	Vietnam	38,84	3,98	0,53	1,94	34	3,18	3,07	2,49
Mumbai	India	36,58	3,50	0,62	2,12	44	5,91	4,36	4,17
Shenyang	China	54,82	7,37	2,13	5,12	36	3,73	4,99	4,99
Bangalore	India	36,58	3,50	0,62	2,12	41	5,09	3,95	3,63
New Delhi	India	36,58	3,50	0,62	2,12	42	5,36	4,09	3,81
La Paz	Bolivia	24,76	1,00	0,16	1,20	27	1,27	1,19	0,02
Cairo	Egypt	27,47	1,57	0,61	2,10	37	4,00	2,92	2,29

XXVI.- Magnetism. Strategy. Summary

City	Country	HUMAN CAP NOR	SMARTCITIES NOR	INNOVATION NOR	STRATEGY	STRATEGY NOR
Zurich	Switzerland	7,39	3,33	8,26	5,62	6,53
Vienna	Austria	7,96	6,25	7,88	7,08	8,09
Berlin	Germany	8,74	6,67	8,84	7,74	8,79
Amsterdam	Netherlands	7,29	8,33	7,68	7,93	9,00
Munich	Germany	5,08	4,17	8,13	5,54	6,45
Geneva	Switzerland	4,22	2,08	7,72	4,20	5,01
Vancouver	Canada	4,36	5,83	6,71	5,80	6,73
Dusseldorf	Germany	3,5	2,08	7,24	3,91	4,71
Sydney	Australia	8,17	7,92	7,57	7,87	8,93
Toronto	Canada	7,71	7,5	7,78	7,63	8,68
Melbourne	Australia	7,92	8,33	7,75	8,07	9,16
Bern	Switzerland	5,36	2,92	7,19	4,69	5,54
San Francisco	United States	9,36	7,5	9,29	8,41	9,51
Copenhagen	Denmark	7,84	10	7,65	8,86	10,00
Boston	United States	9,81	5,42	9,29	7,46	8,50
Paris	France	9,32	5	8,37	6,88	7,87
Ottawa	Canada	6,9	5	5,64	5,57	6,48
London	United Kingdom	9,73	6,67	8,88	7,95	9,02
Frankfurt	Germany	6,22	3,75	7,42	5,35	6,24
Stockholm	Sweden	6,06	9,17	8,68	8,40	9,51
New York City	United States	9,88	6,67	10,00	8,31	9,41
Auckland	New Zealand	4,08	5	5,11	4,85	5,71
Singapore	Singapore	7,68	6,25	8,68	7,27	8,29
Adelaide	Australia	7,92	7,5	5,43	6,96	7,97
Canberra	Australia	7,92	3,75	5,43	5,09	5,96
Hamburg	Germany	7,04	5,42	7,60	6,40	7,36
Montreal	Canada	6,45	4,17	7,07	5,50	6,40
Washington, D.C.	United States	9,56	5,83	8,75	7,45	8,49
Tokyo	Japan	8,47	4,17	9,59	6,66	7,64
Basel	Switzerland	6,18	2,5	7,55	4,75	5,60
Oslo	Norway	5,45	6,67	6,73	6,44	7,41
Wellington	New Zealand	5,8	5,83	5,11	5,61	6,52
Chicago	United States	9,43	7,08	9,29	8,21	9,31
Helsinki	Finland	6,11	8,75	7,53	7,86	8,92
Luxembourg	Luxembourg	5,32	5,83	5,04	5,49	6,39
Seattle	United States	6,84	6,67	8,93	7,38	8,42

Brussels	Belgium	2,63	3,75	6,58	4,38	5,20
Dublin	Ireland	3,58	6,25	6,15	5,69	6,60
Stuttgart	Germany	4,64	4,17	7,24	5,19	6,07
Barcelona	Spain	6,64	6,67	6,40	6,58	7,56
Los Angeles	United States	9,95	5,42	9,47	7,54	8,59
Milan	Italy	7,1	5,83	6,21	6,20	7,15
Madrid	Spain	6,96	2,08	6,22	4,30	5,12
Baltimore	United States	6,54	2,92	7,68	5,07	5,95
Seoul	South Korea	8,78	7,5	9,71	8,42	9,53
Philadelphia	United States	9,06	2,5	8,40	5,58	6,49
Dallas	United States	9,31	5,83	8,93	7,46	8,50
Lyon	France	6,41	4,58	6,41	5,50	6,40
Edinburgh	United Kingdom	8,29	6,67	6,38	6,91	7,91
Linz	Austria	4,36	2,92	5,75	4,06	4,86
Lisbon	Portugal	4,75	2,92	5,01	3,91	4,71
Phoenix	United States	9,26	7,08	7,68	7,70	8,75
Houston	United States	7,55	5,83	8,75	7,05	8,06
Rome	Italy	6,21	2,08	5,86	4,04	4,84
Yokohama	Japan	8,47	5,83	6,57	6,58	7,56
Cologne	Germany	5,21	7,08	7,06	6,70	7,69
Florence	Italy	5,52	5	4,79	5,04	5,91
Prague	Czech Republic	6,02	2,92	6,00	4,46	5,30
Málaga	Spain	3,18	7,08	4,26	5,45	6,36
Hong Kong	Hong Kong	8,29	7,5	6,83	7,46	8,50
Birmingham	United Kingdom	7,4	5,42	6,21	6,05	7,00
Liverpool	United Kingdom	5,69	4,58	6,21	5,29	6,18
Atlanta	United States	7,55	6,67	8,75	7,47	8,51
Miami	United States	8,94	5,42	8,57	7,07	8,08
Eindhoven	Netherlands	4,39	7,08	6,25	6,29	7,25
Rotterdam	Netherlands	5,65	7,5	6,79	6,92	7,92
Manchester	United Kingdom	8,61	8,33	6,92	7,96	9,04
Marseille	France	3,75	4,17	5,88	4,60	5,44
Nice	France	5,08	5,42	5,70	5,44	6,34
Osaka	Japan	4,5	4,58	6,74	5,21	6,10
Valencia	Spain	2,67	7,08	4,98	5,57	6,48
Antwerp	Belgium	2,88	7,92	5,51	6,19	7,14
Warsaw	Poland	4,79	2,92	4,41	3,74	4,52
Dubai	United Arab Emirates	1,78	6,25	5,67	5,18	6,06
Taipei	Taiwan	8,51	7,92	6,97	7,75	8,81
Tallinn	Estonia	6,58	5,83	4,66	5,63	6,54
Abu Dhabi	United Arab Emirates	1,02	5,83	4,78	4,55	5,39

Budapest	Hungary	6,95	2,5	5,19	4,20	5,01
Ljubljana	Slovenia	3,04	5,42	4,14	4,56	5,40
Vilnius	Lithuania	8,05	3,33	3,26	4,25	5,07
Bilbao	Spain	2,18	5,83	4,80	4,79	5,65
Bratislava	Slovakia	6,7	1,25	2,94	2,85	3,57
Gothenburg	Sweden	4,99	7,08	7,08	6,66	7,65
Riga	Latvia	4,77	2,92	3,31	3,41	4,17
Buenos Aires	Argentina	6,6	2,92	3,97	3,97	4,77
Kuala Lumpur	Malaysia	3,81	4,17	5,12	4,38	5,21
Montevideo	Uruguay	2,14	5,42	1,74	3,66	4,44
Santiago	Chile	4,6	5,83	3,47	4,88	5,74
Athens	Greece	4,43	2,5	4,67	3,54	4,31
Shanghai	China	8,44	4,17	7,30	5,96	6,90
Zagreb	Croatia	2,57	5	2,64	3,81	4,59
Porto	Portugal	1,71	4,58	4,66	4,03	4,83
Panama City	Panama	1,84	4,17	1,49	2,90	3,62
Wroclaw	Poland	4,15	5,42	3,52	4,60	5,44
Medellín	Colombia	2,63	3,33	3,14	3,13	3,87
Sofia	Bulgaria	4,76	3,75	3,46	3,87	4,66
Beijing	China	6,1	2,08	7,48	4,50	5,34
Tel Aviv	Israel	3,02	9,17	8,72	7,81	8,87
Mexico City	Mexico	7,37	3,33	4,05	4,35	5,18
Bucharest	Romania	3,29	3,33	3,39	3,34	4,10
Córdoba	Argentina	3,21	3,33	2,01	2,91	3,64
Bangkok	Thailand	1,71	3,33	4,59	3,38	4,14
Brasilia	Brazil	1,21	2,92	2,98	2,60	3,30
Jerusalem	Israel	2,39	6,67	7,30	6,00	6,94
Monterrey	Mexico	6,99	1,67	2,98	3,13	3,87
Guangzhou	China	2,06	0,83	4,81	2,27	2,95
Sao Paulo	Brazil	2,6	3,75	4,58	3,77	4,55
Cape Town	South Africa	2,33	6,25	2,88	4,46	5,29
Asuncion	Paraguay	3,66	0,83	0,00	1,15	1,75
Rio de Janeiro	Brazil	3,54	4,58	4,04	4,21	5,03
Istanbul	Turkey	3,04	1,67	4,95	2,93	3,65
Lima	Peru	3,49	4,17	2,34	3,49	4,25
Doha	Qatar	0	7,92	2,66	4,76	5,61
Bogota	Colombia	4,27	5	2,96	4,24	5,06
Durban	South Africa	2,33	6,25	1,81	4,13	4,94
Guadalajara	Mexico	3,58	4,58	2,45	3,74	4,52
Johannesburg	South Africa	2,27	3,33	2,52	2,88	3,60
Tunis	Tunisia	1,19	0	0,69	0,45	1,00

Quito	Ecuador	3,01	5	0,86	3,36	4,12
Shenzhen	China	1,49	3,33	6,77	3,99	4,79
Kuwait City	Kuwait	0,89	2,08	2,25	1,89	2,55
Moscow	Russia	9,46	6,25	5,27	6,60	7,58
Belgrade	Serbia	2,81	2,92	2,89	2,89	3,61
Chengdu	China	1,49	0,42	5,17	2,06	2,73
St Petersburg	Russia	7,44	2,92	4,20	4,21	5,02
Manila	Philippines	2,35	0,83	2,94	1,77	2,41
Kiev	Ukraine	3,29	3,33	2,51	3,08	3,81
Casablanca	Morocco	0,62	4,17	1,57	2,68	3,39
Ho Chi Minh City	Vietnam	1,18	3,33	2,84	2,75	3,47
Jakarta	Indonesia	10	3,75	3,09	4,80	5,66
Chongqing	China	1,49	2,5	5,52	3,20	3,95
Riyadh	Saudi Arabia	0,57	1,25	2,98	1,63	2,27
Ankara	Turkey	3,73	0,83	3,35	2,17	2,84
Hanoi	Vietnam	1,18	2,5	2,49	2,23	2,91
Mumbai	India	0,98	3,33	4,17	3,11	3,85
Shenyang	China	1,49	2,92	4,99	3,26	4,00
Bangalore	India	2,73	2,08	3,63	2,68	3,38
New Delhi	India	1,17	5,42	3,81	4,09	4,89
La Paz	Bolivia	1,82	4,58	0,02	2,66	3,37
Cairo	Egypt	2,56	2,92	2,29	2,66	3,37

XXVII.- Magnetism. Summary

City	Country	IDEN TITY	IDENT RK	DYNA MISM	DYN RK	STRA TEGY	STRA RK	MAG NETISM	MAG NETISM NOR	MAG RK
Zurich	Switzerland	8,33	10	7,89	45	6,53	50	7,67	8,32	23
Vienna	Austria	8,99	6	8,24	26	8,09	26	8,47	9,34	7
Berlin	Germany	7,42	26	8,39	22	8,79	15	8,16	8,95	12
Amsterdam	Netherlands	7,52	22	9,53	8	9,00	10	8,67	9,61	3
Munich	Germany	7,30	31	8,44	20	6,45	55	7,49	8,09	32
Geneva	Switzerland	7,39	29	7,75	56	5,01	91	6,86	7,29	57
Vancouver	Canada	5,31	78	9,77	3	6,73	47	7,35	7,92	40
Dusseldorf	Germany	5,83	62	8,22	29	4,71	101	6,40	6,70	73
Sydney	Australia	7,13	34	9,54	7	8,93	11	8,52	9,41	6
Toronto	Canada	5,69	66	10,00	1	8,68	17	8,11	8,89	14
Melbourne	Australia	6,57	48	9,53	9	9,16	7	8,38	9,23	9
Bern	Switzerland	7,38	30	7,75	55	5,54	75	7,00	7,47	50
San Francisco	United States	6,38	53	8,07	33	9,51	3	7,87	8,59	18
Copenhagen	Denmark	6,54	49	8,89	17	10,00	1	8,37	9,22	10
Boston	United States	5,80	64	8,07	34	8,50	20	7,39	7,97	37
Paris	France	9,35	4	8,37	23	7,87	32	8,58	9,49	4
Ottawa	Canada	4,79	91	9,72	4	6,48	53	7,08	7,58	48
London	United Kingdom	10,00	1	7,97	40	9,02	9	8,98	10,00	1
Frankfurt	Germany	7,00	38	8,19	30	6,24	61	7,23	7,76	44
Stockholm	Sweden	7,76	18	8,94	16	9,51	4	8,68	9,62	2
New York City	United States	8,13	12	8,36	24	9,41	5	8,57	9,48	5
Auckland	New Zealand	5,07	84	9,56	6	5,71	70	6,91	7,35	53
Singapore	Singapore	5,05	85	8,44	21	8,29	25	7,20	7,73	47
Adelaide	Australia	5,62	70	9,44	11	7,97	29	7,68	8,34	22
Canberra	Australia	4,66	96	9,44	11	5,96	66	6,79	7,20	63
Hamburg	Germany	7,06	35	8,23	28	7,36	40	7,58	8,21	30
Montreal	Canada	6,26	54	9,82	2	6,40	56	7,62	8,26	24
Washington, D.C.	United States	6,19	57	7,96	43	8,49	23	7,48	8,09	33
Tokyo	Japan	7,71	19	6,82	66	7,64	35	7,36	7,93	38
Basel	Switzerland	7,01	37	7,77	54	5,60	74	6,90	7,34	54
Oslo	Norway	7,49	25	9,50	10	7,41	39	8,21	9,02	11
Wellington	New Zealand	5,56	72	9,70	5	6,52	51	7,35	7,92	39
Chicago	United States	5,80	64	7,98	39	9,31	6	7,58	8,21	29
Helsinki	Finland	5,69	66	9,25	13	8,92	12	7,90	8,62	17
Luxembourg	Luxembourg	6,78	46	8,23	27	6,39	58	7,21	7,74	45

Seattle	United States	4,87	89	7,80	52	8,42	24	6,93	7,39	51
Brussels	Belgium	7,40	27	7,14	65	5,20	84	6,70	7,08	67
Dublin	Ireland	7,91	15	8,07	35	6,60	48	7,60	8,24	26
Stuttgart	Germany	6,13	58	8,12	32	6,07	64	6,85	7,28	59
Barcelona	Spain	9,29	5	8,26	25	7,56	37	8,43	9,30	8
Los Angeles	United States	6,88	44	8,00	38	8,59	18	7,77	8,45	20
Milan	Italy	8,98	7	6,65	69	7,15	42	7,61	8,25	25
Madrid	Spain	9,39	3	8,48	19	5,12	86	7,87	8,58	19
Baltimore	United States	4,40	97	7,71	58	5,95	67	6,05	6,26	77
Seoul	South Korea	8,67	8	6,60	70	9,53	2	8,14	8,93	13
Philadelphia	United States	5,50	73	7,72	57	6,49	52	6,59	6,95	69
Dallas	United States	3,99	106	7,86	46	8,50	22	6,67	7,04	68
Lyon	France	7,78	17	7,84	47	6,40	57	7,42	8,00	36
Edinburgh	United Kingdom	7,50	23	7,30	61	7,91	31	7,54	8,16	31
Linz	Austria	7,30	31	7,96	42	4,86	95	6,87	7,30	56
Lisbon	Portugal	7,50	23	7,93	44	4,71	100	6,89	7,32	55
Phoenix	United States	4,06	104	7,82	50	8,75	16	6,75	7,15	65
Houston	United States	3,97	107	7,83	48	8,06	28	6,53	6,87	70
Rome	Italy	9,96	2	6,47	71	4,84	96	7,25	7,79	43
Yokohama	Japan	5,11	83	6,46	72	7,56	38	6,29	6,56	75
Cologne	Germany	6,93	43	8,13	31	7,69	33	7,58	8,21	27
Florence	Italy	8,30	11	6,35	73	5,91	68	6,92	7,36	52
Prague	Czech Republic	6,97	41	6,82	67	5,30	81	6,45	6,76	72
Málaga	Spain	7,29	33	8,02	37	6,36	59	7,30	7,85	41
Hong Kong	Hong Kong	6,99	40	5,50	85	8,50	21	6,86	7,28	58
Birmingham	United Kingdom	6,08	59	7,14	64	7,00	44	6,73	7,12	66
Liverpool	United Kingdom	6,96	42	7,16	63	6,18	62	6,82	7,24	61
Atlanta	United States	5,05	85	7,79	53	8,51	19	7,02	7,50	49
Miami	United States	4,76	92	7,83	49	8,08	27	6,82	7,23	62
Eindhoven	Netherlands	6,51	50	9,14	15	7,25	41	7,69	8,35	21
Rotterdam	Netherlands	6,77	47	9,18	14	7,92	30	7,98	8,72	15
Manchester	United Kingdom	7,87	16	7,24	62	9,04	8	7,96	8,70	16
Marseille	France	8,36	9	7,66	60	5,44	76	7,29	7,84	42
Nice	France	8,11	13	7,71	59	6,34	60	7,47	8,07	34
Osaka	Japan	5,59	71	6,33	75	6,10	63	6,00	6,19	78
Valencia	Spain	7,98	14	8,03	36	6,48	54	7,58	8,21	28
Antwerp	Belgium	6,39	52	6,80	68	7,14	43	6,75	7,15	64
Warsaw	Poland	5,41	75	5,55	82	4,52	105	5,22	5,19	88

Dubai	United Arab Emirates	3,88	109	6,17	78	6,06	65	5,33	5,34	86
Taipei	Taiwan	3,71	111	6,32	76	8,81	14	6,09	6,30	76
Tallinn	Estonia	5,15	82	5,45	87	6,54	49	5,65	5,74	82
Abu Dhabi	United Arab Emirates	2,57	130	6,04	79	5,39	79	4,64	4,44	100
Budapest	Hungary	7,00	38	5,06	94	5,01	92	5,73	5,85	81
Ljubljana	Slovenia	5,66	68	6,34	74	5,40	78	5,84	5,98	79
Vilnius	Lithuania	5,05	85	5,31	91	5,07	87	5,15	5,11	89
Bilbao	Spain	7,63	20	7,96	41	5,65	72	7,20	7,73	46
Bratislava	Slovakia	5,82	63	5,40	88	3,57	125	5,04	4,96	93
Gothenburg	Sweden	6,06	60	8,63	18	7,65	34	7,45	8,04	35
Riga	Latvia	4,71	93	4,89	99	4,17	110	4,62	4,43	101
Buenos Aires	Argentina	5,20	80	5,40	89	4,77	99	5,15	5,11	90
Kuala Lumpur	Malaysia	1,25	138	5,03	96	5,21	83	3,74	3,30	120
Montevideo	Uruguay	3,58	117	4,73	105	4,44	107	4,24	3,94	109
Santiago	Chile	3,45	122	5,92	80	5,74	69	5,00	4,91	94
Athens	Greece	7,55	21	4,62	109	4,31	108	5,57	5,64	85
Shanghai	China	7,03	36	3,73	121	6,90	46	5,77	5,90	80
Zagreb	Croatia	5,40	76	4,32	112	4,59	103	4,78	4,62	97
Porto	Portugal	7,40	27	7,80	51	4,83	97	6,84	7,26	60
Panama City	Panama	3,32	123	4,72	106	3,62	122	3,92	3,53	116
Wroclaw	Poland	5,98	61	5,46	86	5,44	77	5,64	5,72	83
Medellín	Colombia	2,53	133	4,74	104	3,87	116	3,72	3,27	121
Sofia	Bulgaria	6,41	51	4,18	114	4,66	102	5,10	5,03	92
Beijing	China	5,64	69	3,42	123	5,34	80	4,74	4,57	99
Tel Aviv	Israel	4,38	99	6,23	77	8,87	13	6,30	6,58	74
Mexico City	Mexico	5,38	77	4,82	102	5,18	85	5,12	5,06	91
Bucharest	Romania	4,69	95	4,38	111	4,10	113	4,41	4,16	105
Córdoba	Argentina	4,82	90	5,04	95	3,64	121	4,57	4,36	102
Bangkok	Thailand	2,57	130	5,51	84	4,14	111	4,09	3,75	113
Brasilia	Brazil	3,71	111	5,31	92	3,30	131	4,19	3,87	110
Jerusalem	Israel	6,80	45	5,77	81	6,94	45	6,46	6,77	71
Monterrey	Mexico	3,51	120	4,67	107	3,87	117	4,04	3,68	114
Guangzhou	China	3,64	115	3,32	124	2,95	132	3,33	2,77	130
Sao Paulo	Brazil	4,25	102	5,54	83	4,55	104	4,81	4,66	96
Cape Town	South Africa	4,01	105	4,13	116	5,29	82	4,41	4,15	106
Asuncion	Paraguay	3,15	127	2,44	136	1,75	139	2,50	1,71	139
Rio de Janeiro	Brazil	5,25	79	5,35	90	5,03	89	5,22	5,20	87
Istanbul	Turkey	6,22	56	4,22	113	3,65	120	4,77	4,61	98
Lima	Peru	3,54	119	2,79	133	4,25	109	3,46	2,93	127
Doha	Qatar	2,17	137	4,82	101	5,61	73	4,10	3,76	112
Bogota	Colombia	3,70	113	4,98	97	5,06	88	4,55	4,33	103

Durban	South Africa	2,50	135	3,93	119	4,94	93	3,71	3,25	122
Guadalajara	Mexico	3,29	124	4,66	108	4,52	105	4,14	3,81	111
Johannesburg	South Africa	3,91	108	4,10	117	3,60	124	3,90	3,49	117
Tunis	Tunisia	5,18	81	2,17	137	1,00	140	2,91	2,23	134
Quito	Ecuador	3,70	113	2,76	134	4,12	112	3,47	2,95	126
Shenzhen	China	3,06	129	3,12	125	4,79	98	3,56	3,07	125
Kuwait City	Kuwait	2,28	136	2,95	132	2,55	136	2,60	1,84	137
Moscow	Russia	4,40	97	5,25	93	7,58	36	5,60	5,67	84
Belgrade	Serbia	6,24	55	4,59	110	3,61	123	4,90	4,78	95
Chengdu	China	5,47	74	3,05	126	2,73	135	3,81	3,39	119
St Petersburg	Russia	3,50	121	4,93	98	5,02	90	4,45	4,20	104
Manila	Philippines	3,55	118	4,78	103	2,41	137	3,69	3,23	123
Kiev	Ukraine	4,19	103	4,87	100	3,81	119	4,34	4,06	107
Casablanca	Morocco	4,27	100	1,63	139	3,39	127	3,05	2,41	133
Ho Chi Minh City	Vietnam	1,00	140	3,76	120	3,47	126	2,70	1,97	136
Jakarta	Indonesia	3,26	125	4,16	115	5,66	71	4,26	3,96	108
Chongqing	China	4,94	88	3,04	127	3,95	115	3,96	3,58	115
Riyadh	Saudi Arabia	1,03	139	2,58	135	2,27	138	1,95	1,00	140
Ankara	Turkey	3,80	110	4,08	118	2,84	134	3,64	3,16	124
Hanoi	Vietnam	3,63	116	3,60	122	2,91	133	3,42	2,89	128
Mumbai	India	3,22	126	3,00	129	3,85	118	3,31	2,75	131
Shenyang	China	4,71	93	3,03	128	4,00	114	3,89	3,49	118
Bangalore	India	3,11	128	2,99	130	3,38	128	3,14	2,53	132
New Delhi	India	2,53	133	2,96	131	4,89	94	3,35	2,79	129
La Paz	Bolivia	2,56	132	1,96	138	3,37	129	2,56	1,78	138
Cairo	Egypt	4,26	101	1,00	140	3,37	130	2,81	2,10	135

XXVIII.- City Profitability. Services. Digital Government

City	Country	DIGITALIZATION OF GOVERNMENT 2019	DIGITALIZATION OF GOVERNMENT NOR	Online Service Index	OSI NOR	eParticipation Index	EPI NOR	DIG GOV	DIG GOV NOR
Zurich	Switzerland	810	8,10	0,85	6,72	0,84	6,59	7,00	7,42
Vienna	Austria	376	3,76	0,87	7,17	0,83	6,22	5,84	6,36
Berlin	Germany	585	5,85	0,93	8,51	0,92	8,29	7,74	8,10
Amsterdam	Netherlands	965	9,65	0,93	8,51	0,99	9,76	9,42	9,64
Munich	Germany	515	5,15	0,93	8,51	0,92	8,29	7,56	7,94
Geneva	Switzerland	607	6,07	0,85	6,72	0,84	6,59	6,49	6,95
Vancouver	Canada	766	7,66	0,93	8,51	0,91	8,05	8,07	8,40
Dusseldorf	Germany	359	3,59	0,93	8,51	0,92	8,29	7,17	7,58
Sydney	Australia	512	5,12	0,97	9,40	0,98	9,63	8,45	8,75
Toronto	Canada	453	4,53	0,93	8,51	0,91	8,05	7,28	7,68
Melbourne	Australia	538	5,38	0,97	9,40	0,98	9,63	8,51	8,81
Bern	Switzerland	470	4,70	0,85	6,72	0,84	6,59	6,15	6,64
San Francisco	United States	659	6,59	0,99	9,70	0,98	9,63	8,89	9,16
Copenhagen	Denmark	924	9,24	1,00	10,00	1,00	10,00	9,81	10,00
Boston	United States	612	6,12	0,99	9,70	0,98	9,63	8,77	9,05
Paris	France	890	8,90	0,98	9,55	0,97	9,27	9,25	9,48
Ottawa	Canada	622	6,22	0,93	8,51	0,91	8,05	7,71	8,07
London	United Kingdom	306	3,06	0,98	9,55	0,98	9,63	7,97	8,31
Frankfurt	Germany	410	4,10	0,93	8,51	0,92	8,29	7,30	7,70
Stockholm	Sweden	1000	10,00	0,94	8,81	0,94	8,66	9,03	9,28
New York City	United States	758	7,58	0,99	9,70	0,98	9,63	9,14	9,38
Auckland	New Zealand	539	5,39	0,95	8,96	0,98	9,63	8,40	8,71
Singapore	Singapore	547	5,47	0,99	9,70	0,97	9,27	8,43	8,73
Adelaide	Australia	494	4,94	0,97	9,40	0,98	9,63	8,40	8,71
Canberra	Australia	500	5,00	0,97	9,40	0,98	9,63	8,42	8,72
Hamburg	Germany	541	5,41	0,93	8,51	0,92	8,29	7,63	8,00
Montreal	Canada	675	6,75	0,93	8,51	0,91	8,05	7,84	8,19
Washington, D.C.	United States	896	8,96	0,99	9,70	0,98	9,63	9,48	9,70
Tokyo	Japan	628	6,28	0,95	8,96	0,98	9,63	8,63	8,91
Basel	Switzerland	470	4,70	0,85	6,72	0,84	6,59	6,15	6,64
Oslo	Norway	743	7,43	0,95	8,96	0,98	9,51	8,85	9,12
Wellington	New Zealand	627	6,27	0,95	8,96	0,98	9,63	8,62	8,91
Chicago	United States	533	5,33	0,99	9,70	0,98	9,63	8,57	8,87
Helsinki	Finland	948	9,48	0,97	9,25	1,00	10,00	9,68	9,88
Luxembourg	Luxembourg	611	6,11	0,92	8,36	0,94	8,66	7,95	8,29
Seattle	United States	679	6,79	0,99	9,70	0,98	9,63	8,94	9,20
Brussels	Belgium	300	3,00	0,76	4,78	0,76	4,76	4,32	4,96

Dublin	Ireland	312	3,12	0,83	6,27	0,93	8,54	6,62	7,07
Stuttgart	Germany	368	3,68	0,93	8,51	0,92	8,29	7,19	7,60
Barcelona	Spain	576	5,76	0,94	8,66	0,98	9,63	8,42	8,73
Los Angeles	United States	507	5,07	0,99	9,70	0,98	9,63	8,51	8,81
Milan	Italy	365	3,65	0,95	8,96	0,96	9,03	7,66	8,03
Madrid	Spain	624	6,24	0,94	8,66	0,98	9,63	8,54	8,84
Baltimore	United States	512	5,12	0,99	9,70	0,98	9,63	8,52	8,82
Seoul	South Korea	523	5,23	0,98	9,55	1,00	10,00	8,70	8,98
Philadelphia	United States	645	6,45	0,99	9,70	0,98	9,63	8,85	9,12
Dallas	United States	455	4,55	0,99	9,70	0,98	9,63	8,38	8,69
Lyon	France	637	6,37	0,98	9,55	0,97	9,27	8,61	8,90
Edinburgh	United Kingdom	669	6,69	0,98	9,55	0,98	9,63	8,88	9,14
Linz	Austria	330	3,30	0,87	7,17	0,83	6,22	5,73	6,25
Lisbon	Portugal	593	5,93	0,93	8,51	0,90	7,81	7,51	7,89
Phoenix	United States	679	6,79	0,99	9,70	0,98	9,63	8,94	9,20
Houston	United States	455	4,55	0,99	9,70	0,98	9,63	8,38	8,69
Rome	Italy	330	3,30	0,95	8,96	0,96	9,03	7,58	7,95
Yokohama	Japan	627	6,27	0,95	8,96	0,98	9,63	8,62	8,91
Cologne	Germany	446	4,46	0,93	8,51	0,92	8,29	7,39	7,78
Florence	Italy	834	8,34	0,95	8,96	0,96	9,03	8,84	9,11
Prague	Czech Republic	282	2,82	0,65	2,54	0,62	1,71	2,19	3,01
Málaga	Spain	606	6,06	0,94	8,66	0,98	9,63	8,50	8,79
Hong Kong	Hong Kong	463	4,63	0,90	7,85	0,92	8,16	7,20	7,61
Birmingham	United Kingdom	341	3,41	0,98	9,55	0,98	9,63	8,06	8,39
Liverpool	United Kingdom	400	4,00	0,98	9,55	0,98	9,63	8,20	8,53
Atlanta	United States	455	4,55	0,99	9,70	0,98	9,63	8,38	8,69
Miami	United States	600	6,00	0,99	9,70	0,98	9,63	8,74	9,02
Eindhoven	Netherlands	596	5,96	0,93	8,51	0,99	9,76	8,50	8,79
Rotterdam	Netherlands	590	5,90	0,93	8,51	0,99	9,76	8,48	8,78
Manchester	United Kingdom	650	6,50	0,98	9,55	0,98	9,63	8,83	9,10
Marseille	France	360	3,60	0,98	9,55	0,97	9,27	7,92	8,27
Nice	France	569	5,69	0,98	9,55	0,97	9,27	8,44	8,75
Osaka	Japan	663	6,63	0,95	8,96	0,98	9,63	8,71	8,99
Valencia	Spain	610	6,10	0,94	8,66	0,98	9,63	8,51	8,80
Antwerp	Belgium	334	3,34	0,76	4,78	0,76	4,76	4,41	5,04
Warsaw	Poland	152	1,52	0,93	8,51	0,89	7,68	6,35	6,82
Dubai	United Arab Emirates	598	5,98	0,94	8,81	0,94	8,78	8,09	8,42
Taipei	Taiwan	750	7,50	0,87	7,21	0,81	5,95	6,65	7,10
Tallinn	Estonia	939	9,39	0,90	7,91	0,91	8,05	8,35	8,66
Abu Dhabi	United Arab Emirates	680	6,80	0,94	8,81	0,94	8,78	8,29	8,61
Budapest	Hungary	316	3,16	0,74	4,33	0,71	3,66	3,70	4,40

Ljubljana	Slovenia	334	3,34	0,80	5,67	0,81	5,98	5,24	5,81
Vilnius	Lithuania	827	8,27	0,80	5,67	0,80	5,73	6,35	6,83
Bilbao	Spain	608	6,08	0,94	8,66	0,98	9,63	8,50	8,80
Bratislava	Slovakia	550	5,50	0,74	4,33	0,81	5,85	5,38	5,94
Gothenburg	Sweden	974	9,74	0,94	8,81	0,94	8,66	8,97	9,23
Riga	Latvia	856	8,56	0,67	2,84	0,69	3,17	4,43	5,07
Buenos Aires	Argentina	324	3,24	0,75	4,63	0,62	1,83	2,88	3,64
Kuala Lumpur	Malaysia	377	3,77	0,89	7,61	0,89	7,56	6,63	7,08
Montevideo	Uruguay	333	3,33	0,89	7,61	0,92	8,17	6,82	7,26
Santiago	Chile	169	1,69	0,83	6,42	0,82	6,10	5,08	5,66
Athens	Greece	126	1,26	0,82	6,12	0,88	7,32	5,50	6,05
Shanghai	China	244	2,44	0,86	7,01	0,90	7,93	6,33	6,80
Zagreb	Croatia	219	2,19	0,68	3,14	0,77	5,00	3,83	4,52
Porto	Portugal	596	5,96	0,93	8,51	0,90	7,81	7,52	7,90
Panama City	Panama	230	2,30	0,66	2,69	0,72	3,90	3,20	3,93
Wroclaw	Poland	120	1,20	0,93	8,51	0,89	7,68	6,27	6,75
Medellín	Colombia	472	4,72	0,88	7,46	0,92	8,29	7,19	7,60
Sofia	Bulgaria	345	3,45	0,76	4,93	0,87	7,20	5,69	6,22
Beijing	China	282	2,82	0,86	7,01	0,90	7,93	6,42	6,89
Tel Aviv	Israel	788	7,88	0,83	6,27	0,83	6,34	6,71	7,15
Mexico City	Mexico	654	6,54	0,92	8,36	0,94	8,78	8,11	8,44
Bucharest	Romania	386	3,86	0,66	2,69	0,71	3,66	3,47	4,18
Córdoba	Argentina	230	2,30	0,75	4,63	0,62	1,83	2,65	3,43
Bangkok	Thailand	157	1,57	0,64	2,24	0,65	2,44	2,17	2,99
Brasilia	Brazil	270	2,70	0,92	8,36	0,97	9,39	7,46	7,84
Jerusalem	Israel	439	4,39	0,83	6,27	0,83	6,34	5,84	6,35
Monterrey	Mexico	429	4,29	0,92	8,36	0,94	8,78	7,55	7,93
Guangzhou	China	200	2,00	0,86	7,01	0,90	7,93	6,22	6,70
Sao Paulo	Brazil	273	2,73	0,92	8,36	0,97	9,39	7,47	7,85
Cape Town	South Africa	601	6,01	0,83	6,42	0,85	6,71	6,46	6,93
Asuncion	Paraguay	31	0,31	0,56	0,45	0,57	0,73	0,56	1,51
Rio de Janeiro	Brazil	290	2,90	0,92	8,36	0,97	9,39	7,51	7,89
Istanbul	Turkey	233	2,33	0,89	7,61	0,86	6,95	5,96	6,47
Lima	Peru	228	2,28	0,82	6,12	0,87	7,07	5,64	6,17
Doha	Qatar	504	5,04	0,79	5,52	0,71	3,78	4,53	5,16
Bogota	Colombia	370	3,70	0,88	7,46	0,92	8,29	6,94	7,36
Durban	South Africa	449	4,49	0,83	6,42	0,85	6,71	6,08	6,58
Guadalajara	Mexico	280	2,80	0,92	8,36	0,94	8,78	7,18	7,59
Johannesburg	South Africa	400	4,00	0,83	6,42	0,85	6,71	5,96	6,47
Tunis	Tunisia	208	2,08	0,81	5,82	0,80	5,61	4,78	5,39
Quito	Ecuador	93	0,93	0,73	4,18	0,67	2,93	2,74	3,52
Shenzhen	China	200	2,00	0,86	7,01	0,90	7,93	6,22	6,70
Kuwait City	Kuwait	387	3,87	0,79	5,52	0,69	3,29	3,99	4,66
Moscow	Russia	784	7,84	0,92	8,21	0,92	8,29	8,16	8,48
Belgrade	Serbia	303	3,03	0,74	4,33	0,81	5,98	4,83	5,43
Chengdu	China	200	2,00	0,86	7,01	0,90	7,93	6,22	6,70
St Petersburg	Russia	463	4,63	0,92	8,21	0,92	8,29	7,36	7,75

Manila	Philippines	222	2,22	0,88	7,46	0,94	8,66	6,75	7,19
Kiev	Ukraine	52	0,52	0,57	0,75	0,69	3,17	1,90	2,75
Casablanca	Morocco	99	0,99	0,67	2,84	0,78	5,12	3,52	4,23
Ho Chi Minh City	Vietnam	103	1,03	0,74	4,33	0,69	3,29	2,99	3,74
Jakarta	Indonesia	52	0,52	0,57	0,75	0,62	1,71	1,17	2,07
Chongqing	China	200	2,00	0,86	7,01	0,90	7,93	6,22	6,70
Riyadh	Saudi Arabia	299	2,99	0,79	5,52	0,71	3,78	4,02	4,69
Ankara	Turkey	233	2,33	0,89	7,61	0,86	6,95	5,96	6,47
Hanoi	Vietnam	103	1,03	0,74	4,33	0,69	3,29	2,99	3,74
Mumbai	India	342	3,42	0,95	8,96	0,96	9,03	7,61	7,98
Shenyang	China	200	2,00	0,86	7,01	0,90	7,93	6,22	6,70
Bangalore	India	262	2,62	0,95	8,96	0,96	9,03	7,41	7,80
New Delhi	India	143	1,43	0,95	8,96	0,96	9,03	7,11	7,52
La Paz	Bolivia	42	0,42	0,56	0,60	0,58	0,86	0,68	1,63
Cairo	Egypt	0	0,00	0,53	0,00	0,54	0,00	0,00	1,00

XXIX.- City Profitability. Services. Education. Lifelong learning

City	Country	QMng Schools	QMng Schools NOR	Preva Training	Preva Training NOR	Emp Dev	EmpDev NOR	Lifelong Learning	EDU CATIO N NOR
Zurich	Switzerland	6,39	10,00	70	8,71	5,86	10,00	28,71	10,00
Vienna	Austria	5,09	6,11	70	8,71	5,02	6,98	21,80	7,37
Berlin	Germany	5,22	6,50	70	8,71	5,19	7,59	22,80	7,75
Amsterdam	Netherlands	5,96	8,71	70	8,71	5,36	8,20	25,63	8,83
Munich	Germany	5,22	6,50	70	8,71	5,19	7,59	22,80	7,75
Geneva	Switzerland	6,39	10,00	70	8,71	5,86	10,00	28,71	10,00
Vancouver	Canada	5,78	8,17	70	8,71	4,9	6,55	23,43	7,99
Dusseldorf	Germany	5,22	6,50	70	8,71	5,19	7,59	22,80	7,75
Sydney	Australia	5,36	6,92	70	8,71	5,03	7,01	22,64	7,69
Toronto	Canada	5,78	8,17	70	8,71	4,9	6,55	23,43	7,99
Melbourne	Australia	5,36	6,92	70	8,71	5,03	7,01	22,64	7,69
Bern	Switzerland	6,39	10,00	70	8,71	5,86	10,00	28,71	10,00
San Francisco	United States	5,9	8,53	70	8,71	5,76	9,64	26,89	9,31
Copenhagen	Denmark	5,5	7,34	70	8,71	5,28	7,91	23,96	8,19
Boston	United States	5,9	8,53	70	8,71	5,76	9,64	26,89	9,31
Paris	France	5,58	7,57	70	8,71	4,8	6,19	22,48	7,63
Ottawa	Canada	5,78	8,17	70	8,71	4,9	6,55	23,43	7,99
London	United Kingdom	5,95	8,68	70	8,71	4,81	6,22	23,62	8,06
Frankfurt	Germany	5,22	6,50	70	8,71	5,19	7,59	22,80	7,75
Stockholm	Sweden	5,46	7,22	70,3	8,76	5,32	8,06	24,03	8,22
New York City	United States	5,9	8,53	70	8,71	5,76	9,64	26,89	9,31
Auckland	New Zealand	5,25	6,59	70	8,71	4,87	6,44	21,74	7,35
Singapore	Singapore	5,99	8,80	70	8,71	5,35	8,17	25,68	8,85
Adelaide	Australia	5,36	6,92	70	8,71	5,03	7,01	22,64	7,69
Canberra	Australia	5,36	6,92	70	8,71	5,03	7,01	22,64	7,69
Hamburg	Germany	5,22	6,50	70	8,71	5,19	7,59	22,80	7,75
Montreal	Canada	5,78	8,17	70	8,71	4,9	6,55	23,43	7,99
Washington, D.C.	United States	5,9	8,53	70	8,71	5,76	9,64	26,89	9,31
Tokyo	Japan	4,43	4,13	70	8,71	5,15	7,45	20,29	6,80
Basel	Switzerland	6,39	10,00	70	8,71	5,86	10,00	28,71	10,00
Oslo	Norway	5,23	6,53	70	8,71	5,09	7,23	22,47	7,63
Wellington	New Zealand	5,25	6,59	70	8,71	4,87	6,44	21,74	7,35
Chicago	United States	5,9	8,53	70	8,71	5,76	9,64	26,89	9,31
Helsinki	Finland	5,62	7,69	70	8,71	5,23	7,73	24,14	8,26
Luxembourg	Luxembourg	4,88	5,48	70	8,71	5,54	8,85	23,04	7,84
Seattle	United States	5,9	8,53	70	8,71	5,76	9,64	26,89	9,31
Brussels	Belgium	5,71	7,96	70	8,71	4,99	6,87	23,55	8,04
Dublin	Ireland	5,5	7,34	70	8,71	5,02	6,98	23,03	7,84
Stuttgart	Germany	5,22	6,50	70	8,71	5,19	7,59	22,80	7,75

Barcelona	Spain	5,54	7,46	70	8,71	3,83	2,70	18,87	6,25
Los Angeles	United States	5,9	8,53	70	8,71	5,76	9,64	26,89	9,31
Milan	Italy	5,39	7,01	70	8,71	3,55	1,69	17,41	5,70
Madrid	Spain	5,54	7,46	70	8,71	3,83	2,70	18,87	6,25
Baltimore	United States	5,9	8,53	70	8,71	5,76	9,64	26,89	9,31
Seoul	South Korea	4,45	4,19	70	8,71	4,49	5,07	17,98	5,92
Philadelphia	United States	5,9	8,53	70	8,71	5,76	9,64	26,89	9,31
Dallas	United States	5,9	8,53	70	8,71	5,76	9,64	26,89	9,31
Lyon	France	5,58	7,57	70	8,71	4,8	6,19	22,48	7,63
Edinburgh	United Kingdom	5,95	8,68	70	8,71	4,81	6,22	23,62	8,06
Linz	Austria	5,09	6,11	70	8,71	5,02	6,98	21,80	7,37
Lisbon	Portugal	5,09	6,11	60	7,31	4,1	3,67	17,09	5,58
Phoenix	United States	5,9	8,53	70	8,71	5,76	9,64	26,89	9,31
Houston	United States	5,9	8,53	70	8,71	5,76	9,64	26,89	9,31
Rome	Italy	5,39	7,01	70	8,71	3,55	1,69	17,41	5,70
Yokohama	Japan	4,43	4,13	70	8,71	5,15	7,45	20,29	6,80
Cologne	Germany	5,22	6,50	70	8,71	5,19	7,59	22,80	7,75
Florence	Italy	5,39	7,01	70	8,71	3,55	1,69	17,41	5,70
Prague	Czech Republic	4,28	3,68	55,1	6,63	4,53	5,22	15,53	4,98
Málaga	Spain	5,54	7,46	70	8,71	3,83	2,70	18,87	6,25
Hong Kong	Hong Kong	4,5	4,34	70	8,71	4,6	5,47	18,52	6,12
Birmingham	United Kingdom	5,95	8,68	70	8,71	4,81	6,22	23,62	8,06
Liverpool	United Kingdom	5,95	8,68	70	8,71	4,81	6,22	23,62	8,06
Atlanta	United States	5,9	8,53	70	8,71	5,76	9,64	26,89	9,31
Miami	United States	5,9	8,53	70	8,71	5,76	9,64	26,89	9,31
Eindhoven	Netherlands	5,96	8,71	70	8,71	5,36	8,20	25,63	8,83
Rotterdam	Netherlands	5,96	8,71	70	8,71	5,36	8,20	25,63	8,83
Manchester	United Kingdom	5,95	8,68	70	8,71	4,81	6,22	23,62	8,06
Marseille	France	5,58	7,57	70	8,71	4,8	6,19	22,48	7,63
Nice	France	5,58	7,57	70	8,71	4,8	6,19	22,48	7,63
Osaka	Japan	4,43	4,13	70	8,71	5,15	7,45	20,29	6,80
Valencia	Spain	5,54	7,46	70	8,71	3,83	2,70	18,87	6,25
Antwerp	Belgium	5,71	7,96	70	8,71	4,99	6,87	23,55	8,04
Warsaw	Poland	4,08	3,08	34,6	3,76	3,94	3,09	9,94	2,86
Dubai	United Arab Emirates	5,21	6,47	70	8,71	4,89	6,51	21,69	7,33
Taipei	Taiwan	4,5	4,34	70	8,71	4,6	5,47	18,52	6,12
Tallinn	Estonia	4,96	5,72	35,2	3,85	4,58	5,40	14,96	4,77
Abu Dhabi	United Arab Emirates	5,21	6,47	70	8,71	4,89	6,51	21,69	7,33
Budapest	Hungary	4,08	3,08	15,8	1,13	3,58	1,80	6,02	1,37
Ljubljana	Slovenia	4,49	4,31	41,5	4,73	4,3	4,39	13,43	4,19
Vilnius	Lithuania	3,91	2,57	42	4,80	4,61	5,50	12,88	3,98
Bilbao	Spain	5,54	7,46	70	8,71	3,83	2,70	18,87	6,25
Bratislava	Slovakia	3,77	2,16	43,5	5,01	4,19	3,99	11,16	3,32
Gothenburg	Sweden	5,46	7,22	70,3	8,76	5,32	8,06	24,03	8,22
Riga	Latvia	4,56	4,52	25,2	2,45	4,21	4,06	11,03	3,27

Buenos Aires	Argentina	4,71	4,97	40,2	4,55	3,69	2,19	11,71	3,53
Kuala Lumpur	Malaysia	5,36	6,92	60	7,31	5,36	8,20	22,43	7,61
Montevideo	Uruguay	4,42	4,10	53,3	6,38	3,64	2,01	12,49	3,83
Santiago	Chile	5,12	6,20	57,5	6,97	4,22	4,10	17,26	5,64
Athens	Greece	4,16	3,32	21,6	1,94	3,61	1,91	7,17	1,81
Shanghai	China	4,48	4,28	79,2	10,00	4,5	5,11	19,39	6,45
Zagreb	Croatia	3,72	2,01	49,3	5,82	3,08	0,00	7,82	2,05
Porto	Portugal	5,09	6,11	60	7,31	4,1	3,67	17,09	5,58
Panama City	Panama	3,67	1,86	11	0,46	3,73	2,34	4,66	0,85
Wroclaw	Poland	4,08	3,08	34,6	3,76	3,94	3,09	9,94	2,86
Medellín	Colombia	4,2	3,44	63	7,73	3,66	2,09	13,26	4,12
Sofia	Bulgaria	3,61	1,68	42,7	4,90	3,41	1,19	7,76	2,03
Beijing	China	4,48	4,28	79,2	10,00	4,5	5,11	19,39	6,45
Tel Aviv	Israel	5,43	7,13	18,6	1,52	4,81	6,22	14,87	4,74
Mexico City	Mexico	4,27	3,65	50,8	6,03	3,78	2,52	12,20	3,72
Bucharest	Romania	3,47	1,26	40,7	4,62	3,4	1,15	7,02	1,75
Córdoba	Argentina	4,71	4,97	40,2	4,55	3,69	2,19	11,71	3,53
Bangkok	Thailand	4,11	3,17	18	1,44	4,26	4,24	8,86	2,45
Brasilia	Brazil	3,66	1,83	42,2	4,83	3,79	2,55	9,21	2,58
Jerusalem	Israel	5,43	7,13	18,6	1,52	4,81	6,22	14,87	4,74
Monterrey	Mexico	4,27	3,65	50,8	6,03	3,78	2,52	12,20	3,72
Guangzhou	China	4,48	4,28	79,2	10,00	4,5	5,11	19,39	6,45
Sao Paulo	Brazil	3,66	1,83	42,2	4,83	3,79	2,55	9,21	2,58
Cape Town	South Africa	4,1	3,14	35	3,82	4,17	3,92	10,88	3,22
Asuncion	Paraguay	3,05	0,00	46,4	5,41	3,47	1,40	6,82	1,67
Rio de Janeiro	Brazil	3,66	1,83	42,2	4,83	3,79	2,55	9,21	2,58
Istanbul	Turkey	3,26	0,63	28,4	2,90	3,5	1,51	5,03	0,99
Lima	Peru	3,79	2,22	65,9	8,14	3,3	0,79	11,15	3,32
Doha	Qatar	5,35	6,89	70	8,71	4,75	6,01	21,61	7,30
Bogota	Colombia	4,2	3,44	63	7,73	3,66	2,09	13,26	4,12
Durban	South Africa	4,1	3,14	35	3,82	4,17	3,92	10,88	3,22
Guadalajara	Mexico	4,27	3,65	50,8	6,03	3,78	2,52	12,20	3,72
Johannesburg	South Africa	4,1	3,14	35	3,82	4,17	3,92	10,88	3,22
Tunis	Tunisia	4,17	3,35	28,9	2,97	3,77	2,48	8,80	2,43
Quito	Ecuador	4,05	2,99	73,7	9,23	3,47	1,40	13,63	4,26
Shenzhen	China	4,48	4,28	79,2	10,00	4,5	5,11	19,39	6,45
Kuwait City	Kuwait	3,57	1,56	70	8,71	3,85	2,77	13,04	4,04
Moscow	Russia	3,94	2,66	46,2	5,38	3,92	3,02	11,07	3,29
Belgrade	Serbia	4,12	3,20	37,8	4,21	3,65	2,05	9,46	2,68
Chengdu	China	4,48	4,28	79,2	10,00	4,5	5,11	19,39	6,45
St Petersburg	Russia	3,94	2,66	46,2	5,38	3,92	3,02	11,07	3,29
Manila	Philippines	5,36	6,92	59,8	7,29	4,8	6,19	20,39	6,83
Kiev	Ukraine	4,25	3,59	22,6	2,08	3,8	2,59	8,27	2,22
Casablanca	Morocco	4,06	3,02	26,3	2,60	3,64	2,01	7,64	1,98
Ho Chi Minh City	Vietnam	3,45	1,20	22,2	2,03	3,75	2,41	5,64	1,22
Jakarta	Indonesia	4,69	4,91	7,7	0,00	4,71	5,86	10,77	3,18

Chongqing	China	4,48	4,28	79,2	10,00	4,5	5,11	19,39	6,45
Riyadh	Saudi Arabia	4,69	4,91	70	8,71	4,26	4,24	17,87	5,87
Ankara	Turkey	3,26	0,63	28,4	2,90	3,5	1,51	5,03	0,99
Hanoi	Vietnam	3,45	1,20	22,2	2,03	3,75	2,41	5,64	1,22
Mumbai	India	4,68	4,88	35,9	3,94	4,56	5,32	14,15	4,46
Shenyang	China	4,48	4,28	79,2	10,00	4,5	5,11	19,39	6,45
Bangalore	India	4,68	4,88	35,9	3,94	4,56	5,32	14,15	4,46
New Delhi	India	4,68	4,88	35,9	3,94	4,56	5,32	14,15	4,46
La Paz	Bolivia	3,42	1,11	49,9	5,90	3,12	0,14	7,15	1,80
Cairo	Egypt	3,2	0,45	10	0,32	3,54	1,65	2,43	0,00

XXX.- City Profitability. Services. Employability.

City	Country	LinkedIn Talent Hiring Demand ALL	LinkedIn Talent Hiring Demand 8 TALENTED	LinkedIN Hiring TOT	LinkedIN Hiring TOT NOR	Employ ability GTCI	Employ ability GTCI NOR	Employ ability TOT	Employ ability NOR
Zurich	Switzerland	5	5	10	7,2	96,29	9,8	17,0	8,5
Vienna	Austria	3	3	6	4,5	70,46	6,6	11,1	5,4
Berlin	Germany	7	7	14	10,0	82,46	8,1	18,1	9,0
Amsterdam	Netherlands	7	7	14	10,0	84,32	8,3	18,3	9,2
Munich	Germany	7	7	14	10,0	82,46	8,1	18,1	9,0
Geneva	Switzerland	5	5	10	7,2	96,29	9,8	17,0	8,5
Vancouver	Canada	3	3	6	4,5	76,06	7,3	11,8	5,8
Dusseldorf	Germany	5	7	12	8,6	82,46	8,1	16,7	8,3
Sydney	Australia	5	5	10	7,2	73,19	7,0	14,2	7,0
Toronto	Canada	5	5	10	7,2	76,06	7,3	14,6	7,2
Melbourne	Australia	5	5	10	7,2	73,19	7,0	14,2	7,0
Bern	Switzerland	5	3	8	5,8	96,29	9,8	15,7	7,8
San Francisco	United States	7	7	14	10,0	97,77	10,0	20,0	10,0
Copenhagen	Denmark	3	3	6	4,5	76,21	7,3	11,8	5,8
Boston	United States	7	7	14	10,0	97,77	10,0	20,0	10,0
Paris	France	5	7	12	8,6	64,6	5,9	14,5	7,2
Ottawa	Canada	3	3	6	4,5	76,06	7,3	11,8	5,8
London	United Kingdom	7	7	14	10,0	72,53	6,9	16,9	8,4
Frankfurt	Germany	5	5	10	7,2	82,46	8,1	15,3	7,6
Stockholm	Sweden	5	7	12	8,6	78,31	7,6	16,2	8,1
New York City	United States	7	7	14	10,0	97,77	10,0	20,0	10,0
Auckland	New Zealand	3	1	4	3,1	69,78	6,5	9,6	4,7
Singapore	Singapore	5	5	10	7,2	85,11	8,4	15,7	7,8
Adelaide	Australia	3	3	6	4,5	73,19	7,0	11,4	5,6
Canberra	Australia	7	7	14	10,0	73,19	7,0	17,0	8,5
Hamburg	Germany	5	5	10	7,2	82,46	8,1	15,3	7,6
Montreal	Canada	5	5	10	7,2	76,06	7,3	14,6	7,2
Washington, D.C.	United States	7	7	14	10,0	97,77	10,0	20,0	10,0
Tokyo	Japan	7	7	14	10,0	63,45	5,8	15,8	7,8
Basel	Switzerland	5	5	10	7,2	96,29	9,8	17,0	8,5
Oslo	Norway	5	5	10	7,2	76,58	7,4	14,6	7,3
Wellington	New Zealand	3	3	6	4,5	69,78	6,5	11,0	5,4
Chicago	United States	7	7	14	10,0	97,77	10,0	20,0	10,0
Helsinki	Finland	3	3	6	4,5	87,32	8,7	13,2	6,5
Luxembourg	Luxembourg	7	5	12	8,6	67,83	6,3	14,9	7,4
Seattle	United States	7	7	14	10,0	97,77	10,0	20,0	10,0

Brussels	Belgium	5	5	10	7,2	72,81	6,9	14,2	7,0
Dublin	Ireland	7	7	14	10,0	79,85	7,8	17,8	8,9
Stuttgart	Germany	5	5	10	7,2	82,46	8,1	15,3	7,6
Barcelona	Spain	4	5	9	6,5	55,57	4,8	11,3	5,6
Los Angeles	United States	5	5	10	7,2	97,77	10,0	17,2	8,6
Milan	Italy	3	5	8	5,8	52,96	4,5	10,3	5,1
Madrid	Spain	5	5	10	7,2	55,57	4,8	12,0	5,9
Baltimore	United States	7	7	14	10,0	97,77	10,0	20,0	10,0
Seoul	South Korea	3	3	6	4,5	59,5	5,3	9,7	4,8
Philadelphia	United States	5	5	10	7,2	97,77	10,0	17,2	8,6
Dallas	United States	7	7	14	10,0	97,77	10,0	20,0	10,0
Lyon	France	3	3	6	4,5	64,6	5,9	10,4	5,1
Edinburgh	United Kingdom	7	7	14	10,0	72,53	6,9	16,9	8,4
Linz	Austria	3	3	6	4,5	70,46	6,6	11,1	5,4
Lisbon	Portugal	3	3	6	4,5	67,59	6,3	10,7	5,3
Phoenix	United States	5	5	10	7,2	97,77	10,0	17,2	8,6
Houston	United States	5	5	10	7,2	97,77	10,0	17,2	8,6
Rome	Italy	3	3	6	4,5	52,96	4,5	8,9	4,3
Yokohama	Japan	5	5	10	7,2	63,45	5,8	13,0	6,4
Cologne	Germany	3	3	6	4,5	82,46	8,1	12,6	6,2
Florence	Italy	1	1	2	1,7	52,96	4,5	6,2	2,9
Prague	Czech Republic	5	5	10	7,2	48,93	4,0	11,2	5,5
Málaga	Spain	2	3	5	3,8	55,57	4,8	8,6	4,2
Hong Kong	Hong Kong	5	5	10	7,2	64	5,8	13,1	6,5
Birmingham	United Kingdom	3	1	4	3,1	72,53	6,9	10,0	4,9
Liverpool	United Kingdom	5	5	10	7,2	72,53	6,9	14,1	7,0
Atlanta	United States	7	7	14	10,0	97,77	10,0	20,0	10,0
Miami	United States	3	3	6	4,5	97,77	10,0	14,5	7,2
Eindhoven	Netherlands	7	7	14	10,0	84,32	8,3	18,3	9,2
Rotterdam	Netherlands	5	5	10	7,2	84,32	8,3	15,6	7,7
Manchester	United Kingdom	7	7	14	10,0	72,53	6,9	16,9	8,4
Marseille	France	3	3	6	4,5	64,6	5,9	10,4	5,1
Nice	France	3	5	8	5,8	64,6	5,9	11,8	5,8
Osaka	Japan	5	7	12	8,6	63,45	5,8	14,4	7,1
Valencia	Spain	3	3	6	4,5	55,57	4,8	9,3	4,5
Antwerp	Belgium	7	7	14	10,0	72,81	6,9	16,9	8,4
Warsaw	Poland	7	7	14	10,0	41,86	3,1	13,1	6,5
Dubai	United Arab Emirates	2	2	4	3,1	75,9	7,3	10,4	5,1
Taipei	Taiwan	3	3	6	4,5	64	5,8	10,3	5,0
Tallinn	Estonia	3	3	6	4,5	58,96	5,2	9,7	4,7
Abu Dhabi	United Arab Emirates	2	2	4	3,1	75,9	7,3	10,4	5,1

Budapest	Hungary	7	7	14	10,0	32,49	1,9	11,9	5,9
Ljubljana	Slovenia	1	1	2	1,7	56,6	4,9	6,6	3,2
Vilnius	Lithuania	3	3	6	4,5	35,63	2,3	6,8	3,3
Bilbao	Spain	2	3	5	3,8	55,57	4,8	8,6	4,2
Bratislava	Slovakia	3	3	6	4,5	34,03	2,1	6,6	3,2
Gothenburg	Sweden	5	5	10	7,2	78,31	7,6	14,8	7,4
Riga	Latvia	2	3	5	3,8	48,1	3,9	7,6	3,7
Buenos Aires	Argentina	2	3	5	3,8	45,11	3,5	7,3	3,5
Kuala Lumpur	Malaysia	3	3	6	4,5	83,02	8,2	12,6	6,2
Montevideo	Uruguay	3	3	6	4,5	42,43	3,2	7,6	3,7
Santiago	Chile	1	1	2	1,7	59,92	5,3	7,0	3,4
Athens	Greece	1	1	2	1,7	50,54	4,2	5,9	2,8
Shanghai	China	3	3	6	4,5	63,9	5,8	10,3	5,0
Zagreb	Croatia	3	3	6	4,5	30,43	1,7	6,2	2,9
Porto	Portugal	3	5	8	5,8	67,59	6,3	12,1	6,0
Panama City	Panama	0	1	1	1,0	36,79	2,5	3,5	1,6
Wroclaw	Poland	7	7	14	10,0	41,86	3,1	13,1	6,5
Medellín	Colombia	0	1	1	1,0	51,8	4,3	5,3	2,5
Sofia	Bulgaria	5	5	10	7,2	37,64	2,6	9,8	4,8
Beijing	China	3	1	4	3,1	63,9	5,8	8,9	4,3
Tel Aviv	Israel	5	5	10	7,2	79,67	7,8	15,0	7,4
Mexico City	Mexico	2	3	5	3,8	47,21	3,8	7,5	3,6
Bucharest	Romania	3	5	8	5,8	29,74	1,6	7,5	3,6
Córdoba	Argentina	0	1	1	1,0	45,11	3,5	4,5	2,1
Bangkok	Thailand	3	3	6	4,5	49,31	4,0	8,5	4,1
Brasilia	Brazil	1	1	2	1,7	27,91	1,4	3,1	1,4
Jerusalem	Israel	3	3	6	4,5	79,67	7,8	12,2	6,0
Monterrey	Mexico	0	1	1	1,0	47,21	3,8	4,8	2,2
Guangzhou	China	1	1	2	1,7	63,9	5,8	7,5	3,6
Sao Paulo	Brazil	2	3	5	3,8	27,91	1,4	5,2	2,4
Cape Town	South Africa	3	3	6	4,5	42,07	3,1	7,6	3,7
Asuncion	Paraguay	1	1	2	1,7	25,27	1,1	2,8	1,2
Rio de Janeiro	Brazil	0	1	1	1,0	27,91	1,4	2,4	1,0
Istanbul	Turkey	1	1	2	1,7	36,23	2,4	4,1	1,9
Lima	Peru	1	1	2	1,7	35,4	2,3	4,0	1,8
Doha	Qatar	0	1	1	1,0	77,92	7,6	8,6	4,2
Bogota	Colombia	0	1	1	1,0	51,8	4,3	5,3	2,5
Durban	South Africa	1	1	2	1,7	42,07	3,1	4,8	2,2
Guadalajara	Mexico	2	3	5	3,8	47,21	3,8	7,5	3,6
Johannesburg	South Africa	3	3	6	4,5	42,07	3,1	7,6	3,7
Tunis	Tunisia	1	1	2	1,7	41,16	3,0	4,7	2,2
Quito	Ecuador	0	1	1	1,0	46,81	3,7	4,7	2,2
Shenzhen	China	1	1	2	1,7	63,9	5,8	7,5	3,6
Kuwait City	Kuwait	3	3	6	4,5	42,73	3,2	7,7	3,7
Moscow	Russia	0	3	3	2,4	50,78	4,2	6,6	3,1
Belgrade	Serbia	3	3	6	4,5	50,42	4,2	8,6	4,2

Chengdu	China	1	1	2	1,7	63,9	5,8	7,5	3,6
St Petersburg	Russia	0	3	3	2,4	50,78	4,2	6,6	3,1
Manila	Philippines	5	3	8	5,8	70,84	6,7	12,5	6,2
Kiev	Ukraine	3	3	6	4,5	53	4,5	8,9	4,3
Casablanca	Morocco	1	1	2	1,7	34,54	2,2	3,9	1,8
Ho Chi Minh City	Vietnam	3	3	6	4,5	34,9	2,2	6,7	3,2
Jakarta	Indonesia	1	1	2	1,7	65,46	6,0	7,7	3,7
Chongqing	China	1	1	2	1,7	63,9	5,8	7,5	3,6
Riyadh	Saudi Arabia	3	3	6	4,5	59,87	5,3	9,8	4,8
Ankara	Turkey	1	1	2	1,7	36,23	2,4	4,1	1,9
Hanoi	Vietnam	3	3	6	4,5	34,9	2,2	6,7	3,2
Mumbai	India	3	3	6	4,5	66,92	6,2	10,7	5,2
Shenyang	China	1	1	2	1,7	63,9	5,8	7,5	3,6
Bangalore	India	3	3	6	4,5	66,92	6,2	10,7	5,2
New Delhi	India	3	3	6	4,5	66,92	6,2	10,7	5,2
La Paz	Bolivia	1	1	2	1,7	33,02	2,0	3,7	1,7
Cairo	Egypt	1	1	2	1,7	24,8	1,0	2,7	1,2

XXXI.- City Profitability. Services. Connectivity.

City	Country	4G LTE	4G LTE NOR	Internet Speed	Internet Speed NOR	WIFI HOT SPOTS	WIFI HOT SPOTS NOR	ICT Infra structure	ICT Infra NOR	CONNECTED CITY	CONNECTED CITY NOR
Zurich	Switzerland	8,88	8,76	31,30	3,04	3,01	1,26	8,85	8,84	6,15	6,84
Vienna	Austria	8,96	8,84	46,30	4,56	7,15	6,44	8,38	8,05	7,19	7,94
Berlin	Germany	3,25	2,50	32,50	3,16	8,77	8,46	8,93	8,97	6,41	7,12
Amsterdam	Netherlands	8,15	7,95	23,80	2,28	6,92	6,15	8,65	8,50	6,68	7,39
Munich	Germany	3,82	3,13	31,30	3,04	4,93	3,66	8,93	8,97	5,55	6,21
Geneva	Switzerland	6,47	6,08	41,30	4,05	2,16	0,20	8,85	8,84	5,60	6,26
Vancouver	Canada	9,61	9,56	27,50	2,65	4,69	3,37	7,93	7,29	6,03	6,72
Dusseldorf	Germany	6,95	6,61	28,80	2,79	3,85	2,31	8,93	8,97	5,93	6,61
Sydney	Australia	9,28	9,20	18,80	1,77	9,16	8,95	8,00	7,41	6,95	7,68
Toronto	Canada	7,51	7,24	36,30	3,55	8,15	7,69	7,93	7,29	6,61	7,33
Melbourne	Australia	5,75	5,28	16,30	1,52	7,69	7,12	8,00	7,41	5,75	6,41
Bern	Switzerland	4,69	4,10	31,30	3,04	5,59	4,49	8,85	8,84	5,86	6,53
San Francisco	United States	2,85	2,05	53,80	5,32	6,31	5,39	8,27	7,86	5,70	6,36
Copenhagen	Denmark	5,35	4,83	47,50	4,68	3,23	1,54	8,39	8,06	5,44	6,08
Boston	United States	5,19	4,65	50,00	4,93	5,39	4,23	8,27	7,86	5,91	6,58
Paris	France	7,92	7,69	30,00	2,91	5,92	4,90	8,64	8,48	6,49	7,20
Ottawa	Canada	6,95	6,61	27,50	2,65	7,46	6,82	7,93	7,29	6,13	6,82
London	United Kingdom	3,57	2,86	20,00	1,89	9,70	9,62	9,15	9,34	6,61	7,33
Frankfurt	Germany	5,75	5,28	20,00	1,89	7,69	7,12	8,93	8,97	6,45	7,15
Stockholm	Sweden	6,71	6,34	47,50	4,68	5,00	3,75	8,55	8,33	6,29	6,98
New York City	United States	3,41	2,68	38,80	3,80	9,31	9,14	8,27	7,86	6,27	6,96
Auckland	New Zealand	9,04	8,94	25,00	2,40	8,69	8,36	8,34	7,98	7,13	7,88
Singapore	Singapore	10,00	10,00	100,00	10,00	9,07	8,84	8,61	8,43	9,14	10,00
Adelaide	Australia	6,31	5,90	17,50	1,64	4,85	3,56	8,00	7,41	5,18	5,82
Canberra	Australia	5,75	5,28	17,50	1,64	4,81	3,51	8,00	7,41	5,05	5,68
Hamburg	Germany	1,81	0,90	27,50	2,65	6,77	5,96	8,93	8,97	5,49	6,14
Montreal	Canada	9,36	9,29	33,80	3,29	8,31	7,89	7,93	7,29	7,01	7,75
Washington, D.C.	United States	3,25	2,50	32,50	3,16	7,00	6,25	8,27	7,86	5,53	6,18
Tokyo	Japan	1,40	0,45	27,50	2,65	9,77	9,71	8,80	8,75	6,06	6,75
Basel	Switzerland	4,69	4,10	31,30	3,04	5,59	4,49	8,85	8,84	5,86	6,53
Oslo	Norway	9,93	9,92	42,50	4,17	5,92	4,90	8,00	7,41	6,76	7,49
Wellington	New Zealand	7,34	7,04	25,00	2,40	8,10	7,63	8,34	7,98	6,61	7,32
Chicago	United States	4,62	4,03	38,80	3,80	8,85	8,56	8,27	7,86	6,42	7,13
Helsinki	Finland	8,64	8,49	31,30	3,04	4,62	3,28	7,35	6,31	5,49	6,14
Luxembourg	Luxembourg	4,13	3,48	37,50	3,67	3,00	1,25	9,54	10,00	5,68	6,34
Seattle	United States	5,10	4,56	32,50	3,16	8,79	8,49	8,27	7,86	6,39	7,09
Brussels	Belgium	8,55	8,39	42,50	4,17	5,77	4,71	8,15	7,66	6,52	7,23

Dublin	Ireland	2,46	1,62	73,80	7,35	4,16	2,69	8,14	7,64	5,39	6,04
Stuttgart	Germany	3,50	2,77	27,50	2,65	3,55	1,93	8,93	8,97	5,06	5,69
Barcelona	Spain	1,97	1,07	46,30	4,56	3,77	2,21	7,98	7,37	4,52	5,12
Los Angeles	United States	5,10	4,56	33,80	3,29	9,61	9,52	8,27	7,86	6,62	7,33
Milan	Italy	7,27	6,97	17,50	1,64	5,69	4,61	7,33	6,28	5,16	5,79
Madrid	Spain	7,92	7,69	35,00	3,41	8,54	8,17	7,98	7,37	6,80	7,53
Baltimore	United States	5,10	4,56	32,50	3,16	8,79	8,49	8,27	7,86	6,39	7,09
Seoul	South Korea	7,60	7,33	20,00	1,89	8,62	8,27	8,85	8,84	7,04	7,77
Philadelphia	United States	5,26	4,73	43,80	4,31	6,61	5,77	8,27	7,86	6,11	6,79
Dallas	United States	5,10	4,56	41,30	4,05	8,79	8,49	8,27	7,86	6,56	7,28
Lyon	France	8,80	8,67	27,50	2,65	6,39	5,49	8,64	8,48	6,76	7,48
Edinburgh	United Kingdom	2,93	2,14	23,80	2,28	4,46	3,08	9,15	9,34	5,24	5,88
Linz	Austria	4,69	4,10	35,00	3,41	7,15	6,44	8,38	8,05	6,01	6,69
Lisbon	Portugal	2,85	2,05	35,00	3,41	3,01	1,26	7,91	7,26	4,25	4,83
Phoenix	United States	5,10	4,56	41,30	4,05	8,79	8,49	8,27	7,86	6,56	7,28
Houston	United States	5,10	4,56	42,50	4,17	8,79	8,49	8,27	7,86	6,59	7,30
Rome	Italy	2,21	1,35	16,30	1,52	8,23	7,79	7,33	6,28	4,64	5,25
Yokohama	Japan	1,40	0,45	23,80	2,28	6,34	5,43	8,80	8,75	5,13	5,76
Cologne	Germany	6,39	5,99	20,00	1,89	5,23	4,04	8,93	8,97	5,97	6,65
Florence	Italy	3,74	3,05	17,00	1,59	2,47	0,58	7,33	6,28	3,56	4,10
Prague	Czech Republic	6,07	5,63	23,80	2,28	8,00	7,50	7,14	5,96	5,47	6,12
Málaga	Spain	6,57	6,19	33,80	3,29	8,02	7,53	7,98	7,37	6,35	7,05
Hong Kong	Hong Kong	2,21	1,35	53,80	5,32	9,38	9,22	5,60	3,37	4,52	5,12
Birmingham	United Kingdom	2,93	2,15	23,80	2,28	4,00	2,50	9,15	9,34	5,12	5,76
Liverpool	United Kingdom	2,93	2,14	23,80	2,28	4,46	3,08	9,15	9,34	5,24	5,88
Atlanta	United States	5,10	4,56	36,30	3,55	8,79	8,49	8,27	7,86	6,46	7,17
Miami	United States	5,10	4,56	32,50	3,16	8,79	8,49	8,27	7,86	6,39	7,09
Eindhoven	Netherlands	8,15	7,95	52,50	5,19	5,33	4,16	8,65	8,50	6,86	7,59
Rotterdam	Netherlands	8,15	7,95	41,30	4,05	5,33	4,16	8,65	8,50	6,63	7,35
Manchester	United Kingdom	2,93	2,14	23,80	2,28	4,46	3,08	9,15	9,34	5,24	5,88
Marseille	France	4,86	4,29	27,50	2,65	6,01	5,01	8,64	8,48	5,78	6,45
Nice	France	7,99	7,77	27,50	2,65	2,08	0,10	8,64	8,48	5,50	6,15
Osaka	Japan	1,49	0,54	25,00	2,40	6,23	5,29	8,80	8,75	5,15	5,78
Valencia	Spain	6,57	6,19	33,80	3,29	8,02	7,53	7,98	7,37	6,35	7,05
Antwerp	Belgium	8,55	8,39	65,00	6,45	6,00	5,00	8,15	7,66	7,03	7,77
Warsaw	Poland	3,06	2,29	35,00	3,41	4,37	2,96	7,58	6,70	4,41	5,01
Dubai	United Arab Emirates	7,04	6,71	10,00	0,88	9,54	9,43	8,11	7,59	6,44	7,15
Taipei	Taiwan	9,12	9,02	25,00	2,40	6,61	5,77	5,60	3,37	4,78	5,40
Tallinn	Estonia	6,14	5,71	26,30	2,53	4,24	2,80	8,16	7,68	5,28	5,92

Abu Dhabi	United Arab Emirates	5,51	5,01	10,00	0,88	6,70	5,87	8,11	7,59	5,39	6,04
Budapest	Hungary	9,68	9,65	48,80	4,81	7,84	7,31	7,78	7,04	7,17	7,91
Ljubljana	Slovenia	7,19	6,88	33,80	3,29	4,46	3,07	7,91	7,26	5,55	6,21
Vilnius	Lithuania	7,94	7,71	21,30	2,03	3,77	2,21	7,11	5,91	4,75	5,37
Bilbao	Spain	6,57	6,19	33,80	3,29	9,00	8,75	7,98	7,37	6,60	7,31
Bratislava	Slovakia	6,63	6,26	26,30	2,53	5,62	4,52	7,22	6,09	5,10	5,73
Gothenburg	Sweden	7,69	7,43	40,00	3,92	4,64	3,30	8,55	8,33	6,26	6,96
Riga	Latvia	2,53	1,70	21,30	2,03	6,61	5,77	7,41	6,41	4,46	5,06
Buenos Aires	Argentina	1,26	0,29	27,50	2,65	5,75	4,69	6,87	5,51	3,73	4,28
Kuala Lumpur	Malaysia	1,00	0,00	16,30	1,52	7,08	6,35	6,93	5,61	3,82	4,38
Montevideo	Uruguay	1,26	0,29	13,80	1,27	5,75	4,69	7,28	6,20	3,73	4,28
Santiago	Chile	1,34	0,38	35,00	3,41	5,67	4,59	6,69	5,20	3,76	4,31
Athens	Greece	3,91	3,23	12,50	1,13	6,36	5,45	7,76	7,00	4,76	5,38
Shanghai	China	2,29	1,43	1,30	0,00	9,23	9,03	5,58	3,33	3,43	3,96
Zagreb	Croatia	3,06	2,29	27,80	2,68	8,18	7,73	7,60	6,73	5,23	5,87
Porto	Portugal	3,57	2,86	35,00	3,41	4,24	2,80	7,91	7,26	4,72	5,33
Panama City	Panama	1,94	1,04	11,30	1,01	4,38	2,98	5,95	3,96	2,59	3,08
Wroclaw	Poland	3,06	2,29	27,50	2,65	4,37	2,96	7,58	6,70	4,26	4,85
Medellín	Colombia	1,60	0,67	15,00	1,39	2,47	0,59	5,88	3,84	2,06	2,52
Sofia	Bulgaria	5,71	5,23	27,50	2,65	6,97	6,21	6,83	5,44	5,00	5,62
Beijing	China	3,34	2,60	1,30	0,00	9,85	9,81	5,58	3,33	3,81	4,37
Tel Aviv	Israel	1,65	0,72	17,50	1,64	4,08	2,60	8,17	7,69	4,07	4,64
Mexico City	Mexico	2,11	1,23	18,80	1,77	3,40	1,75	5,28	2,83	2,08	2,54
Bucharest	Romania	3,06	2,29	66,30	6,59	6,18	5,23	6,98	5,69	5,10	5,73
Córdoba	Argentina	1,26	0,29	17,00	1,59	5,75	4,69	6,87	5,51	3,52	4,06
Bangkok	Thailand	1,00	0,00	25,00	2,40	2,00	0,00	5,48	3,16	1,75	2,19
Brasilia	Brazil	2,54	1,71	12,50	1,13	6,27	5,34	6,25	4,46	3,42	3,96
Jerusalem	Israel	1,65	0,72	17,50	1,64	4,14	2,68	8,17	7,69	4,08	4,66
Monterrey	Mexico	2,29	1,43	15,00	1,39	3,84	2,30	5,28	2,83	2,16	2,62
Guangzhou	China	2,29	1,43	1,30	0,00	8,90	8,63	5,58	3,33	3,34	3,88
Sao Paulo	Brazil	2,54	1,71	11,30	1,01	6,27	5,34	6,25	4,46	3,40	3,93
Cape Town	South Africa	1,77	0,86	7,50	0,63	2,73	0,91	5,48	3,16	1,75	2,19
Asuncion	Paraguay	1,00	0,00	5,00	0,37	2,00	0,00	4,41	1,36	0,62	1,00
Rio de Janeiro	Brazil	1,69	0,77	10,00	0,88	6,96	6,20	6,25	4,46	3,35	3,89
Istanbul	Turkey	1,00	0,00	15,00	1,39	2,00	0,00	6,30	4,55	2,10	2,56
Lima	Peru	1,00	0,00	11,30	1,01	2,00	0,00	4,90	2,19	1,08	1,48
Doha	Qatar	6,49	6,10	12,50	1,13	7,66	7,08	7,90	7,24	5,76	6,43
Bogota	Colombia	1,60	0,67	7,50	0,63	2,47	0,59	5,88	3,84	1,91	2,36
Durban	South Africa	1,77	0,86	7,50	0,63	2,73	0,91	5,48	3,16	1,75	2,19
Guadalajara	Mexico	2,29	1,43	10,00	0,88	3,84	2,30	5,28	2,83	2,05	2,51
Johannesburg	South Africa	1,77	0,86	7,50	0,63	2,73	0,91	5,48	3,16	1,75	2,19
Tunis	Tunisia	1,00	0,00	6,30	0,51	2,00	0,00	5,11	2,54	1,12	1,53
Quito	Ecuador	1,00	0,00	7,50	0,63	2,00	0,00	4,93	2,24	1,02	1,42
Shenzhen	China	2,29	1,43	1,30	0,00	8,90	8,63	5,58	3,33	3,34	3,88

Kuwait City	Kuwait	6,49	6,10	6,30	0,51	7,66	7,08	7,12	5,93	5,11	5,74
Moscow	Russia	1,24	0,27	15,00	1,39	10,00	10,00	7,23	6,11	4,78	5,39
Belgrade	Serbia	3,06	2,29	27,50	2,65	6,18	5,23	7,20	6,06	4,46	5,05
Chengdu	China	2,29	1,43	1,30	0,00	8,90	8,63	5,58	3,33	3,34	3,88
St Petersburg	Russia	3,90	3,22	15,00	1,39	8,08	7,60	7,23	6,11	4,89	5,51
Manila	Philippines	1,00	0,00	18,80	1,77	2,00	0,00	4,87	2,14	1,21	1,62
Kiev	Ukraine	2,20	1,33	30,00	2,91	5,58	4,48	6,60	5,05	3,76	4,32
Casablanca	Morocco	1,00	0,00	6,30	0,51	3,00	1,25	6,06	4,14	2,01	2,47
Ho Chi Minh City	Vietnam	1,00	0,00	27,50	2,65	2,00	0,00	4,75	1,94	1,31	1,72
Jakarta	Indonesia	1,00	0,00	10,00	0,88	2,00	0,00	4,85	2,10	1,02	1,42
Chongqing	China	2,29	1,43	1,30	0,00	8,90	8,63	5,58	3,33	3,34	3,88
Riyadh	Saudi Arabia	1,09	0,10	11,30	1,01	7,13	6,41	7,21	6,08	3,94	4,50
Ankara	Turkey	1,00	0,00	12,50	1,13	2,00	0,00	6,30	4,55	2,05	2,50
Hanoi	Vietnam	1,00	0,00	8,80	0,76	2,00	0,00	4,75	1,94	0,93	1,32
Mumbai	India	1,51	0,57	7,50	0,63	6,44	5,55	3,60	0,00	1,35	1,77
Shenyang	China	2,29	1,43	1,30	0,00	8,90	8,63	5,58	3,33	3,34	3,88
Bangalore	India	1,51	0,57	13,80	1,27	6,31	5,39	3,60	0,00	1,44	1,87
New Delhi	India	1,51	0,57	8,80	0,76	6,31	5,39	3,60	0,00	1,34	1,76
La Paz	Bolivia	1,00	0,00	5,00	0,37	2,00	0,00	4,42	1,38	0,63	1,01
Cairo	Egypt	1,00	0,00	3,80	0,25	2,00	0,00	5,40	3,03	1,26	1,68

XXXII.- City Profitability. Services. Health/Social Services.

City	Country	Social SVS Expenditure (%GDP)	Social SVS Expenditure (%GDP) NOR	Life Expectancy at age 60	Life Expectancy at age 60 NOR	Physicians (per 1k)	Physicians (per 1k) NOR	Public Health Expenditure (%GDP)	Public Health Expenditure (%GDP) NOR	HLC / SOC SVS Index	HLC / SOC SVS Index NOR
Zurich	Switzerland	16	4,70	25	9,18	4,25	6,69	3,8	3,41	5,74	6,78
Vienna	Austria	26,6	8,40	23,8	7,94	5,23	8,31	7,5	7,93	8,19	9,40
Berlin	Germany	25,1	7,87	23,5	7,63	4,19	6,60	8,7	9,39	7,87	9,05
Amsterdam	Netherlands	16,7	4,94	23,8	7,94	3,48	5,42	6,5	6,71	5,99	7,05
Munich	Germany	25,1	7,87	23,5	7,63	4,19	6,60	8,7	9,39	7,87	9,05
Geneva	Switzerland	16	4,70	25	9,18	4,25	6,69	3,8	3,41	5,74	6,78
Vancouver	Canada	17,3	5,15	24,7	8,87	2,54	3,87	7,8	8,29	6,27	7,34
Dusseldorf	Germany	25,1	7,87	23,5	7,63	4,19	6,60	8,7	9,39	7,87	9,05
Sydney	Australia	17,8	5,33	24,9	9,07	3,5	5,45	6,3	6,46	6,33	7,41
Toronto	Canada	17,3	5,15	24,7	8,87	2,54	3,87	7,8	8,29	6,27	7,34
Melbourne	Australia	17,8	5,33	24,9	9,07	3,5	5,45	6,3	6,46	6,33	7,41
Bern	Switzerland	16	4,70	25	9,18	4,25	6,69	3,8	3,41	5,74	6,78
San Francisco	United States	18,7	5,64	23,3	7,42	2,57	3,92	8,6	9,27	6,38	7,46
Copenhagen	Denmark	28	8,88	22,8	6,91	3,65	5,70	8,5	9,15	7,90	9,09
Boston	United States	18,7	5,64	23,3	7,42	2,57	3,92	8,6	9,27	6,38	7,46
Paris	France	31,2	10,00	25,2	9,38	3,24	5,02	8,7	9,39	8,76	10,00
Ottawa	Canada	17,3	5,15	24,7	8,87	2,54	3,87	7,8	8,29	6,27	7,34
London	United Kingdom	20,6	6,30	23,5	7,63	2,83	4,35	7,6	8,05	6,53	7,62
Frankfurt	Germany	25,1	7,87	23,5	7,63	4,19	6,60	8,7	9,39	7,87	9,05
Stockholm	Sweden	26,1	8,22	24,3	8,45	4,19	6,60	9,2	10,00	8,30	9,51
New York City	United States	18,7	5,64	23,3	7,42	2,57	3,92	8,6	9,27	6,38	7,46
Auckland	New Zealand	18,9	5,71	24,5	8,66	3,06	4,73	6,9	7,20	6,40	7,48
Singapore	Singapore	5,30	0,97	25,1	9,28	2,28	3,44	2,1	1,34	3,20	4,07
Adelaide	Australia	17,8	5,33	24,9	9,07	3,5	5,45	6,3	6,46	6,33	7,41
Canberra	Australia	17,8	5,33	24,9	9,07	3,5	5,45	6,3	6,46	6,33	7,41
Hamburg	Germany	25,1	7,87	23,5	7,63	4,19	6,60	8,7	9,39	7,87	9,05
Montreal	Canada	17,3	5,15	24,7	8,87	2,54	3,87	7,8	8,29	6,27	7,34
Washington, D.C.	United States	18,7	5,64	23,3	7,42	2,57	3,92	8,6	9,27	6,38	7,46
Tokyo	Japan	21,9	6,76	25,8	10,00	2,37	3,59	9,2	10,00	7,42	8,57
Basel	Switzerland	16	4,70	25	9,18	4,25	6,69	3,8	3,41	5,74	6,78
Oslo	Norway	25	7,84	23,9	8,04	4,38	6,91	8,9	9,63	8,05	9,25
Wellington	New Zealand	18,9	5,71	24,5	8,66	3,06	4,73	6,9	7,20	6,40	7,48

Chicago	United States	18,7	5,64	23,3	7,42	2,57	3,92	8,6	9,27	6,38	7,46
Helsinki	Finland	28,7	9,13	23,7	7,84	3,2	4,96	7,1	7,44	7,70	8,87
Luxembourg	Luxembourg	22,4	6,93	23,9	8,04	2,92	4,50	4,7	4,51	6,18	7,25
Seattle	United States	18,7	5,64	23,3	7,42	2,57	3,92	8,6	9,27	6,38	7,46
Brussels	Belgium	28,9	9,20	23,7	7,84	3,01	4,64	8	8,54	7,88	9,06
Dublin	Ireland	14,4	4,14	23,4	7,53	2,96	4,56	5,3	5,24	5,12	6,12
Stuttgart	Germany	25,1	7,87	23,5	7,63	4,19	6,60	8,7	9,39	7,87	9,05
Barcelona	Spain	23,7	7,38	24,8	8,97	3,87	6,07	6,3	6,46	7,25	8,39
Los Angeles	United States	18,7	5,64	23,3	7,42	2,57	3,92	8,6	9,27	6,38	7,46
Milan	Italy	27,9	8,85	25,1	9,28	4,02	6,31	6,5	6,71	8,00	9,19
Madrid	Spain	23,7	7,38	24,8	8,97	3,87	6,07	6,3	6,46	7,25	8,39
Baltimore	United States	18,7	5,64	23,3	7,42	2,57	3,92	8,6	9,27	6,38	7,46
Seoul	South Korea	11,1	2,99	24,3	8,45	2,33	3,52	4,4	4,15	4,42	5,37
Philadelphia	United States	18,7	5,64	23,3	7,42	2,57	3,92	8,6	9,27	6,38	7,46
Dallas	United States	18,7	5,64	23,3	7,42	2,57	3,92	8,6	9,27	6,38	7,46
Lyon	France	31,2	10,00	25,2	9,38	3,24	5,02	8,7	9,39	8,76	10,00
Edinburgh	United Kingdom	20,6	6,30	23,5	7,63	2,83	4,35	7,6	8,05	6,53	7,62
Linz	Austria	26,6	8,40	23,8	7,94	5,23	8,31	7,5	7,93	8,19	9,40
Lisbon	Portugal	22,6	7,00	23,7	7,84	4,43	6,99	5,9	5,98	6,96	8,08
Phoenix	United States	18,7	5,64	23,3	7,42	2,57	3,92	8,6	9,27	6,38	7,46
Houston	United States	18,7	5,64	23,3	7,42	2,57	3,92	8,6	9,27	6,38	7,46
Rome	Italy	27,9	8,85	25,1	9,28	4,02	6,31	6,5	6,71	8,00	9,19
Yokohama	Japan	21,9	6,76	25,8	10,00	2,37	3,59	9,2	10,00	7,42	8,57
Cologne	Germany	25,1	7,87	23,5	7,63	4,19	6,60	8,7	9,39	7,87	9,05
Florence	Italy	27,9	8,85	25,1	9,28	4,02	6,31	6,5	6,71	8,00	9,19
Prague	Czech Republic	18,7	5,64	21,5	5,57	3,68	5,75	5,9	5,98	5,72	6,75
Málaga	Spain	23,7	7,38	24,8	8,97	3,87	6,07	6,3	6,46	7,25	8,39
Hong Kong	Hong Kong	8	1,91	25,8	10,00	2	2,98	3	2,44	3,85	4,76
Birmingham	United Kingdom	20,6	6,30	23,5	7,63	2,83	4,35	7,6	8,05	6,53	7,62
Liverpool	United Kingdom	20,6	6,30	23,5	7,63	2,83	4,35	7,6	8,05	6,53	7,62
Atlanta	United States	18,7	5,64	23,3	7,42	2,57	3,92	8,6	9,27	6,38	7,46
Miami	United States	18,7	5,64	23,3	7,42	2,57	3,92	8,6	9,27	6,38	7,46
Eindhoven	Netherlands	16,7	4,94	23,8	7,94	3,48	5,42	6,5	6,71	5,99	7,05
Rotterdam	Netherlands	16,7	4,94	23,8	7,94	3,48	5,42	6,5	6,71	5,99	7,05

Manchester	United Kingdom	20,6	6,30	23,5	7,63	2,83	4,35	7,6	8,05	6,53	7,62
Marseille	France	31,2	10,00	25,2	9,38	3,24	5,02	8,7	9,39	8,76	10,00
Nice	France	31,2	10,00	25,2	9,38	3,24	5,02	8,7	9,39	8,76	10,00
Osaka	Japan	21,9	6,76	25,8	10,00	2,37	3,59	9,2	10,00	7,42	8,57
Valencia	Spain	23,7	7,38	24,8	8,97	3,87	6,07	6,3	6,46	7,25	8,39
Antwerp	Belgium	28,9	9,20	23,7	7,84	3,01	4,64	8	8,54	7,88	9,06
Warsaw	Poland	21,1	6,48	21,5	5,57	2,29	3,45	4,5	4,27	5,25	6,26
Dubai	United Arab Emirates	6,05	1,23	19,8	3,81	1,56	2,25	2,4	1,71	2,05	2,84
Taipei	Taiwan	8	1,91	19,4	3,40	2	2,98	3	2,44	2,53	3,35
Tallinn	Estonia	18,4	5,54	21,3	5,36	3,43	5,34	4,8	4,63	5,28	6,29
Abu Dhabi	United Arab Emirates	6,05	1,23	19,8	3,81	1,56	2,25	2,4	1,71	2,05	2,84
Budapest	Hungary	19,4	5,89	20,1	4,12	3,09	4,78	4,7	4,51	5,04	6,03
Ljubljana	Slovenia	21,2	6,51	23,1	7,22	2,82	4,33	5,9	5,98	6,11	7,17
Vilnius	Lithuania	16,2	4,77	19,2	3,20	4,38	6,91	4,2	3,90	4,71	5,68
Bilbao	Spain	23,7	7,38	24,8	8,97	3,87	6,07	6,3	6,46	7,25	8,39
Bratislava	Slovakia	17	5,05	20,3	4,33	3,45	5,37	5,3	5,24	5,01	6,00
Gothenburg	Sweden	26,1	8,22	24,3	8,45	4,19	6,60	9,2	10,00	8,30	9,51
Riga	Latvia	16,2	4,77	19,8	3,81	3,21	4,98	3,4	2,93	4,25	5,19
Buenos Aires	Argentina	15,99	4,69	21,4	5,46	3,91	6,13	6,6	6,83	5,56	6,59
Kuala Lumpur	Malaysia	5,05	0,88	19,3	3,30	1,53	2,20	2	1,22	1,70	2,47
Montevideo	Uruguay	15,99	4,69	22	6,08	3,74	5,85	6,6	6,83	5,63	6,66
Santiago	Chile	10,9	2,92	25,2	9,38	1,03	1,37	4,5	4,27	4,17	5,11
Athens	Greece	23,5	7,31	23,6	7,73	6,25	10,00	4,8	4,63	7,40	8,55
Shanghai	China	7,32	1,67	19,4	3,40	1,81	2,66	2,9	2,32	2,34	3,16
Zagreb	Croatia	17,75	5,31	20,6	4,64	3,13	4,84	5,6	5,61	5,14	6,14
Porto	Portugal	22,6	7,00	23,7	7,84	4,43	6,99	5,9	5,98	6,96	8,08
Panama City	Panama	10,66	2,84	23,9	8,04	1,59	2,30	4,4	4,15	4,03	4,96
Wroclaw	Poland	21,1	6,48	21,5	5,57	2,29	3,45	4,5	4,27	5,25	6,26
Medellín	Colombia	11,87	3,26	21,4	5,46	1,82	2,68	4,9	4,76	3,88	4,80
Sofia	Bulgaria	13,31	3,76	19,2	3,20	4	6,28	4,2	3,90	4,18	5,12
Beijing	China	7,32	1,67	19,4	3,40	1,81	2,66	2,9	2,32	2,34	3,16
Tel Aviv	Israel	16	4,70	24,6	8,76	3,58	5,59	4,7	4,51	5,65	6,69
Mexico City	Mexico	7,5	1,74	22,7	6,80	2,23	3,36	2,8	2,20	3,17	4,03
Bucharest	Romania	12,99	3,65	19,8	3,81	2,67	4,08	4,1	3,78	3,80	4,71
Córdoba	Argentina	15,99	4,69	21,4	5,46	3,91	6,13	6,6	6,83	5,56	6,59
Bangkok	Thailand	7,32	1,67	21,4	5,46	0,47	0,45	2,9	2,32	2,31	3,13
Brasilia	Brazil	9,69	2,50	21,3	5,36	1,85	2,73	4	3,66	3,35	4,23
Jerusalem	Israel	16	4,70	24,6	8,76	3,58	5,59	4,7	4,51	5,65	6,69
Monterrey	Mexico	7,5	1,74	22,7	6,80	2,23	3,36	2,8	2,20	3,17	4,03
Guangzhou	China	7,32	1,67	19,4	3,40	1,81	2,66	2,9	2,32	2,34	3,16
Sao Paulo	Brazil	9,69	2,50	21,3	5,36	1,85	2,73	4	3,66	3,35	4,23
Cape Town	South Africa	11,10	2,99	16,1	0,00	0,82	1,02	4,4	4,15	2,23	3,04

Asuncion	Paraguay	7,27	1,65	21	5,05	1,29	1,80	3	2,44	2,52	3,35
Rio de Janeiro	Brazil	9,69	2,50	21,3	5,36	1,85	2,73	4	3,66	3,35	4,23
Istanbul	Turkey	12,5	3,48	20,8	4,85	1,75	2,56	3,3	2,80	3,43	4,32
Lima	Peru	7,75	1,82	21,3	5,36	1,12	1,52	3,2	2,68	2,64	3,48
Doha	Qatar	6,3	1,32	21	5,05	1,96	2,91	2,1	1,34	2,39	3,20
Bogota	Colombia	11,87	3,26	21,4	5,46	1,82	2,68	4,9	4,76	3,88	4,80
Durban	South Africa	11,10	2,99	16,1	0,00	0,82	1,02	4,4	4,15	2,23	3,04
Guadalajara	Mexico	7,5	1,74	22,7	6,80	2,23	3,36	2,8	2,20	3,17	4,03
Johannesburg	South Africa	11,10	2,99	16,1	0,00	0,82	1,02	4,4	4,15	2,23	3,04
Tunis	Tunisia	10,34	2,73	19,5	3,51	1,29	1,80	4,1	3,78	2,91	3,76
Quito	Ecuador	10,66	2,84	22,9	7,01	1,66	2,41	4,4	4,15	3,85	4,76
Shenzhen	China	7,32	1,67	19,4	3,40	1,81	2,66	2,9	2,32	2,34	3,16
Kuwait City	Kuwait	13,8	3,93	17,7	1,65	2,61	3,98	4,6	4,39	3,58	4,47
Moscow	Russia	9,83	2,55	18,4	2,37	3,98	6,25	3,1	2,56	3,25	4,13
Belgrade	Serbia	15,21	4,43	19,1	3,09	2,46	3,74	4,8	4,63	4,06	4,99
Chengdu	China	7,32	1,67	19,4	3,40	1,81	2,66	2,9	2,32	2,34	3,16
St Petersburg	Russia	9,83	2,55	18,4	2,37	3,98	6,25	3,1	2,56	3,25	4,13
Manila	Philippines	3,53	0,35	16,8	0,72	0,2	0,00	1,4	0,49	0,38	1,07
Kiev	Ukraine	7,82	1,85	18,1	2,06	3	4,63	3,1	2,56	2,59	3,42
Casablanca	Morocco	5,80	1,14	19,1	3,09	0,62	0,69	2,3	1,59	1,53	2,29
Ho Chi Minh City	Vietnam	6,81	1,50	22,4	6,49	0,82	1,02	2,7	2,07	2,52	3,34
Jakarta	Indonesia	3,53	0,35	16,5	0,41	0,2	0,00	1,4	0,49	0,32	1,00
Chongqing	China	7,32	1,67	19,4	3,40	1,81	2,66	2,9	2,32	2,34	3,16
Riyadh	Saudi Arabia	10,2	2,68	18,5	2,47	2,57	3,92	3,4	2,93	2,93	3,79
Ankara	Turkey	12,5	3,48	20,8	4,85	1,75	2,56	3,3	2,80	3,43	4,32
Hanoi	Vietnam	6,81	1,50	22,4	6,49	0,82	1,02	2,7	2,07	2,52	3,34
Mumbai	India	2,52	0,00	17,7	1,65	0,76	0,93	1	0,00	0,52	1,21
Shenyang	China	7,32	1,67	19,4	3,40	1,81	2,66	2,9	2,32	2,34	3,16
Bangalore	India	2,52	0,00	17,7	1,65	0,76	0,93	1	0,00	0,52	1,21
New Delhi	India	2,52	0,00	17,7	1,65	0,76	0,93	1	0,00	0,52	1,21
La Paz	Bolivia	10,66	2,84	21,1	5,15	0,47	0,45	4,4	4,15	3,08	3,95
Cairo	Egypt	4,29	0,62	17,3	1,24	0,81	1,01	1,7	0,85	0,87	1,58

XXXIII.- City Profitability. Services. Environmental Sustainability.

City	Country	CIMI ENVIRONMENT 2019	CIMI ENV Index NOR	ARCADIS 2018 Planet	ARCADIS 2018 Planet NOR	ENV SUS	ENV SUS NOR
Zurich	Switzerland	25	8,72	77	9,39	18,11	9,13
Vienna	Austria	15	9,28	77	9,39	18,67	9,42
Berlin	Germany	47	7,5	72	8,37	15,87	8
Amsterdam	Netherlands	28	8,56	67	7,35	15,91	8,02
Munich	Germany	69	6,28	70	7,96	14,24	7,18
Geneva	Switzerland	60	6,78	68	7,55	14,33	7,23
Vancouver	Canada	77	5,83	66	7,14	12,97	6,54
Dusseldorf	Germany	33	8,28	71	8,16	16,44	8,29
Sydney	Australia	18	9,11	56	5,1	14,21	7,17
Toronto	Canada	53	7,17	67	7,35	14,52	7,32
Melbourne	Australia	31	8,39	44	2,65	11,04	5,57
Bern	Switzerland	70	6,22	61	6,12	12,34	6,22
San Francisco	United States	122	3,33	58	5,51	8,84	4,46
Copenhagen	Denmark	3	9,94	76	9,18	19,12	9,64
Boston	United States	115	3,72	61	6,12	9,84	4,96
Paris	France	54	7,11	63	6,53	13,64	6,88
Ottawa	Canada	62	6,67	68	7,55	14,22	7,17
London	United Kingdom	34	8,22	68	7,55	15,77	7,95
Frankfurt	Germany	80	5,67	79	9,8	15,47	7,8
Stockholm	Sweden	5	9,83	80	10	19,83	10
New York City	United States	78	5,78	64	6,73	12,51	6,31
Auckland	New Zealand	7	9,72	78	9,59	19,31	9,74
Singapore	Singapore	10	9,56	58	5,51	15,07	7,6
Adelaide	Australia	90	5,11	56	5,1	10,21	5,15
Canberra	Australia	83	5,5	58	5,51	11,01	5,55
Hamburg	Germany	57	6,94	74	8,78	15,72	7,93
Montreal	Canada	63	6,61	68	7,55	14,16	7,14
Washington, D.C.	United States	141	2,28	57	5,31	7,59	3,83
Tokyo	Japan	6	9,78	46	3,06	12,84	6,48
Basel	Switzerland	36	8,11	71	8,16	16,27	8,2
Oslo	Norway	8	9,67	75	8,98	18,65	9,4
Wellington	New Zealand	2	10	58	5,51	15,51	7,82
Chicago	United States	130	2,89	56	5,1	7,99	4,03
Helsinki	Finland	12	9,44	77	9,39	18,83	9,5
Luxembourg	Luxembourg	46	7,56	67	7,35	14,91	7,52
Seattle	United States	143	2,17	62	6,33	8,5	4,29
Brussels	Belgium	43	7,72	57	5,31	13,03	6,57
Dublin	Ireland	24	8,78	61	6,12	14,9	7,51

Stuttgart	Germany	65	6,5	63	6,53	13,03	6,57
Barcelona	Spain	51	7,28	64	6,73	14,01	7,07
Los Angeles	United States	152	1,67	54	4,69	6,36	3,21
Milan	Italy	66	6,44	58	5,51	11,95	6,03
Madrid	Spain	58	6,89	67	7,35	14,24	7,18
Baltimore	United States	129	2,94	51	4,08	7,02	3,54
Seoul	South Korea	32	8,33	61	6,12	14,45	7,29
Philadelphia	United States	144	2,11	59	5,71	7,82	3,94
Dallas	United States	134	2,67	51	4,08	6,75	3,4
Lyon	France	64	6,56	59	5,71	12,27	6,19
Edinburgh	United Kingdom	81	5,61	65	6,94	12,55	6,33
Linz	Austria	37	8,06	70	7,96	16,02	8,08
Lisbon	Portugal	14	9,33	58	5,51	14,84	7,48
Phoenix	United States	137	2,5	54	4,69	7,19	3,63
Houston	United States	150	1,78	54	4,69	6,47	3,26
Rome	Italy	123	3,28	63	6,53	9,81	4,95
Yokohama	Japan	7	9,72	47	3,27	12,99	6,55
Cologne	Germany	92	5	55	4,9	9,9	4,99
Florence	Italy	128	3	50	3,88	6,88	3,47
Prague	Czech Republic	26	8,67	50	3,88	12,55	6,33
Málaga	Spain	86	5,33	57	5,31	10,64	5,37
Hong Kong	Hong Kong	20	9	56	5,1	14,1	7,11
Birmingham	United Kingdom	72	6,11	62	6,33	12,44	6,27
Liverpool	United Kingdom	109	4,06	51	4,08	8,14	4,1
Atlanta	United States	146	2	46	3,06	5,06	2,55
Miami	United States	142	2,22	54	4,69	6,91	3,48
Eindhoven	Netherlands	107	4,17	52	4,29	8,46	4,27
Rotterdam	Netherlands	49	7,39	58	5,51	12,9	6,51
Manchester	United Kingdom	101	4,5	64	6,73	11,23	5,66
Marseille	France	106	4,22	52	4,29	8,51	4,29
Nice	France	83	5,5	58	5,51	11,01	5,55
Osaka	Japan	23	8,83	74	8,78	17,61	8,88
Valencia	Spain	39	7,94	70	7,96	15,9	8,02
Antwerp	Belgium	48	7,44	59	5,71	13,15	6,63
Warsaw	Poland	96	4,78	47	3,27	8,05	4,06
Dubai	United Arab Emirates	159	1,28	37	1,22	2,5	1,26
Taipei	Taiwan	145	2,06	49	3,67	5,73	2,89
Tallinn	Estonia	21	8,94	75	8,98	17,92	9,04
Abu Dhabi	United Arab Emirates	169	0,72	35	0,82	1,54	0,78
Budapest	Hungary	38	8	53	4,49	12,49	6,3
Ljubljana	Slovenia	45	7,61	68	7,55	15,16	7,64

Vilnius	Lithuania	22	8,89	74	8,78	17,67	8,91
Bilbao	Spain	91	5,06	56	5,1	10,16	5,12
Bratislava	Slovakia	35	8,17	71	8,16	16,33	8,23
Gothenburg	Sweden	11	9,5	78	9,59	19,09	9,63
Riga	Latvia	27	8,61	73	8,57	17,18	8,66
Buenos Aires	Argentina	29	8,5	44	2,65	11,15	5,62
Kuala Lumpur	Malaysia	113	3,83	43	2,45	6,28	3,17
Montevideo	Uruguay	4	9,89	79	9,8	19,69	9,93
Santiago	Chile	30	8,44	46	3,06	11,5	5,8
Athens	Greece	52	7,22	45	2,86	10,08	5,08
Shanghai	China	147	1,94	46	3,06	5	2,52
Zagreb	Croatia	46	7,56	68	7,55	15,11	7,62
Porto	Portugal	19	9,06	75	8,98	18,04	9,1
Panama City	Panama	42	7,78	69	7,76	15,54	7,84
Wroclaw	Poland	98	4,67	54	4,69	9,36	4,72
Medellín	Colombia	114	3,78	49	3,67	7,45	3,76
Sofia	Bulgaria	90	5,11	56	5,1	10,21	5,15
Beijing	China	163	1,06	42	2,24	3,3	1,66
Tel Aviv	Israel	41	7,83	69	7,76	15,59	7,86
Mexico City	Mexico	168	0,78	50	3,88	4,66	2,35
Bucharest	Romania	104	4,33	52	4,29	8,62	4,35
Córdoba	Argentina	74	6	60	5,92	11,92	6,01
Bangkok	Thailand	125	3,17	37	1,22	4,39	2,21
Brasilia	Brazil	85	5,39	57	5,31	10,7	5,4
Jerusalem	Israel	55	7,06	65	6,94	14	7,06
Monterrey	Mexico	147	1,94	41	2,04	3,98	2,01
Guangzhou	China	154	1,56	50	3,88	5,44	2,74
Sao Paulo	Brazil	102	4,44	60	5,92	10,36	5,22
Cape Town	South Africa	131	2,83	36	1,02	3,85	1,94
Asuncion	Paraguay	9	9,61	75	8,98	18,59	9,37
Rio de Janeiro	Brazil	110	4	57	5,31	9,31	4,69
Istanbul	Turkey	132	2,78	40	1,84	4,62	2,33
Lima	Peru	140	2,33	33	0,41	2,74	1,38
Doha	Qatar	166	0,89	35	0,82	1,71	0,86
Bogota	Colombia	89	5,17	56	5,1	10,27	5,18
Durban	South Africa	132	2,78	44	2,65	5,43	2,74
Guadalajara	Mexico	168	0,78	35	0,82	1,6	0,81
Johannesburg	South Africa	151	1,72	47	3,27	4,99	2,52
Tunis	Tunisia	76	5,89	59	5,71	11,6	5,85
Quito	Ecuador	82	5,56	58	5,51	11,07	5,58
Shenzhen	China	153	1,61	52	4,29	5,9	2,98
Kuwait City	Kuwait	146	2	41	2,04	4,04	2,04
Moscow	Russia	136	2,56	40	1,84	4,4	2,22
Belgrade	Serbia	56	7	65	6,94	13,94	7,03
Chengdu	China	160	1,22	37	1,22	2,44	1,23
St Petersburg	Russia	155	1,5	38	1,43	2,93	1,48
Manila	Philippines	149	1,83	39	1,63	3,46	1,74

Kiev	Ukraine	120	3,44	48	3,47	6,91	3,48
Casablanca	Morocco	156	1,44	38	1,43	2,87	1,45
Ho Chi Minh City	Vietnam	73	6,06	60	5,92	11,98	6,04
Jakarta	Indonesia	127	3,06	35	0,82	3,88	1,96
Chongqing	China	160	1,22	37	1,22	2,44	1,23
Riyadh	Saudi Arabia	173	0,5	33	0,41	0,91	0,46
Ankara	Turkey	139	2,39	43	2,45	4,84	2,44
Hanoi	Vietnam	182	0	31	0	0	0
Mumbai	India	164	1	39	1,63	2,63	1,33
Shenyang	China	160	1,22	37	1,22	2,44	1,23
Bangalore	India	165	0,94	43	2,45	3,39	1,71
New Delhi	India	170	0,67	40	1,84	2,51	1,27
La Paz	Bolivia	68	6,33	62	6,33	12,66	6,38
Cairo	Egypt	160	1,22	37	1,22	2,44	1,23

XXXIV.- City Profitability. Services. Culture/Tourism.

City	Country	% Culture Creative Jobs	Culture Jobs NOR	City Destination 2019	Destination NOR	CULTURE INDEX	CULTURE INDEX NOR
Zurich	Switzerland	9,00%	6,80	2000	0,56	3,68	4,89
Vienna	Austria	9,00%	6,80	6635	2,33	4,56	5,89
Berlin	Germany	9,00%	6,80	6196	2,16	4,48	5,79
Amsterdam	Netherlands	9,20%	6,96	8835	3,17	5,06	6,45
Munich	Germany	5,00%	3,60	4206	1,40	2,50	3,57
Geneva	Switzerland	5,00%	3,60	1500	0,37	1,98	2,99
Vancouver	Canada	4,20%	2,96	3398	1,09	2,03	3,04
Dusseldorf	Germany	3,00%	2,00	1400	0,33	1,17	2,07
Sydney	Australia	4,60%	3,28	4443	1,49	2,39	3,44
Toronto	Canada	6,90%	5,12	4736	1,60	3,36	4,54
Melbourne	Australia	4,20%	2,96	3300	1,06	2,01	3,02
Bern	Switzerland	5,00%	3,60	1500	0,37	1,98	2,99
San Francisco	United States	5,40%	3,92	2988	0,94	2,43	3,49
Copenhagen	Denmark	5,00%	3,60	3186	1,01	2,31	3,35
Boston	United States	2,40%	1,52	2000	0,56	1,04	1,93
Paris	France	9,00%	6,80	19088	7,09	6,94	8,55
Ottawa	Canada	4,20%	2,96	1441	0,35	1,65	2,62
London	United Kingdom	12,00%	9,20	19560	7,27	8,23	10,00
Frankfurt	Germany	4,00%	2,80	2728	0,84	1,82	2,81
Stockholm	Sweden	5,00%	3,60	2722	0,84	2,22	3,25
New York City	United States	5,40%	3,92	14010	5,15	4,53	5,85
Auckland	New Zealand	5,00%	3,60	2926	0,91	2,26	3,30
Singapore	Singapore	1,50%	0,80	19761	7,34	4,07	5,33
Adelaide	Australia	2,20%	1,36	1729	0,46	0,91	1,79
Canberra	Australia	2,20%	1,36	1729	0,46	0,91	1,79
Hamburg	Germany	4,00%	2,80	1800	0,48	1,64	2,61
Montreal	Canada	6,80%	5,04	1556	0,39	2,71	3,81
Washington, D.C.	United States	2,40%	1,52	2000	0,56	1,04	1,93
Tokyo	Japan	13,00%	10,00	10443	3,78	6,89	8,50
Basel	Switzerland	5,00%	3,60	1800	0,48	2,04	3,06
Oslo	Norway	2,50%	1,60	1700	0,44	1,02	1,91
Wellington	New Zealand	3,00%	2,00	1463	0,35	1,18	2,09
Chicago	United States	2,40%	1,52	2000	0,56	1,04	1,93
Helsinki	Finland	0,50%	0,00	1677	0,44	0,22	1,01
Luxembourg	Luxembourg	2,00%	1,20	2000	0,56	0,88	1,75
Seattle	United States	2,40%	1,52	2000	0,56	1,04	1,93
Brussels	Belgium	6,50%	4,80	4276	1,43	3,11	4,26
Dublin	Ireland	3,90%	2,72	5462	1,88	2,30	3,35
Stuttgart	Germany	2,50%	1,60	1400	0,33	0,97	1,85

Barcelona	Spain	9,00%	6,80	7017	2,48	4,64	5,97
Los Angeles	United States	10,50%	8,00	7726	2,75	5,37	6,79
Milan	Italy	10,10%	7,68	6604	2,32	5,00	6,37
Madrid	Spain	9,00%	6,80	5598	1,93	4,37	5,66
Baltimore	United States	2,40%	1,52	1000	0,18	0,85	1,72
Seoul	South Korea	12,00%	9,20	9106	3,27	6,24	7,76
Philadelphia	United States	2,40%	1,52	1200	0,25	0,89	1,76
Dallas	United States	2,40%	1,52	1300	0,29	0,91	1,78
Lyon	France	3,00%	2,00	1500	0,37	1,18	2,10
Edinburgh	United Kingdom	5,20%	3,76	2000	0,56	2,16	3,19
Linz	Austria	2,50%	1,60	1843	0,50	1,05	1,95
Lisbon	Portugal	4,40%	3,12	3640	1,19	2,15	3,18
Phoenix	United States	10,00%	7,60	700	0,06	3,83	5,06
Houston	United States	2,40%	1,52	900	0,14	0,83	1,70
Rome	Italy	8,70%	6,56	10317	3,74	5,15	6,54
Yokohama	Japan	8,00%	6,00	2000	0,56	3,28	4,45
Cologne	Germany	5,00%	3,60	1800	0,48	2,04	3,06
Florence	Italy	6,10%	4,48	5126	1,75	3,12	4,26
Prague	Czech Republic	8,00%	6,00	9151	3,29	4,65	5,98
Málaga	Spain	2,60%	1,68	2000	0,56	1,12	2,02
Hong Kong	Hong Kong	5,70%	4,16	26717	10,00	7,08	8,71
Birmingham	United Kingdom	5,00%	3,60	700	0,06	1,83	2,82
Liverpool	United Kingdom	5,00%	3,60	800	0,10	1,85	2,84
Atlanta	United States	2,40%	1,52	800	0,10	0,81	1,68
Miami	United States	2,40%	1,52	8337	2,98	2,25	3,29
Eindhoven	Netherlands	7,50%	5,60	800	0,10	2,85	3,96
Rotterdam	Netherlands	7,50%	5,60	1800	0,48	3,04	4,18
Manchester	United Kingdom	5,00%	3,60	1500	0,37	1,98	2,99
Marseille	France	3,00%	2,00	1000	0,18	1,09	1,99
Nice	France	3,00%	2,00	2583	0,78	1,39	2,33
Osaka	Japan	8,00%	6,00	8999	3,23	4,62	5,94
Valencia	Spain	2,60%	1,68	1500	0,37	1,02	1,92
Antwerp	Belgium	5,40%	3,92	922	0,15	2,03	3,05
Warsaw	Poland	1,60%	0,88	2827	0,88	0,88	1,75
Dubai	United Arab Emirates	3,00%	2,00	16328	6,03	4,02	5,27
Taipei	Taiwan	2,30%	1,44	9982	3,61	2,52	3,60
Tallinn	Estonia	5,00%	3,60	1677	0,44	2,02	3,03
Abu Dhabi	United Arab Emirates	2,00%	1,20	2565	0,78	0,99	1,88
Budapest	Hungary	6,00%	4,40	4025	1,33	2,87	3,98
Ljubljana	Slovenia	2,50%	1,60	1200	0,25	0,93	1,81
Vilnius	Lithuania	2,50%	1,60	1200	0,25	0,93	1,81
Bilbao	Spain	2,60%	1,68	1000	0,18	0,93	1,81
Bratislava	Slovakia	2,50%	1,60	1300	0,29	0,95	1,83
Gothenburg	Sweden	3,00%	2,00	800	0,10	1,05	1,95
Riga	Latvia	2,50%	1,60	1200	0,25	0,93	1,81

Buenos Aires	Argentina	9,30%	7,04	2767	0,85	3,95	5,19
Kuala Lumpur	Malaysia	3,00%	2,00	14072	5,17	3,59	4,79
Montevideo	Uruguay	3,00%	2,00	800	0,10	1,05	1,95
Santiago	Chile	4,00%	2,80	1384	0,32	1,56	2,52
Athens	Greece	9,00%	6,80	6301	2,20	4,50	5,82
Shanghai	China	1,30%	0,64	7746	2,75	1,70	2,67
Zagreb	Croatia	2,50%	1,60	1677	0,44	1,02	1,91
Porto	Portugal	3,00%	2,00	2492	0,75	1,37	2,31
Panama City	Panama	1,00%	0,40	900	0,14	0,27	1,07
Wroclaw	Poland	1,40%	0,72	2910	0,91	0,81	1,68
Medellín	Colombia	3,00%	2,00	1384	0,32	1,16	2,07
Sofia	Bulgaria	5,00%	3,60	1488	0,36	1,98	2,99
Beijing	China	1,30%	0,64	4070	1,35	0,99	1,88
Tel Aviv	Israel	3,00%	2,00	2978	0,93	1,47	2,41
Mexico City	Mexico	3,00%	2,00	2000	0,56	1,28	2,20
Bucharest	Romania	2,00%	1,20	1400	0,33	0,77	1,63
Córdoba	Argentina	1,80%	1,04	536	0,00	0,52	1,35
Bangkok	Thailand	2,00%	1,20	25848	9,67	5,43	6,86
Brasilia	Brazil	2,00%	1,20	1554	0,39	0,79	1,66
Jerusalem	Israel	9,00%	6,80	4468	1,50	4,15	5,42
Monterrey	Mexico	2,00%	1,20	1500	0,37	0,78	1,65
Guangzhou	China	1,30%	0,64	9006	3,24	1,94	2,94
Sao Paulo	Brazil	2,50%	1,60	1943	0,54	1,07	1,97
Cape Town	South Africa	2,00%	1,20	1800	0,48	0,84	1,71
Asuncion	Paraguay	1,00%	0,40	600	0,02	0,21	1,01
Rio de Janeiro	Brazil	3,00%	2,00	2331	0,69	1,34	2,27
Istanbul	Turkey	1,60%	0,88	14716	5,42	3,15	4,30
Lima	Peru	2,00%	1,20	2764	0,85	1,03	1,92
Doha	Qatar	3,00%	2,00	3500	1,13	1,57	2,52
Bogota	Colombia	3,00%	2,00	1384	0,32	1,16	2,07
Durban	South Africa	3,60%	2,48	1600	0,41	1,44	2,39
Guadalajara	Mexico	1,00%	0,40	700	0,06	0,23	1,03
Johannesburg	South Africa	4,50%	3,20	4211	1,40	2,30	3,35
Tunis	Tunisia	0,70%	0,16	1700	0,44	0,30	1,11
Quito	Ecuador	1,00%	0,40	800	0,10	0,25	1,05
Shenzhen	China	2,40%	1,52	12324	4,50	3,01	4,14
Kuwait City	Kuwait	1,00%	0,40	1500	0,37	0,38	1,20
Moscow	Russia	2,00%	1,20	5969	2,08	1,64	2,60
Belgrade	Serbia	2,00%	1,20	1200	0,25	0,73	1,58
Chengdu	China	1,30%	0,64	2000	0,56	0,60	1,44
St Petersburg	Russia	3,00%	2,00	4457	1,50	1,75	2,73
Manila	Philippines	2,00%	1,20	1800	0,48	0,84	1,71
Kiev	Ukraine	1,00%	0,40	700	0,06	0,23	1,03
Casablanca	Morocco	0,70%	0,16	1200	0,25	0,21	1,00
Ho Chi Minh City	Vietnam	2,00%	1,20	8208	2,93	2,07	3,08
Jakarta	Indonesia	2,00%	1,20	4703	1,59	1,40	2,33

Chongqing	China	1,30%	0,64	2000	0,56	0,60	1,44
Riyadh	Saudi Arabia	2,00%	1,20	5452	1,88	1,54	2,49
Ankara	Turkey	0,70%	0,16	1800	0,48	0,32	1,13
Hanoi	Vietnam	2,00%	1,20	5132	1,76	1,48	2,43
Mumbai	India	2,00%	1,20	12442	4,55	2,87	3,99
Shenyang	China	1,30%	0,64	2000	0,56	0,60	1,44
Bangalore	India	2,00%	1,20	2676	0,82	1,01	1,90
New Delhi	India	2,00%	1,20	15197	5,60	3,40	4,58
La Paz	Bolivia	2,00%	1,20	777	0,09	0,65	1,49
Cairo	Egypt	3,00%	2,00	6808	2,40	2,20	3,23

XXXV.- City Profitability. Services. Urban Mobility.

City	Country	SMART PARKING 2019	SMART PARKING NOR	CAR SHARING SERVICES 2019	CAR SHARING SERVICES NOR	INRIX CONGESTION LOST HOURS 2019	INRIX NOR	MOBILITY CiMI 2019	MOBILITY CiMI 2019 NOR	MOBILITY Index	MOBILITY Index NOR
Zurich	Switzerland	738	7,09	758	7,31	50	7,66	55	6,88	7,26	8,09
Vienna	Austria	513	4,59	849	8,32	41	8,15	7	9,65	8,41	9,24
Berlin	Germany	991	9,90	962	9,58	66	6,79	6	9,71	8,55	9,38
Amsterdam	Netherlands	991	9,90	887	8,74	28	8,86	11	9,42	9,18	10,00
Munich	Germany	513	4,59	932	9,24	87	5,65	8	9,60	7,48	8,31
Geneva	Switzerland	644	6,04	508	4,53	51	7,61	32	8,21	7,38	8,22
Vancouver	Canada	513	4,59	1000	10,00	87	5,65	71	5,95	6,10	6,94
Dusseldorf	Germany	644	6,04	773	7,48	50	7,66	26	8,55	7,84	8,67
Sydney	Australia	720	6,89	781	7,57	119	3,91	109	3,76	4,51	5,36
Toronto	Canada	513	4,59	924	9,16	135	3,04	58	6,71	5,27	6,12
Melbourne	Australia	738	7,09	660	6,22	65	6,85	111	3,64	5,53	6,37
Bern	Switzerland	810	7,89	500	4,44	36	8,42	31	8,27	7,91	8,74
San Francisco	United States	963	9,59	902	8,91	97	5,11	100	4,28	5,60	6,45
Copenhagen	Denmark	925	9,17	735	7,06	68	6,68	25	8,61	7,74	8,57
Boston	United States	925	9,17	841	8,23	149	2,28	131	2,49	3,65	4,50
Paris	France	822	8,02	992	9,91	165	1,41	4	9,83	6,29	7,13
Ottawa	Canada	513	4,59	524	4,71	87	5,65	79	5,49	5,39	6,23
London	United Kingdom	925	9,17	970	9,67	149	2,28	3	9,88	6,75	7,59
Frankfurt	Germany	738	7,09	660	6,22	36	8,42	18	9,02	8,31	9,14
Stockholm	Sweden	822	8,02	788	7,64	47	7,83	21	8,84	8,23	9,06
New York City	United States	963	9,59	750	7,22	140	2,77	5	9,77	6,70	7,53
Auckland	New Zealand	650	6,11	418	3,53	50	7,66	106	3,93	5,60	6,44
Singapore	Singapore	644	6,04	690	6,56	40	8,21	67	6,18	7,02	7,85
Adelaide	Australia	513	4,59	327	2,52	33	8,59	35	8,03	7,36	8,19
Canberra	Australia	300	2,22	330	2,56	30	8,75	35	8,03	7,19	8,03
Hamburg	Germany	991	9,90	871	8,57	48	7,77	14	9,25	8,65	9,48
Montreal	Canada	644	6,04	955	9,50	117	4,02	84	5,20	5,24	6,09
Washington, D.C.	United States	963	9,59	856	8,40	124	3,64	92	4,74	5,15	6,00
Tokyo	Japan	822	8,02	879	8,66	70	6,58	29	8,38	7,65	8,48
Basel	Switzerland	810	7,89	500	4,44	27	8,91	19	8,96	8,38	9,21
Oslo	Norway	513	4,59	713	6,81	35	8,48	20	8,90	8,09	8,92
Wellington	New Zealand	275	1,94	320	2,44	40	8,21	70	6,01	6,13	6,97
Chicago	United States	925	9,17	501	4,46	145	2,50	38	7,86	5,51	6,35

Helsinki	Finland	644	6,04	554	5,04	36	8,42	47	7,34	7,41	8,25
Luxembourg	Luxembourg	420	3,56	516	4,62	45	7,93	47	7,34	6,93	7,76
Seattle	United States	925	9,17	870	8,56	74	6,36	149	1,45	4,89	5,74
Brussels	Belgium	738	7,09	705	6,72	140	2,77	24	8,67	5,96	6,80
Dublin	Ireland	810	7,89	670	6,33	154	2,01	69	6,07	4,65	5,50
Stuttgart	Germany	470	4,11	826	8,07	42	8,10	30	8,32	7,79	8,62
Barcelona	Spain	1000	10,00	697	6,63	78	6,14	12	9,36	7,87	8,70
Los Angeles	United States	925	9,17	743	7,14	103	4,78	134	2,31	4,47	5,32
Milan	Italy	644	6,04	811	7,90	98	5,05	23	8,73	6,91	7,74
Madrid	Spain	822	8,02	818	7,98	71	6,52	9	9,54	8,02	8,85
Baltimore	United States	925	9,17	750	7,22	84	5,82	115	3,41	5,33	6,17
Seoul	South Korea	513	4,59	977	9,74	90	5,49	17	9,08	7,26	8,09
Philadelphia	United States	925	9,17	569	5,21	142	2,66	110	3,70	3,98	4,83
Dallas	United States	880	8,67	730	7,00	63	6,96	120	3,12	5,60	6,44
Lyon	France	822	8,02	652	6,13	105	4,67	51	7,11	6,13	6,97
Edinburgh	United Kingdom	925	9,17	640	6,00	98	5,05	39	7,80	6,66	7,50
Linz	Austria	400	3,33	800	7,78	24	9,08	35	8,03	7,96	8,78
Lisbon	Portugal	738	7,09	561	5,12	136	2,99	76	5,66	4,68	5,53
Phoenix	United States	925	9,17	730	7,00	35	8,48	66	6,24	7,51	8,34
Houston	United States	880	8,67	730	7,00	81	5,98	129	2,60	5,00	5,84
Rome	Italy	822	8,02	834	8,16	166	1,36	62	6,47	4,75	5,60
Yokohama	Japan	970	9,67	860	8,44	70	6,58	30	8,32	7,77	8,60
Cologne	Germany	925	9,17	864	8,49	41	8,15	27	8,50	8,43	9,25
Florence	Italy	513	4,59	645	6,06	73	6,41	54	6,94	6,40	7,24
Prague	Czech Republic	650	6,11	682	6,47	64	6,90	57	6,76	6,72	7,56
Málaga	Spain	800	7,78	620	5,78	25	9,02	34	8,09	8,20	9,03
Hong Kong	Hong Kong	644	6,04	150	0,56	70	6,58	40	7,75	6,39	7,23
Birmingham	United Kingdom	925	9,17	637	5,97	80	6,03	75	5,72	6,22	7,05
Liverpool	United Kingdom	360	2,89	640	6,00	52	7,55	101	4,22	5,60	6,44
Atlanta	United States	880	8,67	730	7,00	82	5,92	130	2,54	4,95	5,80
Miami	United States	880	8,67	730	7,00	81	5,98	94	4,62	5,81	6,65
Eindhoven	Netherlands	800	7,78	710	6,78	52	7,55	48	7,28	7,39	8,22
Rotterdam	Netherlands	800	7,78	710	6,78	57	7,28	16	9,13	8,02	8,85
Manchester	United Kingdom	360	2,89	640	6,00	92	5,38	52	7,05	5,86	6,70
Marseille	France	822	8,02	471	4,12	81	5,98	68	6,13	6,06	6,90

Nice	France	644	6,04	357	2,86	70	6,58	105	3,99	5,12	5,96
Osaka	Japan	970	9,67	894	8,82	80	6,03	60	6,59	6,90	7,73
Valencia	Spain	800	7,78	620	5,78	30	8,75	31	8,27	8,16	8,99
Antwerp	Belgium	710	6,78	860	8,44	63	6,96	32	8,21	7,59	8,42
Warsaw	Poland	510	4,56	140	0,44	90	5,49	45	7,46	5,68	6,52
Dubai	United Arab Emirates	738	7,09	576	5,29	26	8,97	117	3,29	6,14	6,98
Taipei	Taiwan	513	4,59	161	0,68	90	5,49	10	9,48	6,51	7,35
Tallinn	Estonia	320	2,44	387	3,19	90	5,49	90	4,86	4,70	5,55
Abu Dhabi	United Arab Emirates	644	6,04	493	4,37	7	10,00	97	4,45	6,82	7,66
Budapest	Hungary	770	7,44	728	6,98	92	5,38	61	6,53	6,21	7,05
Ljubljana	Slovenia	513	4,59	486	4,29	90	5,49	72	5,90	5,44	6,28
Vilnius	Lithuania	400	3,33	530	4,78	77	6,20	78	5,55	5,51	6,35
Bilbao	Spain	800	7,78	620	5,78	25	9,02	63	6,42	7,53	8,36
Bratislava	Slovakia	513	4,59	304	2,27	97	5,11	85	5,14	4,79	5,63
Gothenburg	Sweden	690	6,56	620	5,78	23	9,13	33	8,15	8,15	8,97
Riga	Latvia	460	4,00	312	2,36	71	6,52	73	5,84	5,58	6,42
Buenos Aires	Argentina	130	0,33	120	0,22	144	2,55	133	2,37	2,03	2,89
Kuala Lumpur	Malaysia	380	3,11	455	3,94	80	6,03	59	6,65	5,78	6,62
Montevideo	Uruguay	100	0,00	120	0,22	125	3,59	118	3,24	2,75	3,61
Santiago	Chile	170	0,78	390	3,22	69	6,63	56	6,82	5,78	6,62
Athens	Greece	190	1,00	480	4,22	90	5,49	80	5,43	4,89	5,74
Shanghai	China	450	3,89	985	9,83	150	2,23	1	10,00	6,26	7,10
Zagreb	Croatia	320	2,44	360	2,89	90	5,49	98	4,39	4,49	5,33
Porto	Portugal	500	4,44	600	5,56	66	6,79	103	4,10	5,36	6,20
Panama City	Panama	200	1,11	200	1,11	135	3,04	125	2,83	2,57	3,43
Wroclaw	Poland	400	3,33	140	0,44	95	5,22	49	7,23	5,35	6,20
Medellín	Colombia	240	1,56	130	0,33	69	6,63	107	3,87	4,39	5,24
Sofia	Bulgaria	370	3,00	160	0,67	77	6,20	82	5,32	4,97	5,82
Beijing	China	822	8,02	939	9,32	150	2,23	2	9,94	6,60	7,44
Tel Aviv	Israel	513	4,59	675	6,39	140	2,77	126	2,77	3,32	4,17
Mexico City	Mexico	480	4,22	190	1,00	158	1,79	116	3,35	2,58	3,44
Bucharest	Romania	530	4,78	140	0,44	110	4,40	127	2,72	3,37	4,22
Córdoba	Argentina	100	0,00	120	0,22	50	7,66	146	1,62	3,73	4,59
Bangkok	Thailand	250	1,67	170	0,78	150	2,23	140	1,97	1,92	2,78
Brasilia	Brazil	340	2,67	440	3,78	90	5,49	88	4,97	4,83	5,67
Jerusalem	Israel	450	3,89	650	6,11	150	2,23	139	2,02	2,70	3,56
Monterrey	Mexico	390	3,22	180	0,89	56	7,34	60	6,59	5,98	6,82
Guangzhou	China	250	1,67	650	6,11	90	5,49	13	9,31	6,70	7,53
Sao Paulo	Brazil	340	2,67	440	3,78	152	2,12	168	0,35	1,63	2,49
Cape Town	South Africa	110	0,11	410	3,44	124	3,64	161	0,75	2,11	2,97
Asuncion	Paraguay	100	0,00	100	0,00	150	2,23	137	2,14	1,75	2,61
Rio de Janeiro	Brazil	160	0,67	450	3,89	190	0,05	154	1,16	0,94	1,81
Istanbul	Turkey	250	1,67	170	0,78	153	2,07	112	3,58	2,50	3,36
Lima	Peru	100	0,00	200	1,11	165	1,41	152	1,27	1,18	2,05

Doha	Qatar	440	3,78	210	1,22	90	5,49	128	2,66	3,76	4,61
Bogota	Colombia	200	1,11	130	0,33	191	0,00	148	1,50	0,75	1,61
Durban	South Africa	100	0,00	410	3,44	24	9,08	130	2,54	4,99	5,84
Guadalajara	Mexico	200	1,11	120	0,22	85	5,76	80	5,43	4,61	5,46
Johannesburg	South Africa	100	0,00	410	3,44	74	6,36	155	1,10	3,33	4,18
Tunis	Tunisia	100	0,00	100	0,00	160	1,68	145	1,68	1,34	2,21
Quito	Ecuador	100	0,00	100	0,00	144	2,55	143	1,79	1,74	2,60
Shenzhen	China	250	1,67	650	6,11	90	5,49	15	9,19	6,65	7,49
Kuwait City	Kuwait	440	3,78	210	1,22	21	9,24	123	2,95	5,37	6,22
Moscow	Russia	570	5,22	947	9,41	128	3,42	65	6,30	5,35	6,20
Belgrade	Serbia	320	2,44	360	2,89	90	5,49	121	3,06	3,95	4,80
Chengdu	China	250	1,67	650	6,11	90	5,49	15	9,19	6,65	7,49
St Petersburg	Russia	513	4,59	629	5,88	151	2,17	135	2,25	2,82	3,67
Manila	Philippines	100	0,00	200	1,11	187	0,22	170	0,23	0,29	1,16
Kiev	Ukraine	460	4,00	490	4,33	115	4,13	108	3,82	4,01	4,86
Casablanca	Morocco	100	0,00	100	0,00	170	1,14	160	0,81	0,78	1,65
Ho Chi Minh City	Vietnam	100	0,00	120	0,22	90	5,49	83	5,26	4,32	5,17
Jakarta	Indonesia	100	0,00	100	0,00	185	0,33	174	0,00	0,13	1,00
Chongqing	China	250	1,67	650	6,11	90	5,49	15	9,19	6,65	7,49
Riyadh	Saudi Arabia	130	0,33	110	0,11	14	9,62	136	2,20	4,77	5,62
Ankara	Turkey	250	1,67	170	0,78	53	7,50	86	5,09	5,28	6,12
Hanoi	Vietnam	100	0,00	120	0,22	90	5,49	84	5,20	4,30	5,15
Mumbai	India	120	0,22	930	9,22	180	0,60	164	0,58	1,41	2,28
Shenyang	China	250	1,67	650	6,11	90	5,49	15	9,19	6,65	7,49
Bangalore	India	100	0,00	930	9,22	180	0,60	166	0,46	1,35	2,21
New Delhi	India	150	0,56	940	9,33	130	3,32	114	3,47	3,70	4,55
La Paz	Bolivia	100	0,00	100	0,00	144	2,55	156	1,04	1,44	2,30
Cairo	Egypt	100	0,00	100	0,00	180	0,60	167	0,40	0,40	1,27

XXXVI.- City Profitability. Services. Urban Planning.

City	Country	CIMI URBAN PLANNING 2019	URBAN INDEX NOR
Zurich	Switzerland	68	6,39
Vienna	Austria	45	7,63
Berlin	Germany	40	7,9
Amsterdam	Netherlands	11	9,46
Munich	Germany	58	6,93
Geneva	Switzerland	139	2,56
Vancouver	Canada	3	9,89
Dusseldorf	Germany	126	3,26
Sydney	Australia	23	8,81
Toronto	Canada	1	10
Melbourne	Australia	15	9,25
Bern	Switzerland	104	4,45
San Francisco	United States	13	9,35
Copenhagen	Denmark	75	6,01
Boston	United States	21	8,92
Paris	France	50	7,36
Ottawa	Canada	6	9,73
London	United Kingdom	9	9,57
Frankfurt	Germany	25	8,71
Stockholm	Sweden	48	7,47
New York City	United States	2	9,95
Auckland	New Zealand	53	7,2
Singapore	Singapore	31	8,38
Adelaide	Australia	20	8,98
Canberra	Australia	20	8,98
Hamburg	Germany	55	7,09
Montreal	Canada	7	9,68
Washington, D.C.	United States	10	9,51
Tokyo	Japan	24	8,76
Basel	Switzerland	136	2,72
Oslo	Norway	54	7,14
Wellington	New Zealand	41	7,84
Chicago	United States	5	9,78
Helsinki	Finland	64	6,6
Luxembourg	Luxembourg	50	7,36
Seattle	United States	78	5,85
Brussels	Belgium	49	7,41
Dublin	Ireland	92	5,1
Stuttgart	Germany	96	4,88

Barcelona	Spain	29	8,49
Los Angeles	United States	14	9,3
Milan	Italy	56	7,04
Madrid	Spain	33	8,28
Baltimore	United States	47	7,52
Seoul	South Korea	27	8,6
Philadelphia	United States	43	7,74
Dallas	United States	71	6,23
Lyon	France	72	6,17
Edinburgh	United Kingdom	109	4,18
Linz	Austria	143	2,35
Lisbon	Portugal	76	5,96
Phoenix	United States	59	6,87
Houston	United States	17	9,14
Rome	Italy	141	2,46
Yokohama	Japan	25	8,71
Cologne	Germany	130	3,05
Florence	Italy	147	2,13
Prague	Czech Republic	81	5,69
Málaga	Spain	107	4,29
Hong Kong	Hong Kong	8	9,62
Birmingham	United Kingdom	70	6,28
Liverpool	United Kingdom	103	4,5
Atlanta	United States	60	6,82
Miami	United States	36	8,11
Eindhoven	Netherlands	69	6,34
Rotterdam	Netherlands	16	9,19
Manchester	United Kingdom	101	4,61
Marseille	France	77	5,9
Nice	France	116	3,8
Osaka	Japan	91	5,15
Valencia	Spain	51	7,31
Antwerp	Belgium	42	7,79
Warsaw	Poland	20	8,98
Dubai	United Arab Emirates	90	5,2
Taipei	Taiwan	12	9,41
Tallinn	Estonia	62	6,71
Abu Dhabi	United Arab Emirates	118	3,69
Budapest	Hungary	83	5,58
Ljubljana	Slovenia	93	5,04
Vilnius	Lithuania	57	6,98
Bilbao	Spain	89	5,26
Bratislava	Slovakia	67	6,44
Gothenburg	Sweden	82	5,63
Riga	Latvia	26	8,65

Buenos Aires	Argentina	19	9,03
Kuala Lumpur	Malaysia	94	4,99
Montevideo	Uruguay	84	5,53
Santiago	Chile	28	8,54
Athens	Greece	133	2,89
Shanghai	China	37	8,06
Zagreb	Croatia	86	5,42
Porto	Portugal	138	2,62
Panama City	Panama	99	4,72
Wroclaw	Poland	46	7,57
Medellín	Colombia	87	5,37
Sofia	Bulgaria	149	2,02
Beijing	China	63	6,66
Tel Aviv	Israel	34	8,22
Mexico City	Mexico	35	8,17
Bucharest	Romania	88	5,31
Córdoba	Argentina	123	3,43
Bangkok	Thailand	30	8,44
Brasilia	Brazil	106	4,34
Jerusalem	Israel	148	2,08
Monterrey	Mexico	34	8,22
Guangzhou	China	105	4,4
Sao Paulo	Brazil	39	7,95
Cape Town	South Africa	145	2,24
Asuncion	Paraguay	159	1,49
Rio de Janeiro	Brazil	38	8,01
Istanbul	Turkey	66	6,5
Lima	Peru	142	2,4
Doha	Qatar	129	3,1
Bogota	Colombia	112	4,02
Durban	South Africa	144	2,29
Guadalajara	Mexico	54	7,14
Johannesburg	South Africa	150	1,97
Tunis	Tunisia	158	1,54
Quito	Ecuador	122	3,48
Shenzhen	China	100	4,66
Kuwait City	Kuwait	161	1,38
Moscow	Russia	22	8,87
Belgrade	Serbia	121	3,53
Chengdu	China	105	4,4
St Petersburg	Russia	52	7,25
Manila	Philippines	160	1,43
Kiev	Ukraine	4	9,84
Casablanca	Morocco	154	1,75
Ho Chi Minh City	Vietnam	114	3,91
Jakarta	Indonesia	151	1,92

Chongqing	China	105	4,4
Riyadh	Saudi Arabia	165	1,16
Ankara	Turkey	95	4,93
Hanoi	Vietnam	137	2,67
Mumbai	India	157	1,59
Shenyang	China	105	4,4
Bangalore	India	156	1,65
New Delhi	India	168	1
La Paz	Bolivia	144	2,29
Cairo	Egypt	125	3,32

XXXVII.- City Profitability. Services. Safety.

City	Country	CIMI SAFETY 2019	CIMI SAFETY NOR	GCTCI PERSONAL SAFETY	GCTCI PERSONAL SAFETY NOR	SAFETY INDEX	SAFETY INDEX NOR
Zurich	Switzerland	84,5	8,27	94,9	9,57	17,84	8,97
Vienna	Austria	85,0	8,39	97,5	9,83	18,22	9,15
Berlin	Germany	84,0	8,16	92,9	9,36	17,52	8,81
Amsterdam	Netherlands	88,0	9,08	88,9	8,96	18,04	9,06
Munich	Germany	86,0	8,62	94,9	9,57	18,19	9,14
Geneva	Switzerland	84,0	8,16	94,9	9,57	17,73	8,91
Vancouver	Canada	87,8	9,03	90,4	9,11	18,14	9,11
Dusseldorf	Germany	85,0	8,39	97,1	9,79	18,18	9,13
Sydney	Australia	87,9	9,06	94,4	9,52	18,58	9,33
Toronto	Canada	87,8	9,03	92,9	9,36	18,39	9,24
Melbourne	Australia	87,3	8,92	94,4	9,52	18,44	9,26
Bern	Switzerland	84,0	8,16	94,9	9,57	17,73	8,91
San Francisco	United States	85,9	8,59	73,7	7,43	16,02	8,06
Copenhagen	Denmark	87,4	8,94	96	9,68	18,62	9,35
Boston	United States	82,0	7,7	59,1	5,96	13,66	6,9
Paris	France	82,4	7,79	90,4	9,11	16,9	8,5
Ottawa	Canada	87,8	9,03	92,9	9,36	18,39	9,24
London	United Kingdom	85,7	8,55	93,9	9,47	18,02	9,05
Frankfurt	Germany	85,4	8,48	95,7	9,65	18,13	9,11
Stockholm	Sweden	86,5	8,73	96,5	9,73	18,46	9,27
New York City	United States	85,5	8,5	79,3	7,99	16,49	8,3
Auckland	New Zealand	84,5	8,27	96,5	9,73	18	9,04
Singapore	Singapore	91,5	9,88	99	9,98	19,86	9,97
Adelaide	Australia	87,3	8,92	94,4	9,52	18,44	9,26
Canberra	Australia	87,3	8,92	94,4	9,52	18,44	9,26
Hamburg	Germany	85,0	8,39	96,5	9,73	18,12	9,1
Montreal	Canada	87,8	9,03	93,9	9,47	18,5	9,29
Washington, D.C.	United States	87,6	8,99	0	0	8,99	4,58
Tokyo	Japan	92,0	10	98,5	9,93	19,93	10
Basel	Switzerland	84,0	8,16	94,9	9,57	17,73	8,91
Oslo	Norway	88,0	9,08	97	9,78	18,86	9,47
Wellington	New Zealand	84,5	8,27	96,5	9,73	18	9,04
Chicago	United States	86,7	8,78	11,6	1,17	9,95	5,06
Helsinki	Finland	88,0	9,08	92,9	9,36	18,44	9,26
Luxembourg	Luxembourg	83,0	7,93	95,5	9,63	17,56	8,83
Seattle	United States	82,0	7,7	78,3	7,89	15,59	7,85
Brussels	Belgium	82,1	7,72	83,8	8,45	16,17	8,14
Dublin	Ireland	84,0	8,16	89,9	9,06	17,22	8,66
Stuttgart	Germany	85,0	8,39	95,7	9,65	18,04	9,06

Barcelona	Spain	81,2	7,51	96,5	9,73	17,24	8,67
Los Angeles	United States	85,2	8,43	64,1	6,46	14,89	7,5
Milan	Italy	78,1	6,8	95,5	9,63	16,43	8,27
Madrid	Spain	81,4	7,56	97	9,78	17,34	8,72
Baltimore	United States	82,0	7,7	0	0	7,7	3,95
Seoul	South Korea	87,4	8,94	96,5	9,73	18,67	9,38
Philadelphia	United States	82,0	7,7	0	0	7,7	3,95
Dallas	United States	83,1	7,95	42,4	4,27	12,22	6,18
Lyon	France	83,0	7,93	94,9	9,57	17,5	8,8
Edinburgh	United Kingdom	86,0	8,62	96	9,68	18,3	9,19
Linz	Austria	86,0	8,62	97,5	9,83	18,45	9,27
Lisbon	Portugal	79,0	7	97,5	9,83	16,83	8,47
Phoenix	United States	82,0	7,7	42,4	4,27	11,97	6,06
Houston	United States	82,0	7,7	40,4	4,07	11,77	5,96
Rome	Italy	76,4	6,41	96,5	9,73	16,14	8,12
Yokohama	Japan	91,5	9,88	98,5	9,93	19,81	9,94
Cologne	Germany	85,0	8,39	95,7	9,65	18,04	9,06
Florence	Italy	78,0	6,77	96,5	9,73	16,5	8,3
Prague	Czech Republic	80,0	7,24	96,5	9,73	16,97	8,53
Málaga	Spain	82,0	7,7	98	9,88	17,58	8,84
Hong Kong	Hong Kong	83,7	8,09	98	9,88	17,97	9,03
Birmingham	United Kingdom	84,0	8,16	93,9	9,47	17,63	8,86
Liverpool	United Kingdom	83,0	7,93	93,9	9,47	17,4	8,75
Atlanta	United States	82,0	7,7	10,6	1,07	8,77	4,48
Miami	United States	82,0	7,7	51	5,14	12,84	6,49
Eindhoven	Netherlands	88,5	9,19	93,9	9,47	18,66	9,37
Rotterdam	Netherlands	88,0	9,08	93,4	9,42	18,5	9,29
Manchester	United Kingdom	86,0	8,62	93,9	9,47	18,09	9,09
Marseille	France	80,0	7,24	82,3	8,3	15,54	7,83
Nice	France	81,0	7,47	90,4	9,11	16,58	8,34
Osaka	Japan	90,9	9,75	98,5	9,93	19,68	9,88
Valencia	Spain	82,0	7,7	98	9,88	17,58	8,84
Antwerp	Belgium	83,0	7,93	89,4	9,01	16,94	8,52
Warsaw	Poland	75,0	6,08	97,5	9,83	15,91	8,01
Dubai	United Arab Emirates	79,1	7,03	96,5	9,73	16,76	8,43
Taipei	Taiwan	82,5	7,81	94,9	9,57	17,38	8,74
Tallinn	Estonia	80,0	7,24	86,9	8,76	16	8,05
Abu Dhabi	United Arab Emirates	79,5	7,12	96,5	9,73	16,85	8,48
Budapest	Hungary	75,0	6,08	88,9	8,96	15,04	7,58
Ljubljana	Slovenia	73,0	5,62	98	9,88	15,5	7,81
Vilnius	Lithuania	72,0	5,39	80,3	8,09	13,48	6,81
Bilbao	Spain	83,0	7,93	97,8	9,86	17,79	8,94
Bratislava	Slovakia	72,0	5,39	82,3	8,3	13,69	6,91
Gothenburg	Sweden	86,0	8,62	93,7	9,45	18,07	9,08
Riga	Latvia	72,0	5,39	75,8	7,64	13,03	6,58

Buenos Aires	Argentina	69,7	4,86	76,3	7,69	12,55	6,35
Kuala Lumpur	Malaysia	66,3	4,08	77,8	7,84	11,92	6,03
Montevideo	Uruguay	62,0	3,09	46,5	4,69	7,78	3,99
Santiago	Chile	69,8	4,88	80,3	8,09	12,97	6,55
Athens	Greece	72,0	5,39	96,5	9,73	15,12	7,62
Shanghai	China	70,2	4,98	99,2	10	14,98	7,55
Zagreb	Croatia	70,0	4,93	93,4	9,42	14,35	7,24
Porto	Portugal	79,0	7	97,5	9,83	16,83	8,47
Panama City	Panama	59,0	2,4	65,7	6,62	9,02	4,6
Wroclaw	Poland	72,0	5,39	98,5	9,93	15,32	7,72
Medellín	Colombia	55,1	1,5	2,5	0,25	1,75	1
Sofia	Bulgaria	75,0	6,08	91	9,17	15,25	7,68
Beijing	China	70,5	5,05	99,2	10	15,05	7,58
Tel Aviv	Israel	69,0	4,7	76,8	7,74	12,44	6,29
Mexico City	Mexico	61,6	3	38,4	3,87	6,87	3,53
Bucharest	Romania	72,0	5,39	96	9,68	15,07	7,59
Córdoba	Argentina	70,0	4,93	77	7,76	12,69	6,42
Bangkok	Thailand	57,6	2,07	86,4	8,71	10,78	5,47
Brasilia	Brazil	61,0	2,86	62,6	6,31	9,17	4,67
Jerusalem	Israel	69,0	4,7	76,8	7,74	12,44	6,29
Monterrey	Mexico	60,0	2,63	0	0	2,63	1,44
Guangzhou	China	70,2	4,98	94,9	9,57	14,55	7,34
Sao Paulo	Brazil	59,7	2,56	62,6	6,31	8,87	4,52
Cape Town	South Africa	58,0	2,17	0	0	2,17	1,21
Asuncion	Paraguay	57,0	1,94	46,5	4,69	6,63	3,42
Rio de Janeiro	Brazil	60,9	2,83	20,2	2,04	4,87	2,54
Istanbul	Turkey	66,1	4,03	85,9	8,66	12,69	6,42
Lima	Peru	58,2	2,21	61,1	6,16	8,37	4,28
Doha	Qatar	79,0	7	97,5	9,83	16,83	8,47
Bogota	Colombia	55,1	1,5	13,1	1,32	2,82	1,53
Durban	South Africa	59,0	2,4	38	3,83	6,23	3,22
Guadalajara	Mexico	59,0	2,4	0	0	2,4	1,32
Johannesburg	South Africa	58,6	2,3	0	0	2,3	1,27
Tunis	Tunisia	58,0	2,17	84,8	8,55	10,72	5,44
Quito	Ecuador	55,3	1,54	65,7	6,62	8,16	4,17
Shenzhen	China	70,2	4,98	94,9	9,57	14,55	7,34
Kuwait City	Kuwait	64,5	3,66	93,9	9,47	13,13	6,63
Moscow	Russia	65,8	3,96	73,7	7,43	11,39	5,77
Belgrade	Serbia	70,0	4,93	94,9	9,57	14,5	7,31
Chengdu	China	70,2	4,98	94,9	9,57	14,55	7,34
St Petersburg	Russia	65,0	3,78	75,3	7,59	11,37	5,76
Manila	Philippines	59,1	2,42	71,2	7,18	9,6	4,89
Kiev	Ukraine	65,0	3,78	83,8	8,45	12,23	6,19
Casablanca	Morocco	53,5	1,13	89,9	9,06	10,19	5,18
Ho Chi Minh City	Vietnam	57,6	2,07	93,4	9,42	11,49	5,82
Jakarta	Indonesia	54,5	1,36	98,5	9,93	11,29	5,72

Chongqing	China	70,2	4,98	94,9	9,57	14,55	7,34
Riyadh	Saudi Arabia	62,5	3,2	84,8	8,55	11,75	5,95
Ankara	Turkey	65,0	3,78	85,9	8,66	12,44	6,29
Hanoi	Vietnam	57,6	2,07	96,9	9,77	11,84	6
Mumbai	India	58,2	2,21	95,5	9,63	11,84	6
Shenyang	China	70,2	4,98	94,9	9,57	14,55	7,34
Bangalore	India	58,0	2,17	83,8	8,45	10,62	5,39
New Delhi	India	55,0	1,47	83,8	8,45	9,92	5,04
La Paz	Bolivia	58,0	2,17	65,7	6,62	8,79	4,49
Cairo	Egypt	48,6	0	87,9	8,86	8,86	4,52

XXXVIII.- City Profitability. Services. Summary.

City	Country	DIG-GOV INDEX	EDU CATION INDEX	EMPLOY ABILITY INDEX	CONN ECTED CITY INDEX	HLC - SOCS VS INDEX	ENV SUSTAIN ABILITY INDEX	CULT URE-TOU RISM INDEX	URBAN MOB ILITY Index	URBAN PLAN NING INDEX	SAFE TY INDEX
Zurich	Switzerland	7,42	10,00	8,49	6,84	6,78	9,13	4,89	8,09	6,39	8,97
Vienna	Austria	6,36	7,63	5,45	7,94	9,40	9,42	5,89	9,24	7,63	9,15
Berlin	Germany	8,10	7,98	9,04	7,12	9,05	8,00	5,79	9,38	7,90	8,81
Amsterdam	Netherlands	9,64	8,94	9,15	7,39	7,05	8,02	6,45	10,00	9,46	9,06
Munich	Germany	7,94	7,98	9,04	6,21	9,05	7,18	3,57	8,31	6,93	9,14
Geneva	Switzerland	6,95	10,00	8,49	6,26	6,78	7,23	2,99	8,22	2,56	8,91
Vancouver	Canada	8,40	8,19	5,80	6,72	7,34	6,54	3,04	6,94	9,89	9,11
Dusseldorf	Germany	7,58	7,98	8,33	6,61	9,05	8,29	2,07	8,67	3,26	9,13
Sydney	Australia	8,75	7,92	7,04	7,68	7,41	7,17	3,44	5,36	8,81	9,33
Toronto	Canada	7,68	8,19	7,22	7,33	7,34	7,32	4,54	6,12	10,00	9,24
Melbourne	Australia	8,81	7,92	7,04	6,41	7,41	5,57	3,02	6,37	9,25	9,26
Bern	Switzerland	6,64	10,00	7,78	6,53	6,78	6,22	2,99	8,74	4,45	8,91
San Francisco	United States	9,16	9,37	10,00	6,36	7,46	4,46	3,49	6,45	9,35	8,06
Copenhagen	Denmark	10,00	8,37	5,81	6,08	9,09	9,64	3,35	8,57	6,01	9,35
Boston	United States	9,05	9,37	10,00	6,58	7,46	4,96	1,93	4,50	8,92	6,90
Paris	France	9,48	7,86	7,20	7,20	10,00	6,88	8,55	7,13	7,36	8,50
Ottawa	Canada	8,07	8,19	5,80	6,82	7,34	7,17	2,62	6,23	9,73	9,24
London	United Kingdom	8,31	8,26	8,41	7,33	7,62	7,95	10,00	7,59	9,57	9,05
Frankfurt	Germany	7,70	7,98	7,62	7,15	9,05	7,80	2,81	9,14	8,71	9,11
Stockholm	Sweden	9,28	8,40	8,07	6,98	9,51	10,00	3,25	9,06	7,47	9,27
New York City	United States	9,38	9,37	10,00	6,96	7,46	6,31	5,85	7,53	9,95	8,30
Auckland	New Zealand	8,71	7,61	4,70	7,88	7,48	9,74	3,30	6,44	7,20	9,04
Singapore	Singapore	8,73	8,96	7,79	10,00	4,07	7,60	5,33	7,85	8,38	9,97
Adelaide	Australia	8,71	7,92	5,62	5,82	7,41	5,15	1,79	8,19	8,98	9,26
Canberra	Australia	8,72	7,92	8,45	5,68	7,41	5,55	1,79	8,03	8,98	9,26
Hamburg	Germany	8,00	7,98	7,62	6,14	9,05	7,93	2,61	9,48	7,09	9,10
Montreal	Canada	8,19	8,19	7,22	7,75	7,34	7,14	3,81	6,09	9,68	9,29
Washington, D.C.	United States	9,70	9,37	10,00	6,18	7,46	3,83	1,93	6,00	9,51	4,58
Tokyo	Japan	8,91	7,12	7,84	6,75	8,57	6,48	8,50	8,48	8,76	10,00
Basel	Switzerland	6,64	10,00	8,49	6,53	6,78	8,20	3,06	9,21	2,72	8,91
Oslo	Norway	9,12	7,86	7,25	7,49	9,25	9,40	1,91	8,92	7,14	9,47
Wellington	New Zealand	8,91	7,61	5,41	7,32	7,48	7,82	2,09	6,97	7,84	9,04
Chicago	United States	8,87	9,37	10,00	7,13	7,46	4,03	1,93	6,35	9,78	5,06
Helsinki	Finland	9,88	8,43	6,51	6,14	8,87	9,50	1,01	8,25	6,60	9,26
Luxembourg	Luxembourg	8,29	8,06	7,41	6,34	7,25	7,52	1,75	7,76	7,36	8,83
Seattle	United States	9,20	9,37	10,00	7,09	7,46	4,29	1,93	5,74	5,85	7,85

Brussels	Belgium	4,96	8,23	7,01	7,23	9,06	6,57	4,26	6,80	7,41	8,14
Dublin	Ireland	7,07	8,05	8,87	6,04	6,12	7,51	3,35	5,50	5,10	8,66
Stuttgart	Germany	7,60	7,98	7,62	5,69	9,05	6,57	1,85	8,62	4,88	9,06
Barcelona	Spain	8,73	6,63	5,57	5,12	8,39	7,07	5,97	8,70	8,49	8,67
Los Angeles	United States	8,81	9,37	8,59	7,33	7,46	3,21	6,79	5,32	9,30	7,50
Milan	Italy	8,03	6,13	5,05	5,79	9,19	6,03	6,37	7,74	7,04	8,27
Madrid	Spain	8,84	6,63	5,93	7,53	8,39	7,18	5,66	8,85	8,28	8,72
Baltimore	United States	8,82	9,37	10,00	7,09	7,46	3,54	1,72	6,17	7,52	3,95
Seoul	South Korea	8,98	6,32	4,76	7,77	5,37	7,29	7,76	8,09	8,60	9,38
Philadelphia	United States	9,12	9,37	8,59	6,79	7,46	3,94	1,76	4,83	7,74	3,95
Dallas	United States	8,69	9,37	10,00	7,28	7,46	3,40	1,78	6,44	6,23	6,18
Lyon	France	8,90	7,86	5,08	7,48	10,00	6,19	2,10	6,97	6,17	8,80
Edinburgh	United Kingdom	9,14	8,26	8,41	5,88	7,62	6,33	3,19	7,50	4,18	9,19
Linz	Austria	6,25	7,63	5,45	6,69	9,40	8,08	1,95	8,78	2,35	9,27
Lisbon	Portugal	7,89	6,02	5,27	4,83	8,08	7,48	3,18	5,53	5,96	8,47
Phoenix	United States	9,20	9,37	8,59	7,28	7,46	3,63	5,06	8,34	6,87	6,06
Houston	United States	8,69	9,37	8,59	7,30	7,46	3,26	1,70	5,84	9,14	5,96
Rome	Italy	7,95	6,13	4,35	5,25	9,19	4,95	6,54	5,60	2,46	8,12
Yokohama	Japan	8,91	7,12	6,42	5,76	8,57	6,55	4,45	8,60	8,71	9,94
Cologne	Germany	7,78	7,98	6,21	6,65	9,05	4,99	3,06	9,25	3,05	9,06
Florence	Italy	9,11	6,13	2,93	4,10	9,19	3,47	4,26	7,24	2,13	8,30
Prague	Czech Republic	3,01	5,49	5,51	6,12	6,75	6,33	5,98	7,56	5,69	8,53
Málaga	Spain	8,79	6,63	4,16	7,05	8,39	5,37	2,02	9,03	4,29	8,84
Hong Kong	Hong Kong	7,61	6,51	6,46	5,12	4,76	7,11	8,71	7,23	9,62	9,03
Birmingham	United Kingdom	8,39	8,26	4,87	5,76	7,62	6,27	2,82	7,05	6,28	8,86
Liverpool	United Kingdom	8,53	8,26	6,99	5,88	7,62	4,10	2,84	6,44	4,50	8,75
Atlanta	United States	8,69	9,37	10,00	7,17	7,46	2,55	1,68	5,80	6,82	4,48
Miami	United States	9,02	9,37	7,17	7,09	7,46	3,48	3,29	6,65	8,11	6,49
Eindhoven	Netherlands	8,79	8,94	9,15	7,59	7,05	4,27	3,96	8,22	6,34	9,37
Rotterdam	Netherlands	8,78	8,94	7,74	7,35	7,05	6,51	4,18	8,85	9,19	9,29
Manchester	United Kingdom	9,10	8,26	8,41	5,88	7,62	5,66	2,99	6,70	4,61	9,09
Marseille	France	8,27	7,86	5,08	6,45	10,00	4,29	1,99	6,90	5,90	7,83
Nice	France	8,75	7,86	5,79	6,15	10,00	5,55	2,33	5,96	3,80	8,34
Osaka	Japan	8,99	7,12	7,13	5,78	8,57	8,88	5,94	7,73	5,15	9,88
Valencia	Spain	8,80	6,63	4,51	7,05	8,39	8,02	1,92	8,99	7,31	8,84
Antwerp	Belgium	5,04	8,23	8,43	7,77	9,06	6,63	3,05	8,42	7,79	8,52
Warsaw	Poland	6,82	3,57	6,48	5,01	6,26	4,06	1,75	6,52	8,98	8,01
Dubai	United Arab Emirates	8,42	7,60	5,09	7,15	2,84	1,26	5,27	6,98	5,20	8,43
Taipei	Taiwan	7,10	6,51	5,04	5,40	3,35	2,89	3,60	7,35	9,41	8,74
Tallinn	Estonia	8,66	5,29	4,72	5,92	6,29	9,04	3,03	5,55	6,71	8,05
Abu Dhabi	United Arab Emirates	8,61	7,60	5,09	6,04	2,84	0,78	1,88	7,66	3,69	8,48

Budapest	Hungary	4,40	2,23	5,89	7,91	6,03	6,30	3,98	7,05	5,58	7,58
Ljubljana	Slovenia	5,81	4,77	3,16	6,21	7,17	7,64	1,81	6,28	5,04	7,81
Vilnius	Lithuania	6,83	4,58	3,25	5,37	5,68	8,91	1,81	6,35	6,98	6,81
Bilbao	Spain	8,80	6,63	4,16	7,31	8,39	5,12	1,81	8,36	5,26	8,94
Bratislava	Slovakia	5,94	3,99	3,15	5,73	6,00	8,23	1,83	5,63	6,44	6,91
Gothenburg	Sweden	9,23	8,40	7,36	6,96	9,51	9,63	1,95	8,97	5,63	9,08
Riga	Latvia	5,07	3,95	3,69	5,06	5,19	8,66	1,81	6,42	8,65	6,58
Buenos Aires	Argentina	3,64	4,18	3,50	4,28	6,59	5,62	5,19	2,89	9,03	6,35
Kuala Lumpur	Malaysia	7,08	7,85	6,24	4,38	2,47	3,17	4,79	6,62	4,99	6,03
Montevideo	Uruguay	7,26	4,45	3,68	4,28	6,66	9,93	1,95	3,61	5,53	3,99
Santiago	Chile	5,66	6,08	3,37	4,31	5,11	5,80	2,52	6,62	8,54	6,55
Athens	Greece	6,05	2,63	2,78	5,38	8,55	5,08	5,82	5,74	2,89	7,62
Shanghai	China	6,80	6,81	5,04	3,96	3,16	2,52	2,67	7,10	8,06	7,55
Zagreb	Croatia	4,52	2,85	2,93	5,87	6,14	7,62	1,91	5,33	5,42	7,24
Porto	Portugal	7,90	6,02	5,98	5,33	8,08	9,10	2,31	6,20	2,62	8,47
Panama City	Panama	3,93	1,76	1,56	3,08	4,96	7,84	1,07	3,43	4,72	4,60
Wroclaw	Poland	6,75	3,57	6,48	4,85	6,26	4,72	1,68	6,20	7,57	7,72
Medellín	Colombia	7,60	4,71	2,51	2,52	4,80	3,76	2,07	5,24	5,37	1,00
Sofia	Bulgaria	6,22	2,83	4,80	5,62	5,12	5,15	2,99	5,82	2,02	7,68
Beijing	China	6,89	6,81	4,33	4,37	3,16	1,66	1,88	7,44	6,66	7,58
Tel Aviv	Israel	7,15	5,26	7,44	4,64	6,69	7,86	2,41	4,17	8,22	6,29
Mexico City	Mexico	8,44	4,35	3,63	2,54	4,03	2,35	2,20	3,44	8,17	3,53
Bucharest	Romania	4,18	2,57	3,59	5,73	4,71	4,35	1,63	4,22	5,31	7,59
Córdoba	Argentina	3,43	4,18	2,08	4,06	6,59	6,01	1,35	4,59	3,43	6,42
Bangkok	Thailand	2,99	3,20	4,12	2,19	3,13	2,21	6,86	2,78	8,44	5,47
Brasilia	Brazil	7,84	3,32	1,35	3,96	4,23	5,40	1,66	5,67	4,34	4,67
Jerusalem	Israel	6,35	5,26	6,03	4,66	6,69	7,06	5,42	3,56	2,08	6,29
Monterrey	Mexico	7,93	4,35	2,22	2,62	4,03	2,01	1,65	6,82	8,22	1,44
Guangzhou	China	6,70	6,81	3,62	3,88	3,16	2,74	2,94	7,53	4,40	7,34
Sao Paulo	Brazil	7,85	3,32	2,41	3,93	4,23	5,22	1,97	2,49	7,95	4,52
Cape Town	South Africa	6,93	3,90	3,66	2,19	3,04	1,94	1,71	2,97	2,24	1,21
Asuncion	Paraguay	1,51	2,50	1,19	1,00	3,35	9,37	1,01	2,61	1,49	3,42
Rio de Janeiro	Brazil	7,89	3,32	1,00	3,89	4,23	4,69	2,27	1,81	8,01	2,54
Istanbul	Turkey	6,47	1,89	1,88	2,56	4,32	2,33	4,30	3,36	6,50	6,42
Lima	Peru	6,17	3,99	1,83	1,48	3,48	1,38	1,92	2,05	2,40	4,28
Doha	Qatar	5,16	7,57	4,15	6,43	3,20	0,86	2,52	4,61	3,10	8,47
Bogota	Colombia	7,36	4,71	2,51	2,36	4,80	5,18	2,07	1,61	4,02	1,53
Durban	South Africa	6,58	3,90	2,25	2,19	3,04	2,74	2,39	5,84	2,29	3,22
Guadalajara	Mexico	7,59	4,35	3,63	2,51	4,03	0,81	1,03	5,46	7,14	1,32
Johannesburg	South Africa	6,47	3,90	3,66	2,19	3,04	2,52	3,35	4,18	1,97	1,27
Tunis	Tunisia	5,39	3,18	2,19	1,53	3,76	5,85	1,11	2,21	1,54	5,44
Quito	Ecuador	3,52	4,84	2,19	1,42	4,76	5,58	1,05	2,60	3,48	4,17
Shenzhen	China	6,70	6,81	3,62	3,88	3,16	2,98	4,14	7,49	4,66	7,34
Kuwait City	Kuwait	4,66	4,63	3,70	5,74	4,47	2,04	1,20	6,22	1,38	6,63
Moscow	Russia	8,48	3,96	3,15	5,39	4,13	2,22	2,60	6,20	8,87	5,77
Belgrade	Serbia	5,43	3,41	4,19	5,05	4,99	7,03	1,58	4,80	3,53	7,31

Chengdu	China	6,70	6,81	3,62	3,88	3,16	1,23	1,44	7,49	4,40	7,34
St Petersburg	Russia	7,75	3,96	3,15	5,51	4,13	1,48	2,73	3,67	7,25	5,76
Manila	Philippines	7,19	7,15	6,18	1,62	1,07	1,74	1,71	1,16	1,43	4,89
Kiev	Ukraine	2,75	3,00	4,35	4,32	3,42	3,48	1,03	4,86	9,84	6,19
Casablanca	Morocco	4,23	2,79	1,77	2,47	2,29	1,45	1,00	1,65	1,75	5,18
Ho Chi Minh City	Vietnam	3,74	2,10	3,21	1,72	3,34	6,04	3,08	5,17	3,91	5,82
Jakarta	Indonesia	2,07	3,86	3,72	1,42	1,00	1,96	2,33	1,00	1,92	5,72
Chongqing	China	6,70	6,81	3,62	3,88	3,16	1,23	1,44	7,49	4,40	7,34
Riyadh	Saudi Arabia	4,69	6,29	4,78	4,50	3,79	0,46	2,49	5,62	1,16	5,95
Ankara	Turkey	6,47	1,89	1,88	2,50	4,32	2,44	1,13	6,12	4,93	6,29
Hanoi	Vietnam	3,74	2,10	3,21	1,32	3,34	0,00	2,43	5,15	2,67	6,00
Mumbai	India	7,98	5,01	5,23	1,77	1,21	1,33	3,99	2,28	1,59	6,00
Shenyang	China	6,70	6,81	3,62	3,88	3,16	1,23	1,44	7,49	4,40	7,34
Bangalore	India	7,80	5,01	5,23	1,87	1,21	1,71	1,90	2,21	1,65	5,39
New Delhi	India	7,52	5,01	5,23	1,76	1,21	1,27	4,58	4,55	1,00	5,04
La Paz	Bolivia	1,63	2,62	1,68	1,01	3,95	6,38	1,49	2,30	2,29	4,49
Cairo	Egypt	1,00	1,00	1,16	1,68	1,58	1,23	3,23	1,27	3,32	4,52

XXXIX.- City Profitability. Cost of Living. Net Real Income

City	Country	Monthly Wages (Avg)	AVG INCOME TAXES AVG WAGE	Income After Taxes	Indirect taxes	Net Real Income
Zurich	Switzerland	7.602	16,9%	6.317	7,7	5.831
Vienna	Austria	3.818	31,9%	2.600	20	2.080
Berlin	Germany	5.050	39,7%	3.045	19	2.467
Amsterdam	Netherlands	4.306	30,4%	2.997	21	2.367
Munich	Germany	5.050	39,7%	3.045	19	2.467
Geneva	Switzerland	7.602	16,9%	6.317	7,7	5.831
Vancouver	Canada	4.057	23,1%	3.120	15	2.652
Dusseldorf	Germany	5.050	39,7%	3.045	19	2.467
Sydney	Australia	4.962	24,3%	3.756	10	3.380
Toronto	Canada	4.057	23,1%	3.120	15	2.652
Melbourne	Australia	4.962	24,3%	3.756	10	3.380
Bern	Switzerland	7.602	16,9%	6.317	7,7	5.831
San Francisco	United States	5.013	26,0%	3.709	8,5	3.394
Copenhagen	Denmark	5.570	36,2%	3.554	25	2.665
Boston	United States	5.013	26,0%	3.709	6,25	3.478
Paris	France	3.393	29,1%	2.406	20	1.925
Ottawa	Canada	4.057	23,1%	3.120	15	2.652
London	United Kingdom	3.854	23,3%	2.956	20	2.365
Frankfurt	Germany	5.050	39,7%	3.045	19	2.467
Stockholm	Sweden	4.746	24,9%	3.564	25	2.673
New York City	United States	5.013	26,0%	3.709	8,875	3.380

Auckland	New Zealand	3.720	17,9%	3.054	15	2.596
Singapore	Singapore	3.289	21,0%	2.598	7	2.416
Adelaide	Australia	4.962	24,3%	3.756	10	3.380
Canberra	Australia	4.962	24,3%	3.756	10	3.380
Hamburg	Germany	5.050	39,7%	3.045	19	2.467
Montreal	Canada	4.057	23,1%	3.120	15	2.652
Washington, D.C.	United States	5.013	26,0%	3.709	6	3.487
Tokyo	Japan	3.257	22,2%	2.534	10	2.281
Basel	Switzerland	7.602	16,9%	6.317	7,7	5.831
Oslo	Norway	5.608	27,9%	4.043	25	3.033
Wellington	New Zealand	3.720	17,9%	3.054	15	2.596
Chicago	United States	5.013	26,0%	3.709	10,25	3.329
Helsinki	Finland	3.799	30,8%	2.629	24	1.998
Luxembourg	Luxembourg	5.958	31,0%	4.111	17	3.412
Seattle	United States	5.013	26,0%	3.709	10,1	3.335
Brussels	Belgium	3.973	40,7%	2.356	21	1.861
Dublin	Ireland	4.732	19,2%	3.824	23	2.944
Stuttgart	Germany	5.050	39,7%	3.045	19	2.467
Barcelona	Spain	2.551	21,4%	2.005	21	1.584
Los Angeles	United States	5.013	26,0%	3.709	9,5	3.357
Milan	Italy	2.684	31,1%	1.849	22	1.442
Madrid	Spain	2.551	21,4%	2.005	21	1.584
Baltimore	United States	5.013	26,0%	3.709	6	3.487
Seoul	South Korea	3.265	24,2%	2.475	10	2.227
Philadelphia	United States	5.013	26,0%	3.709	6	3.487

Dallas	United States	5.013	26,0%	3.709	8,25	3.403
Lyon	France	3.393	29,1%	2.406	20	1.925
Edinburgh	United Kingdom	3.854	23,3%	2.956	20	2.365
Linz	Austria	3.818	31,9%	2.600	20	2.080
Lisbon	Portugal	1.528	27,6%	1.106	23	852
Phoenix	United States	5.013	26,0%	3.709	5,6	3.502
Houston	United States	5.013	26,0%	3.709	8,25	3.403
Rome	Italy	2.684	31,1%	1.849	22	1.442
Yokohama	Japan	3.257	22,2%	2.534	10	2.281
Cologne	Germany	5.050	39,7%	3.045	19	2.467
Florence	Italy	2.684	31,1%	1.849	22	1.442
Prague	Czech Republic	1.550	23,6%	1.184	21	936
Málaga	Spain	2.551	21,4%	2.005	21	1.584
Hong Kong	Hong Kong	1.932	7,5%	1.787	0	1.787
Birmingham	United Kingdom	3.854	23,3%	2.956	20	2.365
Liverpool	United Kingdom	3.854	23,3%	2.956	20	2.365
Atlanta	United States	5.013	26,0%	3.709	4	3.561
Miami	United States	5.013	26,0%	3.709	6	3.487
Eindhoven	Netherlands	4.306	30,4%	2.997	21	2.367
Rotterdam	Netherlands	4.306	30,4%	2.997	21	2.367
Manchester	United Kingdom	3.854	23,3%	2.956	20	2.365
Marseille	France	3.393	29,1%	2.406	20	1.925
Nice	France	3.393	29,1%	2.406	20	1.925
Osaka	Japan	3.257	22,2%	2.534	10	2.281
Valencia	Spain	2.551	21,4%	2.005	21	1.584

Antwerp	Belgium	3.973	40,7%	2.356	21	1.861
Warsaw	Poland	1.269	25,0%	952	23	733
Dubai	United Arab Emirates	2.029	2,5%	1.978	5	1.879
Taipei	Taiwan	1.510	26,5%	1.110	5	1.054
Tallinn	Estonia	1.546	18,3%	1.263	20	1.010
Abu Dhabi	United Arab Emirates	2.029	2,5%	1.978	5	1.879
Budapest	Hungary	1.186	33,5%	789	27	576
Ljubljana	Slovenia	2.098	33,4%	1.397	22	1.090
Vilnius	Lithuania	1.091	12,0%	960	21	758
Bilbao	Spain	2.551	21,4%	2.005	21	1.584
Bratislava	Slovakia	1.387	23,2%	1.065	20	852
Gothenburg	Sweden	4.746	24,9%	3.564	25	2.673
Riga	Latvia	1.168	17,0%	970	21	766
Buenos Aires	Argentina	875	26,0%	648	21	512
Kuala Lumpur	Malaysia	765	19,5%	616	10	554
Montevideo	Uruguay	1.044	29,6%	735	22	573
Santiago	Chile	1.513	7,0%	1.407	19	1.140
Athens	Greece	1.599	25,4%	1.193	24	907
Shanghai	China	847	27,8%	612	16	514
Zagreb	Croatia	1.454	28,0%	1.047	25	785
Porto	Portugal	1.528	27,6%	1.106	23	852
Panama City	Panama	870	17,4%	719	7	668
Wroclaw	Poland	1.269	25,0%	952	23	733
Medellín	Colombia	417	21,5%	327	19	265
Sofia	Bulgaria	598	11,9%	527	20	421

Beijing	China	847	27,8%	612	16	514
Tel Aviv	Israel	3.245	17,8%	2.668	17	2.214
Mexico City	Mexico	684	10,8%	610	16	513
Bucharest	Romania	1.105	25,5%	823	19	667
Córdoba	Argentina	875	26,0%	648	21	512
Bangkok	Thailand	463	20,0%	370	7	344
Brasilia	Brazil	681	19,3%	550	17	456
Jerusalem	Israel	3.245	17,8%	2.668	17	2.214
Monterrey	Mexico	684	10,8%	610	16	513
Guangzhou	China	847	27,8%	612	16	514
Sao Paulo	Brazil	681	19,3%	550	17	456
Cape Town	South Africa	264	23,0%	203	15	173
Asuncion	Paraguay	215	29,6%	151	10	136
Rio de Janeiro	Brazil	681	19,3%	550	17	456
Istanbul	Turkey	1.010	27,3%	734	18	602
Lima	Peru	716	21,5%	562	18	461
Doha	Qatar	3.055	2,5%	2.979	0	2.979
Bogota	Colombia	417	21,5%	327	19	265
Durban	South Africa	264	23,0%	203	15	173
Guadalajara	Mexico	684	10,8%	610	16	513
Johannesburg	South Africa	264	23,0%	203	15	173
Tunis	Tunisia	350	22,0%	273	18	224
Quito	Ecuador	515	22,2%	401	12	353
Shenzhen	China	847	27,8%	612	16	514
Kuwait City	Kuwait	4.014	5,3%	3.801	0	3.801

Moscow	Russia	662	6,5%	619	20	495
Belgrade	Serbia	384	17,5%	317	20	253
Chengdu	China	847	27,8%	612	16	514
St Petersburg	Russia	662	6,5%	619	20	495
Manila	Philippines	256	17,8%	210	12	185
Kiev	Ukraine	326	10,8%	291	20	233
Casablanca	Morocco	541	22,4%	420	20	336
Ho Chi Minh City	Vietnam	256	22,8%	198	10	178
Jakarta	Indonesia	136	16,0%	114	10	103
Chongqing	China	847	27,8%	612	16	514
Riyadh	Saudi Arabia	1.710	2,5%	1.667	5	1.584
Ankara	Turkey	1.010	27,3%	734	18	602
Hanoi	Vietnam	256	22,8%	198	10	178
Mumbai	India	414	23,8%	315	18	259
Shenyang	China	847	27,8%	612	16	514
Bangalore	India	414	23,8%	315	18	259
New Delhi	India	414	23,8%	315	18	259
La Paz	Bolivia	449	22,2%	349	13	304
Cairo	Egypt	407	18,3%	333	14	286

XL.- City Profitability. Cost of Living. Net Purchase Power

City	Country	Monthly Wages (Avg)	AVG INCOME TAXES AVG WAGE	Income After Taxes	Indirect taxes	Net Real Income	Cost of Life Index (NY=1)	Net Purchase Power
Zurich	Switzerland	7.602	16,9%	6.317	7,7	5.831	95,56	6.102
Vienna	Austria	3.818	31,9%	2.600	20	2.080	47,98	4.336
Berlin	Germany	5.050	39,7%	3.045	19	2.467	48,6	5.075
Amsterdam	Netherlands	4.306	30,4%	2.997	21	2.367	66,77	3.546
Munich	Germany	5.050	39,7%	3.045	19	2.467	58,17	4.240
Geneva	Switzerland	7.602	16,9%	6.317	7,7	5.831	94,87	6.146
Vancouver	Canada	4.057	23,1%	3.120	15	2.652	59,85	4.431
Dusseldorf	Germany	5.050	39,7%	3.045	19	2.467	46,69	5.283
Sydney	Australia	4.962	24,3%	3.756	10	3.380	62,22	5.433
Toronto	Canada	4.057	23,1%	3.120	15	2.652	60,82	4.361
Melbourne	Australia	4.962	24,3%	3.756	10	3.380	51,82	6.523
Bern	Switzerland	7.602	16,9%	6.317	7,7	5.831	79,41	7.343
San Francisco	United States	5.013	26,0%	3.709	8,5	3.394	102,07	3.325
Copenhagen	Denmark	5.570	36,2%	3.554	25	2.665	64,94	4.104
Boston	United States	5.013	26,0%	3.709	6,25	3.478	79,47	4.376
Paris	France	3.393	29,1%	2.406	20	1.925	65,88	2.921
Ottawa	Canada	4.057	23,1%	3.120	15	2.652	49,5	5.358
London	United Kingdom	3.854	23,3%	2.956	20	2.365	71,77	3.295
Frankfurt	Germany	5.050	39,7%	3.045	19	2.467	52,97	4.657
Stockholm	Sweden	4.746	24,9%	3.564	25	2.673	55,24	4.839

New York City	United States	5.013	26,0%	3.709	8,875	3.380	100	3.380
Auckland	New Zealand	3.720	17,9%	3.054	15	2.596	54,15	4.794
Singapore	Singapore	3.289	21,0%	2.598	7	2.416	70,39	3.433
Adelaide	Australia	4.962	24,3%	3.756	10	3.380	45,25	7.470
Canberra	Australia	4.962	24,3%	3.756	10	3.380	52,29	6.464
Hamburg	Germany	5.050	39,7%	3.045	19	2.467	51,44	4.795
Montreal	Canada	4.057	23,1%	3.120	15	2.652	44,53	5.956
Washington, D.C.	United States	5.013	26,0%	3.709	6	3.487	80,74	4.319
Tokyo	Japan	3.257	22,2%	2.534	10	2.281	63,2	3.609
Basel	Switzerland	7.602	16,9%	6.317	7,7	5.831	90,29	6.458
Oslo	Norway	5.608	27,9%	4.043	25	3.033	63,41	4.782
Wellington	New Zealand	3.720	17,9%	3.054	15	2.596	50,69	5.121
Chicago	United States	5.013	26,0%	3.709	10,25	3.329	69,88	4.764
Helsinki	Finland	3.799	30,8%	2.629	24	1.998	54,32	3.678
Luxembourg	Luxembourg	5.958	31,0%	4.111	17	3.412	68,85	4.956
Seattle	United States	5.013	26,0%	3.709	10,1	3.335	76,01	4.387
Brussels	Belgium	3.973	40,7%	2.356	21	1.861	50,41	3.692
Dublin	Ireland	4.732	19,2%	3.824	23	2.944	68,75	4.282
Stuttgart	Germany	5.050	39,7%	3.045	19	2.467	49,72	4.961
Barcelona	Spain	2.551	21,4%	2.005	21	1.584	44,41	3.567
Los Angeles	United States	5.013	26,0%	3.709	9,5	3.357	74,27	4.520
Milan	Italy	2.684	31,1%	1.849	22	1.442	58,61	2.461
Madrid	Spain	2.551	21,4%	2.005	21	1.584	45,76	3.462
Baltimore	United States	5.013	26,0%	3.709	6	3.487	59,71	5.840
Seoul	South Korea	3.265	24,2%	2.475	10	2.227	55,2	4.035

Philadelphia	United States	5.013	26,0%	3.709	6	3.487	63,2	5.517
Dallas	United States	5.013	26,0%	3.709	8,25	3.403	58,13	5.855
Lyon	France	3.393	29,1%	2.406	20	1.925	48,95	3.932
Edinburgh	United Kingdom	3.854	23,3%	2.956	20	2.365	49,83	4.746
Linz	Austria	3.818	31,9%	2.600	20	2.080	49,79	4.178
Lisbon	Portugal	1.528	27,6%	1.106	23	852	40,71	2.092
Phoenix	United States	5.013	26,0%	3.709	5,6	3.502	52,56	6.662
Houston	United States	5.013	26,0%	3.709	8,25	3.403	56,28	6.047
Rome	Italy	2.684	31,1%	1.849	22	1.442	51,64	2.793
Yokohama	Japan	3.257	22,2%	2.534	10	2.281	58,14	3.923
Cologne	Germany	5.050	39,7%	3.045	19	2.467	47,27	5.218
Florence	Italy	2.684	31,1%	1.849	22	1.442	50,38	2.863
Prague	Czech Republic	1.550	23,6%	1.184	21	936	35,15	2.662
Málaga	Spain	2.551	21,4%	2.005	21	1.584	36,34	4.359
Hong Kong	Hong Kong	1.932	7,5%	1.787	0	1.787	78,15	2.287
Birmingham	United Kingdom	3.854	23,3%	2.956	20	2.365	47,39	4.991
Liverpool	United Kingdom	3.854	23,3%	2.956	20	2.365	43,53	5.433
Atlanta	United States	5.013	26,0%	3.709	4	3.561	61,03	5.835
Miami	United States	5.013	26,0%	3.709	6	3.487	67,02	5.203
Eindhoven	Netherlands	4.306	30,4%	2.997	21	2.367	54,2	4.368
Rotterdam	Netherlands	4.306	30,4%	2.997	21	2.367	53,53	4.423
Manchester	United Kingdom	3.854	23,3%	2.956	20	2.365	48,27	4.900
Marseille	France	3.393	29,1%	2.406	20	1.925	48,86	3.939
Nice	France	3.393	29,1%	2.406	20	1.925	53,29	3.612
Osaka	Japan	3.257	22,2%	2.534	10	2.281	55,89	4.081

Valencia	Spain	2.551	21,4%	2.005	21	1.584	36,37	4.355
Antwerp	Belgium	3.973	40,7%	2.356	21	1.861	48,32	3.852
Warsaw	Poland	1.269	25,0%	952	23	733	31,34	2.338
Dubai	United Arab Emirates	2.029	2,5%	1.978	5	1.879	59,21	3.174
Taipei	Taiwan	1.510	26,5%	1.110	5	1.054	42,58	2.476
Tallinn	Estonia	1.546	18,3%	1.263	20	1.010	35,05	2.883
Abu Dhabi	United Arab Emirates	2.029	2,5%	1.978	5	1.879	53,76	3.496
Budapest	Hungary	1.186	33,5%	789	27	576	29,03	1.983
Ljubljana	Slovenia	2.098	33,4%	1.397	22	1.090	38,49	2.831
Vilnius	Lithuania	1.091	12,0%	960	21	758	30,04	2.525
Bilbao	Spain	2.551	21,4%	2.005	21	1.584	45	3.520
Bratislava	Slovakia	1.387	23,2%	1.065	20	852	34,46	2.473
Gothenburg	Sweden	4.746	24,9%	3.564	25	2.673	49,4	5.411
Riga	Latvia	1.168	17,0%	970	21	766	31,7	2.416
Buenos Aires	Argentina	875	26,0%	648	21	512	21,3	2.402
Kuala Lumpur	Malaysia	765	19,5%	616	10	554	27,65	2.004
Montevideo	Uruguay	1.044	29,6%	735	22	573	30,27	1.894
Santiago	Chile	1.513	7,0%	1.407	19	1.140	29,36	3.882
Athens	Greece	1.599	25,4%	1.193	24	907	36,51	2.483
Shanghai	China	847	27,8%	612	16	514	42,77	1.201
Zagreb	Croatia	1.454	28,0%	1.047	25	785	32,32	2.429
Porto	Portugal	1.528	27,6%	1.106	23	852	36,51	2.333
Panama City	Panama	870	17,4%	719	7	668	42,14	1.586
Wroclaw	Poland	1.269	25,0%	952	23	733	28,02	2.615
Medellín	Colombia	417	21,5%	327	19	265	18,12	1.463

Sofia	Bulgaria	598	11,9%	527	20	421	26,45	1.593
Beijing	China	847	27,8%	612	16	514	39,07	1.315
Tel Aviv	Israel	3.245	17,8%	2.668	17	2.214	64,22	3.448
Mexico City	Mexico	684	10,8%	610	16	513	24,99	2.052
Bucharest	Romania	1.105	25,5%	823	19	667	26,39	2.527
Córdoba	Argentina	875	26,0%	648	21	512	14,91	3.431
Bangkok	Thailand	463	20,0%	370	7	344	39,09	881
Brasilia	Brazil	681	19,3%	550	17	456	23,29	1.959
Jerusalem	Israel	3.245	17,8%	2.668	17	2.214	55,11	4.018
Monterrey	Mexico	684	10,8%	610	16	513	21,76	2.356
Guangzhou	China	847	27,8%	612	16	514	28,91	1.777
Sao Paulo	Brazil	681	19,3%	550	17	456	25,15	1.814
Cape Town	South Africa	264	23,0%	203	15	173	28,44	608
Asuncion	Paraguay	215	29,6%	151	10	136	21,33	639
Rio de Janeiro	Brazil	681	19,3%	550	17	456	23,06	1.978
Istanbul	Turkey	1.010	27,3%	734	18	602	21,76	2.767
Lima	Peru	716	21,5%	562	18	461	30,35	1.519
Doha	Qatar	3.055	2,5%	2.979	0	2.979	57,61	5.170
Bogota	Colombia	417	21,5%	327	19	265	19,87	1.334
Durban	South Africa	264	23,0%	203	15	173	21,73	795
Guadalajara	Mexico	684	10,8%	610	16	513	19,65	2.609
Johannesburg	South Africa	264	23,0%	203	15	173	25,3	683
Tunis	Tunisia	350	22,0%	273	18	224	17,93	1.249
Quito	Ecuador	515	22,2%	401	12	353	28,73	1.227
Shenzhen	China	847	27,8%	612	16	514	34,26	1.499

Kuwait City	Kuwait	4.014	5,3%	3.801	0	3.801	41,79	9.096
Moscow	Russia	662	6,5%	619	20	495	33,49	1.479
Belgrade	Serbia	384	17,5%	317	20	253	25,34	1.000
Chengdu	China	847	27,8%	612	16	514	26,09	1.969
St Petersburg	Russia	662	6,5%	619	20	495	25,89	1.913
Manila	Philippines	256	17,8%	210	12	185	31,55	587
Kiev	Ukraine	326	10,8%	291	20	233	24,76	940
Casablanca	Morocco	541	22,4%	420	20	336	23,77	1.413
Ho Chi Minh City	Vietnam	256	22,8%	198	10	178	28,48	625
Jakarta	Indonesia	136	16,0%	114	10	103	28,64	359
Chongqing	China	847	27,8%	612	16	514	26,09	1.969
Riyadh	Saudi Arabia	1.710	2,5%	1.667	5	1.584	31,85	4.973
Ankara	Turkey	1.010	27,3%	734	18	602	18,99	3.171
Hanoi	Vietnam	256	22,8%	198	10	178	25,83	689
Mumbai	India	414	23,8%	315	18	259	23,29	1.111
Shenyang	China	847	27,8%	612	16	514	24,79	2.072
Bangalore	India	414	23,8%	315	18	259	17,24	1.500
New Delhi	India	414	23,8%	315	18	259	17,81	1.452
La Paz	Bolivia	449	22,2%	349	13	304	17,29	1.758
Cairo	Egypt	407	18,3%	333	14	286	20,06	1.426

XLI.- City Profitability. Summary

City	Country	Services	NPP	PROFITABILITY INDEX
Zurich	Switzerland	9,11	6101,75	9,46
Vienna	Austria	9,25	4335,52	7,26
Berlin	Germany	9,62	5075,25	8,54
Amsterdam	Netherlands	10	3545,71	6,67
Munich	Germany	8,98	4240,28	6,95
Geneva	Switzerland	8,13	6146,13	8,57
Vancouver	Canada	8,28	4431,20	6,69
Dusseldorf	Germany	8,59	5282,87	7,96
Sydney	Australia	8,29	5432,77	7,88
Toronto	Canada	8,59	4360,53	6,83
Melbourne	Australia	8,13	6523,10	9,01
Bern	Switzerland	8,17	7342,69	10,00
San Francisco	United States	8,5	3325,35	5,51
Copenhagen	Denmark	9,14	4104,17	6,88
Boston	United States	7,89	4376,06	6,35
Paris	France	9,11	2921,38	5,33
Ottawa	Canada	8,21	5357,73	7,73
London	United Kingdom	9,56	3295,28	6,07
Frankfurt	Germany	9,23	4656,54	7,67
Stockholm	Sweden	9,85	4839,22	8,39
New York City	United States	9,36	3380,28	6,07
Auckland	New Zealand	8,32	4793,66	7,15
Singapore	Singapore	8,9	3432,91	5,87
Adelaide	Australia	8,01	7470,21	9,96
Canberra	Australia	8,44	6464,47	9,25
Hamburg	Germany	9,06	4795,05	7,72
Montreal	Canada	8,56	5955,71	8,75
Washington, D.C.	United States	7,69	4318,71	6,15
Tokyo	Japan	9,34	3608,93	6,36
Basel	Switzerland	8,5	6457,89	9,30
Oslo	Norway	9,4	4782,41	7,97
Wellington	New Zealand	8,16	5120,87	7,41
Chicago	United States	7,89	4764,27	6,79
Helsinki	Finland	9,01	3677,83	6,25
Luxembourg	Luxembourg	8,32	4955,91	7,34
Seattle	United States	7,85	4387,37	6,33
Brussels	Belgium	8,09	3692,03	5,70
Dublin	Ireland	7,61	4282,50	6,05
Stuttgart	Germany	8,28	4960,92	7,32
Barcelona	Spain	8,47	3566,92	5,79
Los Angeles	United States	8,05	4520,12	6,63

Milan	Italy	7,89	2460,84	4,20
Madrid	Spain	8,74	3461,69	5,82
Baltimore	United States	7,31	5839,77	7,46
Seoul	South Korea	8,21	4035,11	6,18
Philadelphia	United States	6,96	5517,29	6,82
Dallas	United States	7,56	5854,92	7,71
Lyon	France	8,08	3931,78	5,97
Edinburgh	United Kingdom	8,15	4746,17	6,96
Linz	Austria	7,96	4177,91	6,18
Lisbon	Portugal	7,15	2092,09	3,50
Phoenix	United States	8,07	6662,41	9,11
Houston	United States	7,51	6047,38	7,87
Rome	Italy	6,61	2792,99	3,95
Yokohama	Japan	8,79	3923,02	6,42
Cologne	Germany	7,89	5218,05	7,30
Florence	Italy	6,31	2862,84	3,87
Prague	Czech Republic	6,87	2661,50	3,95
Málaga	Spain	7,46	4359,03	6,03
Hong Kong	Hong Kong	7,99	2286,76	4,04
Birmingham	United Kingdom	7,62	4990,54	6,83
Liverpool	United Kingdom	7,25	5433,08	6,99
Atlanta	United States	7,07	5835,03	7,24
Miami	United States	7,58	5202,82	7,02
Eindhoven	Netherlands	8,48	4368,03	6,76
Rotterdam	Netherlands	9,09	4422,70	7,26
Manchester	United Kingdom	7,9	4899,56	6,95
Marseille	France	7,41	3939,02	5,55
Nice	France	7,43	3611,57	5,21
Osaka	Japan	8,82	4080,95	6,64
Valencia	Spain	8,29	4355,43	6,61
Antwerp	Belgium	8,68	3851,72	6,26
Warsaw	Poland	6,33	2338,38	3,41
Dubai	United Arab Emirates	5,97	3174,06	3,97
Taipei	Taiwan	6,39	2476,18	3,56
Tallinn	Estonia	7,09	2882,93	4,27
Abu Dhabi	United Arab Emirates	5,53	3495,84	3,98
Budapest	Hungary	6,17	1983,27	3,03
Ljubljana	Slovenia	6,27	2831,00	3,82
Vilnius	Lithuania	6,31	2524,84	3,57
Bilbao	Spain	7,43	3520,15	5,12
Bratislava	Slovakia	5,92	2472,93	3,35
Gothenburg	Sweden	9,31	5411,30	8,73
Riga	Latvia	6,13	2416,13	3,39
Buenos Aires	Argentina	5,27	2401,53	3,01
Kuala Lumpur	Malaysia	5,58	2004,49	2,83

Montevideo	Uruguay	5,53	1893,89	2,72
Santiago	Chile	5,98	3882,17	4,57
Athens	Greece	5,54	2483,20	3,19
Shanghai	China	5,73	1201,05	2,23
Zagreb	Croatia	5,39	2429,33	3,08
Porto	Portugal	7,23	2332,76	3,78
Panama City	Panama	3,67	1585,94	1,90
Wroclaw	Poland	6,14	2615,44	3,57
Medellín	Colombia	3,74	1463,30	1,85
Sofia	Bulgaria	5,04	1593,46	2,33
Beijing	China	5,38	1314,79	2,22
Tel Aviv	Israel	6,71	3447,60	4,63
Mexico City	Mexico	3,97	2051,85	2,25
Bucharest	Romania	4,44	2526,76	2,73
Córdoba	Argentina	4,49	3008,97	3,06
Bangkok	Thailand	3,71	881,23	1,54
Brasilia	Brazil	4,2	1958,53	2,28
Jerusalem	Israel	5,67	4017,51	4,48
Monterrey	Mexico	3,91	2356,42	2,40
Guangzhou	China	5,18	1776,85	2,51
Sao Paulo	Brazil	4,16	1813,68	2,18
Cape Town	South Africa	2,32	607,55	1,15
Asuncion	Paraguay	2,6	638,65	1,21
Rio de Janeiro	Brazil	3,44	1978,06	2,02
Istanbul	Turkey	3,61	2767,01	2,48
Lima	Peru	2,28	1518,58	1,44
Doha	Qatar	4,6	5170,33	4,53
Bogota	Colombia	3,2	1334,42	1,63
Durban	South Africa	3,11	795,16	1,37
Guadalajara	Mexico	3,44	2609,45	2,32
Johannesburg	South Africa	2,68	682,96	1,24
Tunis	Tunisia	2,99	1248,52	1,54
Quito	Ecuador	3,28	1227,25	1,61
Shenzhen	China	5,33	1499,38	2,35
Kuwait City	Kuwait	4,1	9096,09	6,41
Moscow	Russia	5,04	1478,58	2,25
Belgrade	Serbia	5,06	1000,16	1,91
Chengdu	China	4,81	1968,91	2,51
St Petersburg	Russia	4,22	1912,61	2,26
Manila	Philippines	2,96	586,94	1,25
Kiev	Ukraine	4,37	939,55	1,71
Casablanca	Morocco	1,73	1412,93	1,25
Ho Chi Minh City	Vietnam	3,82	624,54	1,42
Jakarta	Indonesia	1,83	358,99	1,00
Chongqing	China	4,81	1968,91	2,51
Riyadh	Saudi Arabia	3,87	4972,96	3,82

Ankara	Turkey	3,7	3170,62	2,74
Hanoi	Vietnam	2,6	688,61	1,23
Mumbai	India	3,1	1110,71	1,51
Shenyang	China	4,81	2072,16	2,59
Bangalore	India	2,89	1500,49	1,62
New Delhi	India	3,27	1452,46	1,71
La Paz	Bolivia	2,54	1757,72	1,60
Cairo	Egypt	1	1425,56	1,04

XLII.- NordicEdge Event Questionnaire

Smart with a Heart
Research: What makes a City Attractive?

Nordic Edge Expo is pleased to introduce a research study, in cooperation with Jose A. Ondiviela from Microsoft, to better understand what our attendees consider an irresistible city to live in.
The study is part of a wider PhD research by Mr. Ondiviela based on citizen involvement from people living in 140 Smart Cities worldwide. The research will give insights into citizens' preferences and help authorities develop even more attractive cities, which people wish to live in.

Please feel free to complete this short survey. It only takes 30 seconds. Participation is anonymous. If you wish to receive a copy of the results we ask that you submit your e-mail address. This will not be used for any other purposes. The results are expected towards the end of 2018.

THANK YOU VERY MUCH FOR YOUR TIME AND HELP.

1. SMART: City Services: If you were to move to another city, what services would be decisive? Please answer according to your values and at this time in your life. Rate the questions on a scale from 0 to 5. 0=Irrelevant – 5=Most Significant. All answers are valid, but try to assign differences to highs and lows. 10 Areas. No answer means 0. *

	0	1	2	3	4	5
Governance	○	○	○	○	○	○
Education	○	○	○	○	○	○
Employability	○	○	○	○	○	○
Connected City (IoT - Citizens)	○	○	○	○	○	○
Social Services / Health	○	○	○	○	○	○
Sustainability / Environment	○	○	○	○	○	○
Cultural Services / Tourism	○	○	○	○	○	○
Urban Mobility / Transportation	○	○	○	○	○	○
Urban Planning	○	○	○	○	○	○
Safety (Physical/Virtual)	○	○	○	○	○	○

2. ...with HEART. Irresistible: Use your heart to tell us what makes a city "Magnetic" to you. The question has three Components (Identity-Past, Dynamism-Present, Strategy-Future). No answer means 0. *

	0	1	2	3	4	5
IDENTITY. (Past) Culture, History, Reputation, Recognition, Climate, GeoInfluence, Gastronomy, Events (International Identity)	○	○	○	○	○	○
DYNAMISM. (Present). Vibrant in-Motion City, Competitiveness, Talent Enabler, Ethics, Equality, Friendly with Expats, Easy to start-up new life / business.	○	○	○	○	○	○
STRATEGY. (Future) Human Capital, R&D Investment, Innovation, SmartCity Plan	○	○	○	○	○	○

3. Dependencies. What responsibilities might inflict your ability to move to another city?. (No answer = NO)

	YES	NO
Children – do you have responsibility for children?	○	○
Elderly – do you have any elderly people in your care?	○	○

4. Please state your age for statistics. *

Select your answer ∨

5. Please state your gender? (No answer = Prefer not to say)

- ○ Female
- ○ Male
- ○ Prefer not to say
- ○ Other

XLIII.- NordicEdge Event Survey Results

DATA AVERAGES

					CHILDREN		ELDER		AGE					GENDER	
CITY SERVICES - SCALE OF V	RK	1-10	Over 100	INPUT	Yes	No	Yes	No	18- 29	30- 39	40- 49	50- 59	60- 65	65+	Female	Male
GOVERNANCE	9	1,30	9%	**3,21**	3,24	3,16	2,85	3,29	3,45	3,12	3,17	3,00	3,50	5,00	3,16	3,26
EDUCATION	5	6,06	10%	**3,92**	4,12	3,60	3,69	3,96	3,55	4,12	4,26	3,25	4,00	5,00	4,06	3,79
EMPLOYABILITY	6	4,74	10%	**3,73**	3,76	3,68	3,92	4,65	3,64	3,59	3,61	3,92	5,00	5,00	3,84	3,62
CONNECTED CITY	8	1,51	9%	**3,24**	3,02	3,60	3,08	3,27	3,91	2,59	3,17	3,25	5,00	5,00	2,97	3,50
SOCSERVICES / HEALTH	2	8,99	12%	**4,36**	4,46	4,20	4,31	4,37	4,64	4,53	4,26	3,92	5,00	5,00	4,47	4,26
ENV. SUSTAINABILITY	1	10,00	12%	**4,52**	4,46	4,60	4,00	3,63	4,73	4,47	4,52	4,42	4,00	5,00	4,75	4,29
CULTURAL SVS / TOURISM	10	1,00	8%	**3,17**	2,98	3,48	3,38	3,37	3,73	2,59	3,09	3,17	5,00	5,00	3,16	3,18
URBAN MOBILITY / TRANSPOR	3	7,47	11%	**4,14**	3,88	4,56	4,31	4,08	4,45	3,94	3,87	4,42	5,00	5,00	4,22	4,06
URBAN PLANNING	7	2,31	9%	**3,36**	3,24	3,56	2,92	3,25	3,64	3,47	3,13	3,17	4,00	5,00	3,38	3,35
SAFETY (PHYSICAL/VIRTUAL)	4	6,46	11%	**3,98**	4,05	3,88	4,08	3,96	4,09	4,06	4,13	3,33	5,00	4,00	4,09	3,88

					CHILDREN		ELDER		AGE					GENDER	
MAGNETISM PREFERENCES	RK	1-10	Over 100	INPUT	Yes	No	Yes	No	18- 29	30- 39	40- 49	50- 59	60- 65	65+	Female	Male
IDENTITY	2	4,72	33%	**3,71**	3,63	3,84	4,00	3,64	3,18	3,88	3,39	4,33	4,50	5,00	3,63	3,79
DYNAMISM	1	10	36%	**4,00**	3,93	4,12	4,23	3,94	4,09	4,00	3,78	4,17	4,50	5,00	3,88	4,12
STRATEGY	3	1	31%	**3,45**	3,34	3,64	3,69	3,40	3,73	3,47	3,30	3,17	4,50	5,00	3,47	3,44

RANKINGS

					CHILDREN		ELDER		AGE					GENDER	
CITY SERVICES - SCALE OF V	RK	1-10	Over 100	INPUT	Yes	No	Yes	No	18- 29	30- 39	40- 49	50- 59	60- 65	65+	Female	Male
GOVERNANCE	9	1,30	9%	9	7	10	10	8	10	8	7	10	10	1	8	9
EDUCATION	5	6,06	10%	5	3	6	6	4	9	3	2	6	7	1	5	5
EMPLOYABILITY	6	4,74	10%	6	6	5	5	1	7	6	6	3	1	1	6	6
CONNECTED CITY	8	1,51	9%	8	9	6	8	9	5	9	7	6	1	1	10	7
SOCSERVICES / HEALTH	2	8,99	12%	2	1	3	1	2	2	1	2	3	1	1	2	2
ENV. SUSTAINABILITY	1	10,00	12%	1	1	1	4	6	1	2	1	1	7	1	1	1
CULTURAL SVS / TOURISM	10	1,00	8%	10	10	9	7	7	6	9	10	8	1	1	8	10
URBAN MOBILITY / TRANSPOR	3	7,47	11%	3	5	2	1	3	3	5	5	1	1	1	3	3
URBAN PLANNING	7	2,31	9%	7	7	8	9	10	7	7	9	8	7	1	7	8
SAFETY (PHYSICAL/VIRTUAL)	4	6,46	11%	4	4	4	3	4	4	4	4	5	1	10	4	4
				n	41	25	13	53	11	17	23	12	2	1	32	34
					62%	38%	20%	80%	17%	26%	35%	18%	3%	2%	48%	52%
									24	35	45	55	62	67		
											AVG AGE:	**41,6**				

XLIV.- SmartCityExpo WW Congress Event Questionnaire

SMARTCITY
EXPO WORLD CONGRESS

Research: What's making a City Attractive to LIVE IN?

SmartCityExpo & WW Congress is very pleased to introduce a research study, in cooperation with Jose A. Ondiviela from Microsoft, to better understand what our attendees consider an irresistible city to live in.
The study is part of a wider PhD research by Mr. Ondiviela based on citizen involvement from people living in 140 Smart Cities worldwide. The research will give insights into citizens' preferences and help authorities develop even more attractive cities, which people wish to live in.

Please feel free to complete this short survey. It only takes 40 seconds. Participation is anonymous. If you wish to receive a copy of the results we ask that you submit your e-mail address. This will not be used for any other purposes. The results are expected towards the end of 2018.

THANK YOU VERY MUCH FOR YOUR TIME AND HELP.

1. CITIES TO LIVE IN: (What do they offer to me? What's the deal?: According to your scale of values, and in this moment in your life, what are the most important SERVICES a City should offer you to consider that city a potential next home? (0=Irrelevant; 5: The most Important. All answers are valid, but try to be crisp, assigning significant differences to highs and lows. 10 Areas. No answer = 0. *

	0	1	2	3	4	5
Governance	○	○	○	○	○	○
Education	○	○	○	○	○	○
Employability	○	○	○	○	○	○
Connected City (IoT - Citizens)	○	○	○	○	○	○
Social Services / Health	○	○	○	○	○	○
Sustainability / Environment	○	○	○	○	○	○
Cultural Services / Tourism	○	○	○	○	○	○
Urban Mobility / Transportation	○	○	○	○	○	○
Urban Planning	○	○	○	○	○	○
Safety (Physical/Virtual)	○	○	○	○	○	○

2. CITIES TO LIVE IN. A city to fall in love with. Now, just use your heart to tell us what do you like/love the most from a city. What makes a city "Magnetic" to you. 3 Components (Identity-Past, Dynamism-Present, Strategy-Future) No answer = 0 *

	0	1	2	3	4	5
IDENTITY. (Past) Culture, History, Reputation, Recognition, Climate, GeoInfluence, Gastronomy, Events (International Identity)	○	○	○	○	○	○
DYNAMISM. (Present). Vibrant in-Motion City, Competitiveness, Talent Enabler, Ethics, Equality, Friendly with Expats, Easy to start-up new life / business.	○	○	○	○	○	○
STRATEGY. (Future) Human Capital, R&D Investment, Innovation, SmartCity Plan	○	○	○	○	○	○

3. Dependencies. What responsibilities might inflict your ability to move to another city?. (No answer = NO)

	YES	NO
Children – do you have responsibility for children?	○	○
Elderly – do you have any elderly people in your care?	○	○

4. AGE. Please, state your Age range for statistics. *

Select your answer

5. And your GENDER? (No answer = Prefer not to say)

- ○ Female
- ○ Male
- ○ Prefer not to say
- ○ Other

XLV.- SmartCityExpo WW Congress Survey Results

DATA AVERAGES

				CHILDREN		ELDER		AGE						GENDER		
CITY SERVICES - SCALE OF V	RK	1-10	Over 100	INPUT	Yes	No	Yes	No	18- 29	30- 39	40- 49	50- 59	60- 65	65+	Female	Male	N.A.
GOVERNANCE	8	2,85	6,95	3,74	3,71	3,77	3,76	3,73	3,67	3,84	3,71	3,70	3,72	4,11	3,80	3,71	3,92
EDUCATION	5	7,67	11,40	4,21	4,24	4,19	4,15	4,23	4,30	4,37	4,19	4,03	3,96	4,22	4,32	4,17	4,19
EMPLOYABILITY	6	7,11	10,87	4,16	4,10	4,22	4,07	4,19	4,23	4,31	4,10	4,11	3,60	4,00	4,32	4,08	4,12
CONNECTED CITY	9	1,83	6,01	3,64	3,63	3,65	3,68	3,63	3,66	3,55	3,61	3,76	3,81	3,72	3,61	3,66	3,42
SOCSERVICES / HEALTH	2	9,04	12,66	4,35	4,31	4,38	4,38	4,34	4,33	4,40	4,27	4,42	4,19	4,72	4,49	4,28	4,35
ENV. SUSTAINABILITY	3	8,95	12,57	4,34	4,32	4,35	4,33	4,34	4,38	4,32	4,35	4,33	4,26	4,44	4,40	4,32	4,00
CULTURAL SVS / TOURISM	10	1,00	5,24	3,56	3,53	3,58	3,60	3,54	3,42	3,56	3,55	3,64	3,61	3,78	3,60	3,54	3,42
URBAN MOBILITY / TRANSPOI	1	10,00	13,54	4,44	4,39	4,49	4,37	4,46	4,44	4,47	4,42	4,46	4,26	4,50	4,48	4,43	4,50
URBAN PLANNING	7	4,78	8,72	3,93	3,88	3,98	3,94	3,93	3,96	3,99	3,85	3,94	3,89	4,11	3,98	3,91	4,00
SAFETY (PHYSICAL/VIRTUAL)	4	8,37	12,04	4,28	4,29	4,28	4,36	4,26	4,23	4,21	4,28	4,40	4,30	4,44	4,35	4,26	3,81
					CHILDREN		ELDER		AGE						GENDER		
MAGNETISM PREFERENCES	RK	1-10	Over 100	INPUT	Yes	No	Yes	No	18- 29	30- 39	40- 49	50- 59	60- 65	65+	Female	Male	N.A.
IDENTITY	2	8,43	35,33	4,14	4,12	4,15	4,12	4,14	4,08	4,08	4,14	4,23	4,07	4,44	4,18	4,12	3,96
DYNAMISM	1	10	36,93	4,19	4,18	4,19	4,19	4,19	4,13	4,27	4,17	4,16	4,02	4,44	4,21	4,18	4,23
STRATEGY	3	1	27,74	3,89	3,90	3,88	4,03	3,85	3,81	3,90	3,88	3,90	4,04	4,28	3,84	3,93	3,42

RANKINGS

				CHILDREN		ELDER		AGE						GENDER		
CITY SERVICES - SCALE OF V	RK	1-10	Over 100	INPUT	Yes	No	Yes	No	18- 29	30- 39	40- 49	50- 59	60- 65	65+	Female	Male	N.A.
GOVERNANCE	8	2,85	6,95	3,74	8	8	8	8	8	8	8	9	8	6	8	8	7
EDUCATION	5	7,67	11,40	4,21	5	6	5	5	4	3	5	6	5	5	6	5	3
EMPLOYABILITY	6	7,11	10,87	4,16	6	5	6	6	6	5	6	5	10	8	5	6	4
CONNECTED CITY	9	1,83	6,01	3,64	9	9	9	9	9	10	9	8	7	10	9	9	9
SOCSERVICES / HEALTH	2	9,04	12,66	4,35	3	2	1	3	3	2	4	2	4	1	1	3	2
ENV. SUSTAINABILITY	3	8,95	12,57	4,34	2	3	4	2	2	4	2	4	2	3	3	2	5
CULTURAL SVS / TOURISM	10	1,00	5,24	3,56	10	10	10	10	10	9	10	10	9	9	10	10	9
URBAN MOBILITY / TRANSPOI	1	10,00	13,54	4,44	1	1	2	1	1	1	1	1	2	2	2	1	1
URBAN PLANNING	7	4,78	8,72	3,93	7	7	7	7	7	7	7	7	6	6	7	7	5
SAFETY (PHYSICAL/VIRTUAL)	4	8,37	12,04	4,28	4	4	3	4	5	6	3	3	1	3	4	4	8
				n	786	764	383	1.167	230	424	496	325	57	18	482	1.040	26
					51%	49%	25%	75%	15%	27%	32%	21%	4%	1%	31%	67%	2%
									24	35	45	55	62	67			
											AVG AGE:	**42,1**					

XLVI.- City Attractiveness Ranking (SmartCityExpo Attendees Input)

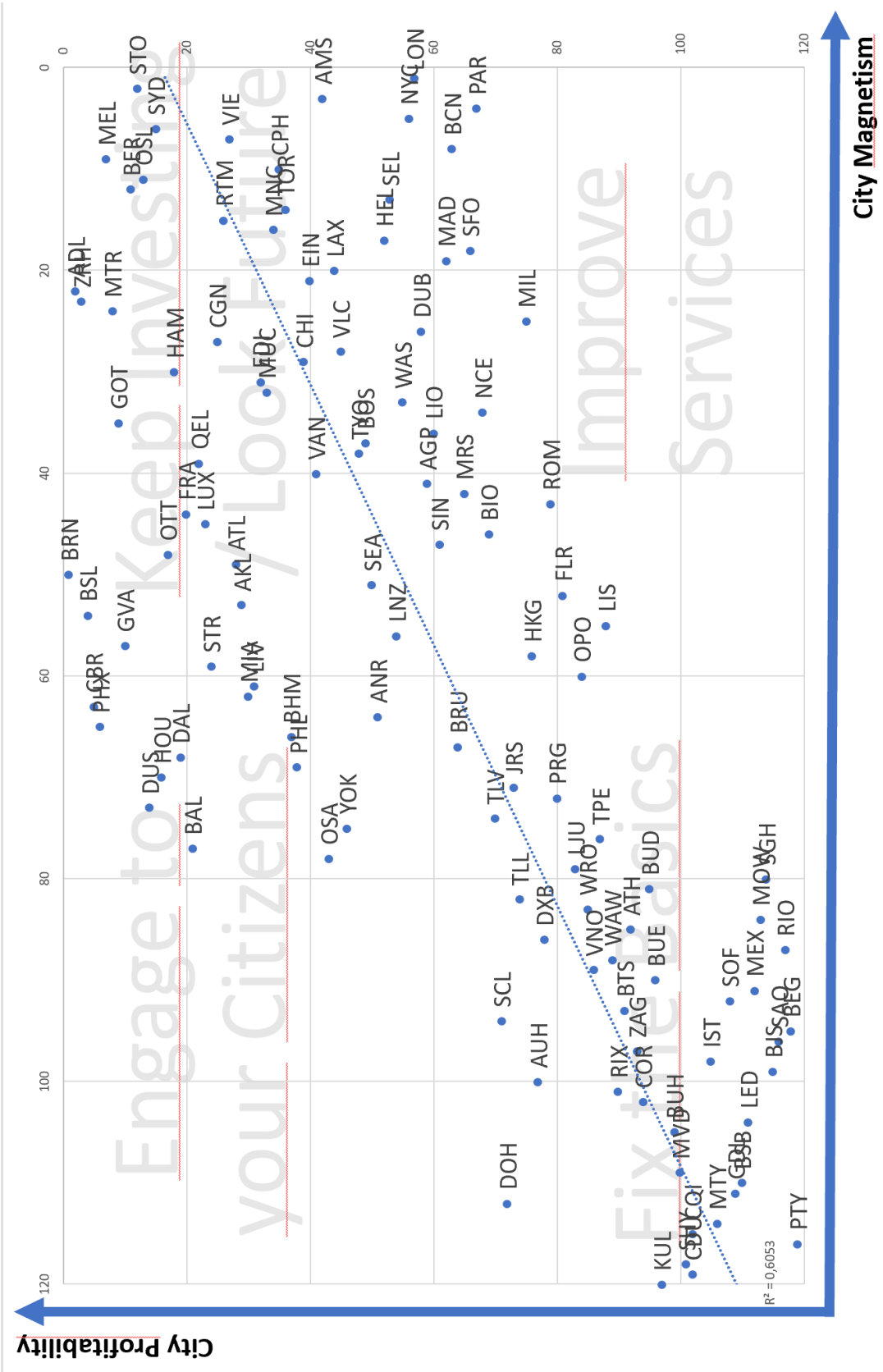
City	Country	MAGNETISM	PROFITABILITY	ATTRACTIVENESS	ATTRACTIVENESS INDEX
Melbourne	Australia	9,23	9,01	83,16	**1**
Adelaide	Australia	8,34	9,96	83,09	**2**
Stockholm	Sweden	9,62	8,39	80,74	**3**
Zurich	Switzerland	8,32	9,46	78,71	**4**
Berlin	Germany	8,95	8,54	76,41	**5**
Bern	Switzerland	7,47	10,00	74,75	**6**
Sydney	Australia	9,41	7,88	74,19	**7**
Montreal	Canada	8,26	8,75	72,28	**8**
Oslo	Norway	9,02	7,97	71,86	**9**
Gothenburg	Sweden	8,04	8,73	70,23	**10**
Basel	Switzerland	7,34	9,30	68,32	**11**
Vienna	Austria	9,34	7,26	67,87	**12**
Canberra	Australia	7,20	9,25	66,57	**13**
Phoenix	United States	7,15	9,11	65,08	**14**
Amsterdam	Netherlands	9,61	6,67	64,07	**15**
Copenhagen	Denmark	9,22	6,88	63,46	**16**
Hamburg	Germany	8,21	7,72	63,36	**17**
Rotterdam	Netherlands	8,72	7,26	63,35	**18**
Geneva	Switzerland	7,29	8,57	62,50	**19**
Toronto	Canada	8,89	6,83	60,70	**20**
London	United Kingdom	10,00	6,07	60,65	**21**
Manchester	United Kingdom	8,70	6,95	60,41	**22**
Cologne	Germany	8,21	7,30	59,92	**23**
Frankfurt	Germany	7,76	7,67	59,53	**24**
Wellington	New Zealand	7,92	7,41	58,69	**25**
Ottawa	Canada	7,58	7,73	58,52	**26**
New York City	United States	9,48	6,07	57,49	**27**
Edinburgh	United Kingdom	8,16	6,96	56,84	**28**
Luxembourg	Luxembourg	7,74	7,34	56,82	**29**
Eindhoven	Netherlands	8,35	6,76	56,44	**30**
Munich	Germany	8,09	6,95	56,24	**31**
Los Angeles	United States	8,45	6,63	56,05	**32**
Chicago	United States	8,21	6,79	55,73	**33**
Seoul	South Korea	8,93	6,18	55,19	**34**
Dallas	United States	7,04	7,71	54,28	**35**
Valencia	Spain	8,21	6,61	54,28	**36**
Atlanta	United States	7,50	7,24	54,25	**37**
Houston	United States	6,87	7,87	54,02	**38**
Helsinki	Finland	8,62	6,25	53,90	**39**
Barcelona	Spain	9,30	5,79	53,83	**40**
Dusseldorf	Germany	6,70	7,96	53,31	**41**

Stuttgart	Germany	7,28	7,32	53,25	**42**
Vancouver	Canada	7,92	6,69	52,99	**43**
Auckland	New Zealand	7,35	7,15	52,54	**44**
Miami	United States	7,23	7,02	50,79	**45**
Boston	United States	7,97	6,35	50,59	**46**
Paris	France	9,49	5,33	50,57	**47**
Liverpool	United Kingdom	7,24	6,99	50,55	**48**
Tokyo	Japan	7,93	6,36	50,43	**49**
Madrid	Spain	8,58	5,82	49,92	**50**
Dublin	Ireland	8,24	6,05	49,87	**51**
Washington, D.C.	United States	8,09	6,15	49,69	**52**
Birmingham	United Kingdom	7,12	6,83	48,58	**53**
Lyon	France	8,00	5,97	47,82	**54**
Philadelphia	United States	6,95	6,82	47,40	**55**
San Francisco	United States	8,59	5,51	47,34	**56**
Málaga	Spain	7,85	6,03	47,33	**57**
Seattle	United States	7,39	6,33	46,78	**58**
Baltimore	United States	6,26	7,46	46,70	**59**
Singapore	Singapore	7,73	5,87	45,38	**60**
Linz	Austria	7,30	6,18	45,08	**61**
Antwerp	Belgium	7,15	6,26	44,78	**62**
Marseille	France	7,84	5,55	43,50	**63**
Yokohama	Japan	6,56	6,42	42,12	**64**
Nice	France	8,07	5,21	42,09	**65**
Osaka	Japan	6,19	6,64	41,11	**66**
Brussels	Belgium	7,08	5,70	40,39	**67**
Bilbao	Spain	7,73	5,12	39,56	**68**
Milan	Italy	8,25	4,20	34,63	**69**
Rome	Italy	7,79	3,95	30,78	**70**
Tel Aviv	Israel	6,58	4,63	30,43	**71**
Jerusalem	Israel	6,77	4,48	30,38	**72**
Hong Kong	Hong Kong	7,28	4,04	29,46	**73**
Florence	Italy	7,36	3,87	28,49	**74**
Porto	Portugal	7,26	3,78	27,43	**75**
Prague	Czech Republic	6,76	3,95	26,71	**76**
Lisbon	Portugal	7,32	3,50	25,63	**77**
Tallinn	Estonia	5,74	4,27	24,54	**78**
Ljubljana	Slovenia	5,98	3,82	22,86	**79**
Santiago	Chile	4,91	4,57	22,44	**80**
Taipei	Taiwan	6,30	3,56	22,42	**81**
Dubai	United Arab Emirates	5,34	3,97	21,16	**82**
Wroclaw	Poland	5,72	3,57	20,42	**83**
Vilnius	Lithuania	5,11	3,57	18,20	**84**
Athens	Greece	5,64	3,19	17,97	**85**
Budapest	Hungary	5,85	3,03	17,70	**86**

Abu Dhabi	United Arab Emirates	4,44	3,98	17,69	**87**
Warsaw	Poland	5,19	3,41	17,67	**88**
Doha	Qatar	3,76	4,53	17,04	**89**
Bratislava	Slovakia	4,96	3,35	16,60	**90**
Buenos Aires	Argentina	5,11	3,01	15,36	**91**
Riga	Latvia	4,43	3,39	15,00	**92**
Zagreb	Croatia	4,62	3,08	14,24	**93**
Córdoba	Argentina	4,36	3,06	13,36	**94**
Shanghai	China	5,90	2,23	13,13	**95**
Moscow	Russia	5,67	2,25	12,74	**96**
Kuwait City	Kuwait	1,84	6,41	11,81	**97**
Sofia	Bulgaria	5,03	2,33	11,73	**98**
Istanbul	Turkey	4,61	2,48	11,45	**99**
Mexico City	Mexico	5,06	2,25	11,40	**100**
Bucharest	Romania	4,16	2,73	11,35	**101**
Montevideo	Uruguay	3,94	2,72	10,71	**102**
Rio de Janeiro	Brazil	5,20	2,02	10,47	**103**
Sao Paulo	Brazil	4,66	2,18	10,18	**104**
Beijing	China	4,57	2,22	10,17	**105**
St Petersburg	Russia	4,20	2,26	9,52	**106**
Kuala Lumpur	Malaysia	3,30	2,83	9,32	**107**
Belgrade	Serbia	4,78	1,91	9,13	**108**
Shenyang	China	3,49	2,59	9,02	**109**
Chongqing	China	3,58	2,51	9,00	**110**
Guadalajara	Mexico	3,81	2,32	8,85	**111**
Brasilia	Brazil	3,87	2,28	8,83	**112**
Monterrey	Mexico	3,68	2,40	8,82	**113**
Ankara	Turkey	3,16	2,74	8,66	**114**
Chengdu	China	3,39	2,51	8,52	**115**
Shenzhen	China	3,07	2,35	7,21	**116**
Bogota	Colombia	4,33	1,63	7,07	**117**
Kiev	Ukraine	4,06	1,71	6,95	**118**
Guangzhou	China	2,77	2,51	6,95	**119**
Panama City	Panama	3,53	1,90	6,69	**120**
Medellín	Colombia	3,27	1,85	6,05	**121**
Bangkok	Thailand	3,75	1,54	5,75	**122**
Cape Town	South Africa	4,15	1,15	4,77	**123**
New Delhi	India	2,79	1,71	4,77	**124**
Quito	Ecuador	2,95	1,61	4,73	**125**
Durban	South Africa	3,25	1,37	4,46	**126**
Johannesburg	South Africa	3,49	1,24	4,34	**127**
Lima	Peru	2,93	1,44	4,22	**128**
Mumbai	India	2,75	1,51	4,15	**129**
Bangalore	India	2,53	1,62	4,08	**130**
Manila	Philippines	3,23	1,25	4,05	**131**
Jakarta	Indonesia	3,96	1,00	3,96	**132**

Riyadh	Saudi Arabia	1,00	3,82	3,82	**133**
Hanoi	Vietnam	2,89	1,23	3,54	**134**
Tunis	Tunisia	2,23	1,54	3,44	**135**
Casablanca	Morocco	2,41	1,25	3,01	**136**
La Paz	Bolivia	1,78	1,60	2,86	**137**
Ho Chi Minh City	Vietnam	1,97	1,42	2,80	**138**
Cairo	Egypt	2,10	1,04	2,18	**139**
Asuncion	Paraguay	1,71	1,21	2,07	**140**

XLVII.- AttractiveCities. City Magnetism vs City Profitability Quadrants



XLVIII.- AttractiveCities vs Population vs GDP/Capita

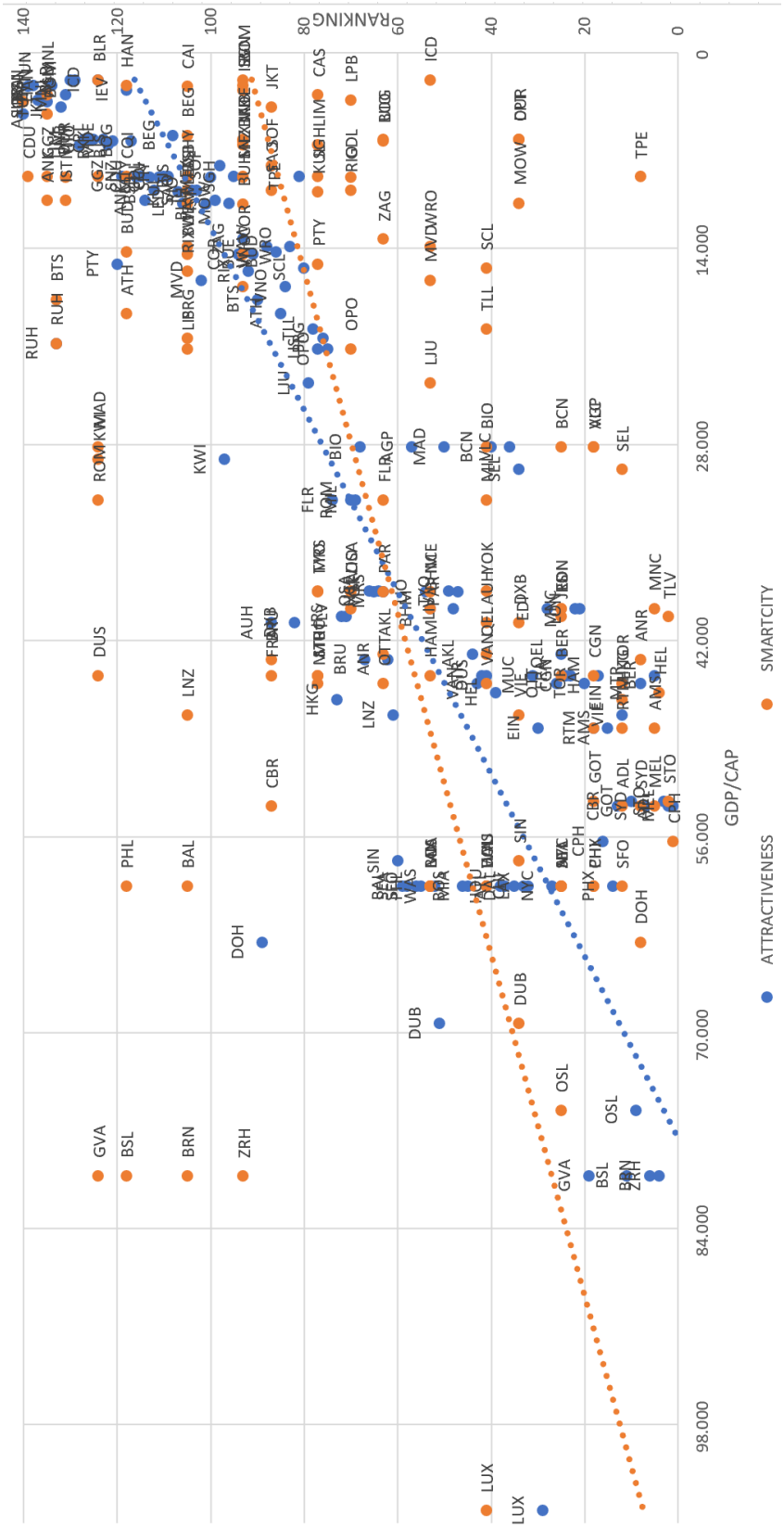
City	Country	POPULATION	MAGNETISM	PROFITABILITY	ATTRACTIVENESS	SMART CITY	GDP/ CAP	UNLOCODE	SMART vs ATTRACTIVE
Zurich	Switzerland	810.000	23	3	4	93	80.190	ZRH	89
Vienna	Austria	1.795.000	7	27	12	34	47.291	VIE	22
Berlin	Germany	4.120.000	12	11	5	25	44.470	BER	20
Amsterdam	Netherlands	1.660.000	3	42	15	5	48.223	AMS	-10
Munich	Germany	2.045.000	32	33	31	77	44.470	MUC	46
Geneva	Switzerland	620.000	57	10	19	124	80.190	GVA	105
Vancouver	Canada	2.335.000	40	41	43	41	45.032	VAN	-2
Dusseldorf	Germany	6.665.000	73	14	41	124	44.470	DUS	83
Sydney	Australia	4.390.000	6	15	7	8	53.800	SYD	1
Toronto	Canada	6.635.000	14	36	20	12	45.032	TOR	-8
Melbourne	Australia	4.305.000	9	7	1	5	53.800	MEL	4
Bern	Switzerland	215.000	50	1	6	105	80.190	BRN	99
San Francisco	United States	6.540.000	18	66	56	12	59.532	SFO	-44
Copenhagen	Denmark	1.305.000	10	35	16	1	56.308	CPH	-15
Boston	United States	7.315.000	37	49	46	53	59.532	BOS	7
Paris	France	10.980.000	4	67	47	63	38.477	PAR	16
Ottawa	Canada	1.020.000	48	17	26	63	45.032	OTT	37
London	United Kingdom	10.585.000	1	57	21	25	39.720	LON	4
Frankfurt	Germany	1.965.000	44	20	24	87	44.470	FRA	63
Stockholm	Sweden	1.565.000	2	12	3	2	53.442	STO	-1
New York City	United States	21.575.000	5	56	27	25	59.532	NYC	-2
Auckland	New Zealand	1.530.000	53	29	44	63	42.941	AKL	19
Singapore	Singapore	5.930.000	47	61	60	34	57.714	SIN	-26
Adelaide	Australia	1.185.000	22	2	2	12	53.800	ADL	10
Canberra	Australia	435.000	63	5	13	87	53.800	CBR	74
Hamburg	Germany	2.115.000	30	18	17	53	44.470	HAM	36
Montreal	Canada	3.585.000	24	8	8	77	45.032	MTR	69
Washington, D.C.	United States	5.180.000	33	55	52	41	59.532	WAS	-11
Tokyo	Japan	38.050.000	38	48	49	77	38.428	TYO	28
Basel	Switzerland	535.000	54	4	11	118	80.190	BSL	107
Oslo	Norway	1.025.000	11	13	9	25	75.505	OSL	16
Wellington	New Zealand	450.000	39	22	25	41	42.941	QEL	16
Chicago	United States	9.160.000	29	39	33	18	59.532	CHI	-15
Helsinki	Finland	1.250.000	17	52	39	4	45.703	HEL	-35
Luxembourg	Luxembourg	116.000	45	23	29	41	104.103	LUX	12
Seattle	United States	3.860.000	51	50	58	25	59.532	SEA	-33
Brussels	Belgium	2.140.000	67	64	67	87	43.324	BRU	20
Dublin	Ireland	1.220.000	26	58	51	34	69.331	DUB	-17
Stuttgart	Germany	1.400.000	59	24	42	77	44.470	STR	35

Barcelona	Spain	4.840.000	8	63	40	25	28.157	BCN	-15
Los Angeles	United States	15.620.000	20	44	32	53	59.532	LAX	21
Milan	Italy	5.290.000	25	75	69	41	31.953	MIL	-28
Madrid	Spain	6.385.000	19	62	50	124	28.157	MAD	74
Baltimore	United States	2.335.000	77	21	59	105	59.532	BAL	46
Seoul	South Korea	24.210.000	13	53	34	12	29.743	SEL	-22
Philadelphia	United States	5.575.000	69	38	55	118	59.532	PHL	63
Dallas	United States	6.600.000	68	19	35	41	59.532	DAL	6
Lyon	France	1.665.000	36	60	54	70	38.477	LIO	16
Edinburgh	United Kingdom	505.000	31	32	28	25	39.720	EDI	-3
Linz	Austria	260.000	56	54	61	105	47.291	LNZ	44
Lisbon	Portugal	2.715.000	55	88	77	105	21.136	LIS	28
Phoenix	United States	4.365.000	65	6	14	18	59.532	PHX	4
Houston	United States	6.285.000	70	16	38	41	59.532	HOU	3
Rome	Italy	3.970.000	43	79	70	124	31.953	ROM	54
Yokohama	Japan	38.050.000	75	46	64	41	38.428	YOK	-23
Cologne	Germany	2.175.000	27	25	23	18	44.470	CGN	-5
Florence	Italy	835.000	52	81	74	63	31.953	FLR	-11
Prague	Czech Republic	1.400.000	72	80	76	105	20.368	PRG	29
Málaga	Spain	730.000	41	59	57	18	28.157	AGP	-39
Hong Kong	Hong Kong	7.380.000	58	76	73	12	46.194	HKG	-61
Birmingham	United Kingdom	2.565.000	66	37	53	53	39.720	BHM	0
Liverpool	United Kingdom	885.000	61	31	48	70	39.720	LIV	22
Atlanta	United States	5.325.000	49	28	37	25	59.532	ATL	-12
Miami	United States	6.195.000	62	30	45	53	59.532	MIA	8
Eindhoven	Netherlands	340.000	21	40	30	18	48.223	EIN	-12
Rotterdam	Netherlands	2.675.000	15	26	18	12	48.223	RTM	-6
Manchester	United Kingdom	2.705.000	16	34	22	5	39.720	MNC	-17
Marseille	France	1.630.000	42	65	63	77	38.477	MRS	14
Nice	France	980.000	34	68	65	53	38.477	NCE	-12
Osaka	Japan	17.165.000	78	43	66	70	38.428	OSA	4
Valencia	Spain	1.595.000	28	45	36	18	28.157	VLC	-18
Antwerp	Belgium	1.020.000	64	51	62	8	43.324	ANR	-54
Warsaw	Poland	2.285.000	88	89	88	105	13.812	WAW	17
Dubai	United Arab Emirates	3.990.000	86	78	82	34	40.699	DXB	-48
Taipei	Taiwan	8.605.000	76	87	81	8	8.827	TPE	-73
Tallinn	Estonia	380.000	82	74	78	41	19.705	TLL	-37
Abu Dhabi	United Arab Emirates	1.840.000	100	77	87	41	40.699	AUH	-46
Budapest	Hungary	2.495.000	81	95	86	118	14.225	BUD	32
Ljubljana	Slovenia	537.712	79	83	79	53	23.597	LJU	-26
Vilnius	Lithuania	505.000	89	86	84	93	16.681	VNO	9

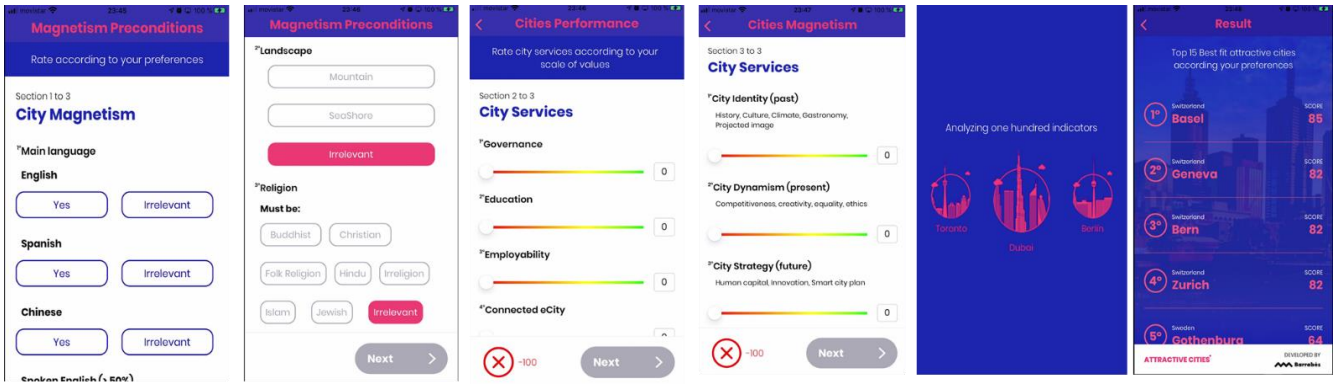
Bilbao	Spain	780.000	46	69	68	41	28.157	BIO	-27
Bratislava	Slovakia	659.578	93	91	90	133	17.605	BTS	43
Gothenburg	Sweden	605.000	35	9	10	18	53.442	GOT	8
Riga	Latvia	595.000	101	90	92	105	15.594	RIX	13
Buenos Aires	Argentina	15.520.000	90	96	91	105	14.402	BUE	14
Kuala Lumpur	Malaysia	7.820.000	120	97	107	77	9.945	KUL	-30
Montevideo	Uruguay	1.320.000	109	100	102	53	16.246	MVD	-49
Santiago	Chile	6.350.000	94	71	80	41	15.346	SCL	-39
Athens	Greece	3.470.000	85	92	85	118	18.613	ATH	33
Shanghai	China	24.115.000	80	114	95	77	8.827	SGH	-18
Zagreb	Croatia	705.000	97	93	93	63	13.295	ZAG	-30
Porto	Portugal	1.490.000	60	84	75	70	21.136	OPO	-5
Panama City	Panama	1.595.000	116	119	120	77	15.088	PTY	-43
Wroclaw	Poland	620.000	83	85	83	53	13.812	WRO	-30
Medellín	Colombia	3.990.000	121	120	121	93	6.302	MDE	-28
Sofia	Bulgaria	1.330.000	92	108	98	87	8.032	SOF	-11
Beijing	China	21.250.000	99	115	105	124	8.827	BJS	19
Tel Aviv	Israel	3.465.000	74	70	71	2	40.270	TLV	-69
Mexico City	Mexico	20.565.000	91	112	100	93	8.903	MEX	-7
Bucharest	Romania	2.110.000	105	99	101	93	10.814	BUH	-8
Córdoba	Argentina	1.620.000	102	94	94	93	14.402	COR	-1
Bangkok	Thailand	15.975.000	113	128	122	93	6.594	BKK	-29
Brasilia	Brazil	3.300.000	110	110	112	105	9.821	BSB	-7
Jerusalem	Israel	880.000	71	73	72	25	40.270	JRS	-47
Monterrey	Mexico	4.295.000	114	106	113	131	8.903	MTY	18
Guangzhou	China	19.965.000	130	104	119	135	8.827	GGZ	16
Sao Paulo	Brazil	21.100.000	96	116	104	87	9.821	SAO	-17
Cape Town	South Africa	3.980.000	106	138	123	34	6.161	CPT	-89
Asuncion	Paraguay	2.860.000	139	137	140	135	4.366	ASU	-5
Rio de Janeiro	Brazil	11.990.000	87	117	103	70	9.821	RIO	-33
Istanbul	Turkey	13.995.000	98	105	99	131	10.541	IST	32
Lima	Peru	11.355.000	127	130	128	77	6.572	LIM	-51
Doha	Qatar	1.745.000	112	72	89	8	63.506	DOH	-81
Bogota	Colombia	9.965.000	103	123	117	63	6.302	BOG	-54
Durban	South Africa	3.515.000	122	132	126	34	6.161	DUR	-92
Guadalajara	Mexico	4.830.000	111	109	111	70	8.903	GDL	-41
Johannesburg	South Africa	9.115.000	117	135	127	93	6.161	JNB	-34
Tunis	Tunisia	2.280.000	134	127	135	140	3.491	TUN	5
Quito	Ecuador	2.445.000	126	125	125	63	6.199	UIO	-62
Shenzhen	China	12.905.000	125	107	116	93	8.827	SNZ	-23
Kuwait City	Kuwait	4.860.000	137	47	97	124	29.040	KWI	27
Moscow	Russia	16.855.000	84	113	96	34	10.743	MOW	-62
Belgrade	Serbia	1.090.000	95	118	108	105	5.900	BEG	-3
Chengdu	China	11.430.000	119	102	115	139	8.827	CDU	24
St Petersburg	Russia	5.175.000	104	111	106	105	10.743	LED	-1
Manila	Philippines	24.650.000	123	133	131	135	2.989	MNL	4
Kiev	Ukraine	2.845.000	107	121	118	93	2.640	IEV	-25

Casablanca	Morocco	4.410.000	133	134	136	77	3.007	CAS	-59
Ho Chi Minh City	Vietnam	10.690.000	136	131	138	93	2.343	SGN	-45
Jakarta	Indonesia	32.275.000	108	140	132	87	3.847	JKT	-45
Chongqing	China	8.875.000	115	102	110	118	8.827	CQI	8
Riyadh	Saudi Arabia	6.220.000	140	82	133	133	20.761	RUH	0
Ankara	Turkey	4.850.000	124	98	114	135	10.541	ANK	21
Hanoi	Vietnam	8.140.000	128	136	134	118	2.343	HAN	-16
Mumbai	India	23.265.000	131	129	129	93	1.940	BOM	-36
Shenyang	China	8.095.000	118	101	109	105	8.827	SHY	-4
Bangalore	India	10.920.000	132	124	130	124	1.940	BLR	-6
New Delhi	India	27.280.000	129	122	124	53	1.940	ICD	-71
La Paz	Bolivia	1.990.000	138	126	137	70	3.394	LPB	-67
Cairo	Egypt	16.545.000	135	139	139	105	2.413	CAI	-34

XLIX.- AttractiveCities vs SmartCities by GDP



L.- AttractiveCities App downloading QR Codes & App Screenshots



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As explained, Attractive Cities are made by an intertwined combination of Humanism, Urbanism and Technology. Let's present the Bibliography grouped by these three areas and their associated disciplines. (in alphabetical order inside each area) for better understanding.

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(see Appendix XXII).

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