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Background contextualisation: introducing the new paradigm

Throughout the history of humankind the whole context of competitiveness in society has been developed as a consequence of a dynamic set of variables. Natural resource management, environmental conditions, industrial policies and economic power have shaped cities and directly influenced modern urban lifestyles. The 20th century has seen the explosion of megalopolises around the globe. Cities have attracted and concentrated a massive number of people, generating new problems of management and creating huge challenges not only for the public sector – in managing limited resources – but also for the private sector by pushing companies to promote continuous adaptation in business to answer the new consumption demands. By 2030 over 70% of the world's population is likely to be concentrated in cities, having a dramatic impact in our lifestyle. Some countries that are still in the process of urbanisation will face mass migration of their population in the coming years. How to promote inclusive and sustainable competitiveness is one of our greatest challenges.

The disruption of the fourth industrial revolution

These outstanding transformations in our society are happening in parallel to another rising megatrend: the fourth industrial revolution. In the first industrial revolution, water and steam energy were used to replace manpower and mechanise production. The second revolution brought the concept of mass production through the use of electricity. The third revolution was evidenced by the use of information technology and electronic means to automatise the production. The fourth industrial revolution, probably one of the most disruptive, is bringing a new perspective of time and space by combining physical, digital and biological domains.

The emergence of new economies

Against this backdrop, our society is evolving at the pace of rapid technological change in a context shaped by high levels of volatility, uncertainty, complexity

and ambiguity (Bennet & Lemoine, 2014). This is transforming the economy into a new, unique format with four main dimensions:

The creative economy

The creative economy redefines the economic system based on the use of creativity as added value for the local economy. It also suggests that the promotion and full support of a creative class, as proposed by Richard Florida, may be a factor behind the blooming of prosperous high-tech clusters such as Silicon Valley in California, Austin Technology Cluster in Texas and East London Tech City or Silicon Roundabout, the new paradise for world-class Fintech start-ups (Florida, 2014).

The concept became fashionable in 2001, when John Howkins applied it to 15 different industry sectors from the arts to technology. Nowadays the approach of the creative economy is even wider, including services, cultural goods, toys, games and is one of the main areas for research and development departments.

For some researchers, creativity nowadays has the same impact on our lives and in the development of the fourth industrial revolution as steam power and electricity had in the 19th and early 20th centuries.

The sharing economy

As a consequence of the creative economy and the rapid evolution of information and communication technologies, society is evolving new collective behaviour. Another important milestone to understand the phenomena behind the shift in consumption behaviour was the 2008 global crisis. Not only did a real need to save, reuse and divide resources emerge, it also brought about the questioning of a capitalist system based on the values of consumerism and materialism and an economic system driven by consumer spending.

Against this background, the concept of the sharing economy is related to solutions based on peer-to-peer interaction. "The sharing economy is an emerging economic-technological phenomenon that is fueled by developments in information and communications technology (ICT), growing consumer awareness, proliferation of collaborative web communities as well as social commerce/sharing" (Hamari, Sjöklint et al., 2016). Recently, revolutionary services such as Airbnb and Uber are deeply disrupting our traditional urban services marketplace and bringing a new dimension to the provision and delivery of services. This sharing behaviour that is emerging in our modern society is definitely shaping a new idea of "access over ownership". This new scheme will affect the whole global production and distribution chain and will promote the rise of new business and innovation models.

The circular economy

The idea behind the circular economy is to take a new approach to production cycles, creating a conscious and sustainable reuse of the

resources. The circular economy is characterised by three main principles:[1]
1) The preservation and enhancement of natural capital by managing finite stocks and harmonising renewable resources flow; 2) The optimisation of the resources by circulating products, components and materials; And, 3) the fostering of system effectiveness by minimising systematic leakage and negative externalities. In the circular economy approach there is no waste. It largely differs from the traditional concept of the linear economy where the cycle flows from raw materials to transformation to use and finally waste. The application of this concept requires a deep mindset change not only for consumers, but also for manufacturing as it entails the implementation of a new system of production and a new product design process. The same concept can be applied to cities and public management and services, implying a different relationship between citizens and local government. We can already see the influence of the circular economy in some products: BMW – seating made from recycled fibres in the electric BMW i3; Ford – a hybrid fibre for seating partly using recycled plastic; Jaguar Land Rover – aluminium that is up to 50% recycled for car body parts; Renault – reconditioning old engines to prevent contamination of the local environment when engines are disposed of in landfill.

Denmark hosts many businesses piloting circular economy solutions. In Copenhagen a local bike company called Baisikerli uses no raw materials to produce "new products": it only uses old abandoned bikes.[2] They are shipped to east Africa to be repaired and sold on the market, helping to foster the local economy. Waste management is another successful case from Denmark where one third of all urban waste produced in the cities is recycled to produce heat and power generation. The Ellen MacArthur Foundation[3] has dedicated a whole website just to promoting and disseminating successful circular economy cases from around the world.

Co-creation

Another important idea the creative economy is seeding in our modern society is the sense of co-creation. This is one of the main features of the millennial generation.[4] The new breed of start-ups are being born with co-creation already in their DNA, welcoming open and actively external collaboration from employees, suppliers, customers and even competitors. Open data and open application programming interfaces (APIs) are becoming the standard, not only in the private sector, but also in the public spheres. Some cities are now trying to promote sustainable growth by engaging their citizens in a deeper, more responsible and long-term oriented process of co-creation.

From the perspective of a Wise City, we can develop this concept even further by having citizens co-create alongside public management, not only suggesting changes or reporting problems, but also by using public open data to develop and deliver new urban services. Following the same footsteps, cities can also boost public projects through modern tools such as crowdfunding, the collective raising of money to promote ventures or projects from a wide number of ordinary people. Far beyond a mode of subsidising, the idea brings in citizens as active stakeholders by fostering entrepreneurship, with a double return of investment: potential dividends as shareholders and a better quality of life for them and their livelihoods.

1. http://www.coara.co.uk/definitive-guide-circular-economy-businesses/
2. http://www.worldwatch-europe.org/node/152
3. https://www.ellenmacarthurfoundation.org/case-studies
4. Millennials Coming of Age Infographic. (2016). Retrieved from: http://www.goldmansachs.com/our-thinking/pages/millennials/

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Challenges

As a result of the intense urban migration the world has been facing in the last decades and with the "unplanned" development of our cities, several solutions have been developed and tested in different fields since the eighties. A consequence of this attempt to solve urban problems is the rise of the "Smart City" concept. Around the world old cities have been retrofitted and some brand new cities are being built on greenfield land, fully planned and oriented to be smart from their first draft plans. The older and more developed a city is, the more complex it is to retrofit and adapt. Emerging economies such as China and India are heavily investing in cities that are forged to be models of sustainable urban life, combining the latest high-end information and communication technologies with state-of-the-art architectural design fully integrated into ubiquitous urban environments. These huge projects are getting global attention and attracting talented professionals, large corporations and massive investments. However some projects, mainly the ones related to a greenfield operation such as Masdar City in the United Arab Emirates;[5] King Abdullah Economic City in Saudi Arabia;[6] and PlanIT Valley near Porto, Portugal are struggling to attract not only investments, but also people to populate them. Probably the most successful case to date is Songdo International Business District, a $35 billion project launched in 2004 in South Korea, that already has a population of almost 70,000 people and is forecasted to reach 300,000 commuters by 2018.

One of the first references to the term "smart growth" is related to an experiment in the US to regulate and incentivise policies for the development of cities. Portland, in Oregon, is a well-known successful example of these first models. A Smart City is defined as a city that uses information and communications technologies to make the critical infrastructure components and services of a city such as administration, education, healthcare, public safety, real estate, transportation, and utilities, in a more aware, interactive, and efficient way (Bélissent, 2010). Building smart cities is not just a fashion trend; they are needed by the entire civilisation as a sustainable solution for urban life (Townsend, 2013). The Smart City concept is so vast and abstract that a complete, precise understanding can only be obtained if several definitions, from different authors, backgrounds and dates are analysed together. Hollands stated that: "… we know surprisingly little about so-called smart cities, particularly in terms of what the label ideologically reveals as well as hides" (2008).

Solutions relating to water management, clean and renewable energies, smart grids, intelligent traffic control, electronic government, urban mobility, wireless internet accessibility and waste management are just a few examples that can be highlighted in a long list of problem-oriented proposed solutions. The challenge is not technology per se, but how to design and use technology for the real benefit of citizens' well-being.

Trends

Due to the radical changes we are facing, competitiveness and welfare are already highly influenced by our cities' ecosystem. The right balance between economic, social and environmental sustainability is one of the critical success factors. A full citizen-centred approach in urban projects

supported by a deep engagement of the civil society can foster economic growth and contribute to mitigating the social gap. Access over ownership and full inclusion over welfarism are key governance principles for managing cities in the near future.

The new urban mobility

Traffic management and transportation systems are recognised as one of the most chaotic problems a metropolis can face (Batty, Axhausen et al., 2012). Outstanding results have been achieved in projects developed in this field like the one in Singapore. Singapore's is easily one of the most developed transportation systems in the world. By combining investment in modern infrastructure, high technology and public policies the country has an efficient system with a 95% satisfaction index among users. A complex programme called "travel smart" has been used since 1997. It encourages workers and companies to shift their working schedule to promote off-peak travel. Traffic management programmes in Tokyo and Seoul are also relevant references to demonstrate how developed research in this field is, with a combination of innovation, applied engineering and management that is effective in managing mobility

New disruptive technologies are also rising in our cities. Autonomous cars are no longer utopian – they are already being tested in Singapore. The world's first self-driving taxis are a project headed by a company called Nutonomy, a start-up founded by two researchers from the Massachusetts Institute of Technology. Drones are also already part of our reality. As well as carrying goods, drones will soon be transporting people. A Chinese manufacturing company called EHang has stated that self-flying craft could be used as a smart fully autonomous drone taxi. They have already presented their prototype called 184, an all-electric vehicle with four arms and a total of eight propellers. These developments present huge challenges for cities: from the management of aerial space to the transformation of traffic management and citizen safety to name but a few.

Artificial intelligence applied to public security

A second big trend is the use of artificial intelligence and deep learning to develop new services for cities. Undoubtedly, public safety is currently one of the main issues. Latin American and African countries are struggling with high levels of street criminality while Europe and the United States are being hit by terrorism. Our modern society is willing to trade privacy for security but it is still not enough to fully prevent or solve the problem. It is here that technology is starting to play a big role. State-of-the-art video surveillance systems are using artificial intelligence to combine high definition cameras with social networks such as Facebook and Twitter on time messages, not only to react quickly to threatening situations but also to predict crimes before they happen.

Rising unemployment

As a consequence of the digitalisation of the economy and the robotisation of work, a growing trend will be the substitution of jobs for complex

robots. For the first time, robots are replacing not only blue-collar jobs, but white-collar too in unprecedented rates, especially in traditionally intensive manufacturing industries. Some studies foresee that in the next decades technology could replace workers in 80% of current jobs,[7] which poses a huge challenge for employment policies and inequality. Some cities, such as Utrecht in the Netherlands, are already proposing to test the introduction of a universal basic income as a policy mechanism aimed at addressing this threat. However, there are also some voices that believe that the consequences of this intense process of robotisation will be positive. Philip Jennings,[8] general secretary of UNI Global Union said: "We need some governance to ensure a democratic evolution and that requires public policy discussion. There is the opportunity to shape technology to improve people's lives; through connectivity, education, health. We shouldn't be fearful and fatalist about it." Whereas we still do not know the scope and reach of this trend, we are entering a new paradigm that challenges the traditional view of work in a context of rising unemployment and inequality.

Solutions

The core of any evolutionary urban project is no longer technology but people. Cities also embrace ICT as one of the main drivers of successful implementation of Smart City projects. It is important to reemphasise that the old concept of IT (information technology) was upgraded by the addition of "communication". In this case, communication is related to the capacity not only for one-way flows of information but to creating an interaction between the two sides: one that wants to inform and the other that is using and reacting to the information. And the trend is towards even deeper use of technology in the Internet of Things (IoT) era. Information and communication technology is being used to connect people to people, people to machines and machines to machines. Items in daily use like home appliances, bikes and cars are being connected. Public lighting is becoming smart and connected, as are water meters, car parking and so on. That said, the first step to scale up any tech-based project is to enable complete, ubiquitous and full-time internet connection in the city. The internet is becoming as important as a reliable and stable utilities supply (power, water or gas) to a city.

Scaling up tech projects for inclusive urban development

Case study: The magic box – a "plug-and-play" Internet connection on a national scale.[9]

Athonet is an Italian high-tech company. They have developed a solution to create large-scale internet coverage. They won the Global Mobile Awards 2016 in the category of Best Solution for Growing Smaller or Independent Networks issued by the World Mobile Congress in Barcelona. There are Facebook's partners in the project to take free Wi-Fi worldwide. Athonet has successfully enabled customers worldwide to deploy local internet networks, simply, cost-effectively and in record time. Basically, they can enable a complete full internet network in a vast area with an initial cost of less than 5% of a normal investment budget by replacing all the expensive hardware with simple software running on standard IT servers.

7. http://issues.org/30-3/stuart/
8. https://www.theguardian.com/business/economics-blog/2016/jan/24/4th-industrial-revolution-brings-promise-and-peril-for-humanity-technology-davos
9. http://www.smartscities.com/en/articles/city-scaleup-from-wow-now

Connectivity and internet access are important elements in promoting digital inclusion and facilitating access to information. In this way, cities in developing countries can also benefit from these new disruptive and affordable technologies.

Connectivity also has applications in disaster management. Athonet developed a humanitarian service during the large earthquake in Italy in 2012. Within just a few hours they deployed a complete local wireless internet network in the affected area 35 kilometres north of Bologna. It allowed the Italian civil protection teams to run operations using HD live-streaming videos of the disaster area to control centres, communicating and co-ordinating the activities of emergency personnel and helping save lives. The main competitive advantage of the system is the low initial cost to the government or company seeking to establish city-wide internet networks. It removes the huge barrier to deployment of city-wide networks that comes from the cost of conventional technologies. Costs fall from seven or eight figures to a few thousand dollars. It is a pay-per-use model in which app companies, developers and finally the end-user will pay the bill in the long term.

As the concept is still in development, all the potential applications have still not been fully released. Considering, for example, the great challenge Europe is facing with the refugees, technologies like this could facilitate better management. Recent research done with refugees in Europe revealed that Wi-Fi is one of and perhaps *the* major need when they first reach the camps. "A lack of connectivity constrains the capacity of refugee communities to organize and empower themselves, cutting the path to self-reliance" according to UNHCR.[10]

Smart credit for financial inclusion and economic sustainability

Case: ZmartCredit: New technologies to propel Smart City development.

Smart credit is a concept that is becoming widespread in newly industrialised countries such as Brazil, Mexico and India. These are large, populous countries with young populations. Though they are all huge economies in terms of GDP, credit is not only a local need, it is also an important economic tool to promote economic development and social inclusion. One of the most successful cases in this field is a spin-off called Salaryfits, based in London. They have combined two traditional financial tools to develop the product they call ZmartCredit: salary deduction loans and big data deep integration, powered by a cutting-edge business intelligence platform. The basic solution proposed by Salaryfits is a Business Intelligence (BI) tool to quickly and efficiently integrate the credit offered by local providers into the payroll systems of organisations, regardless of whether the users are public administrations or private companies. Salaryfits will process this information and allow the credit providers to better access the credit profile of the employees of those entities. This technology helps reduce credit risk and enables employees to get interest rates lower than with other modalities. It works well with all stakeholders involved: the local financial institutions and other providers, companies and employees (citizens), who can get access to cost-effective, convenient credit lines, with the possibility of comparing costs and doing simulations

10. http://www.unhcr.org/5770d43c4.pdf

online, in the same way that they currently do when searching for flight tickets and hotel rooms on Kayak or TripAdvisor. Once the individuals decide what the best offer is, they can easily get the credit from the institution chosen and the instalment/repayment will be automatically deducted each month from their salary. It means that it does not matter if you are a citizen or not or whether you have a previous credit record or even a good credit rating, you can get good, fair credit offer whenever you need it. This is process that until now has been totally connected to your social status is becoming smarter and tailored to our new "Smart Citizens" profile.

Back to the challenge of the refugees, this technology could be used to help governments to better manage the huge and intense flux of financial resources. With just one tech solution we could distribute the money to the people in need (refugees) and better manage it, promote the local economy and bring full transparency to the whole process, avoiding traditional problems such as corruption and the misuse of financial resources.

Lessons learned and/or policy recommendations

With all these new paradigms, the whole concept of urban planning and development needs to be adjusted. Previously, the success of a city development project was a matter of "fighting" for budgets, non-repayable loans or grants from national government or financial support from international organisations. This approach is now almost obsolete. Projects were designed to suit the requirements related to these funds rather than to be economically sustainable or to promote the city's real competitive advantages. Solutions were ICT-oriented instead of citizen-centred. Problems are rising due to migration and population concentration, and new wise solutions are being deployed to improve people's well-being. Hence, citizens should be at the core of the new policies, followed by the economic sustainability of any new initiative implemented at the local level. Here is a four-step process that can help policymakers to implement inclusive and sustainable urban projects:

Step 1 - Sharpen the city's pitch

People have a deep connection with their cities, even deeper than with their province, region or country. To understand the unique DNA of the city and translate it in a strategy to develop a wiser city will be crucial for the success of any project. Citizens do not want a new city, they want a better city to live in.

Step 2 - Keep it simple

When thinking about the projects to solve or how to mitigate urban problems very often policymakers use the traditional top-down approach and keep their focus on long-term complex plans. Huge infrastructure changes, billion-dollar master plans and state-of-the-art technology can bring you a well-rounded road map, but is it doable? Does the city have the resources to make it happen? All concepts and applied technologies

should be observed in a harmonious combination between timing and budget and should definitely be focused on making citizen's daily life better. Keeping it simple, and focusing on solutions that can have a deep, positive impact and good results will help the city to attract partners and investors.

Step 3 - Find the right partners

As mentioned above, creative and sharing economies are driving the new economy. Start-ups oriented to urban solutions are emerging around the world. Some of them from newly industrialised markets such as Russia, China, Brazil and India are also showing the world new wise solutions. Probably the challenging reality faced in these countries is helping these enterprises to develop creative and affordable solutions. These companies are striving to go global and prove the effectiveness of their solutions and they need international cases to enhance their portfolio. It means that the city can get good cooperation agreements based on mutually beneficial terms with these companies. Rio de Janeiro, for example, has partnered with WAZE, the world's largest community-based traffic and navigation application, to develop a city traffic management solution on a win-win basis in 2013. Rio solved the problem of few cameras in the city and WAZE was able to develop, pilot and test a new product that is already being fully monetised. The focus lies not in asking for more budget but instead what value the city can offer in order to attract strategic partnerships.

Step 4 - The new 4Ps approach

More than a step, this is a radical shift in the political mindset. One of the most popular and most effective tools to promote investment attraction to public projects is the public-private partnership (PPP). These are basically contracts between the government and the private sector, in which a governmental authority allows the private sector to invest in and operate a public service. It is raising now the concept of PPPPs, public-private-people partnerships, which go deeper into the idea of citizen-centred approaches. People become active stakeholders in the process of planning, developing, testing, implementing and evaluating urban policies.

All in all, a successful model of urban development will go hand in hand with an increased sense of well-being within the city environment. This is particularly relevant because, firstly, the smart cities already built are not delivering the eco-friendly, hyper-connected future they set out to (e.g. Masdar, Songdo, and eco-cities in China) and secondly cities are accommodating more and more inhabitants who do not succeed in achieving a higher quality of life.

Understanding the urban determinants of intercity flows is indispensable to the city's capacity to improve its citizens' well-being (Wall, 2016). Therefore, it is argued that a city (space) depends on "glocal wisdom", which requires an understanding of the interdependency between "world" processes acting upon the city (global and regional competition), and subjective "people" processes within the city (local sustainability). Only by understanding this interdependency can "technology innovation" and "urban planning policy" be used as devices to achieve Wise Cities. Competitiveness needs to be steered at

an urban planning level while taking glocal conditions into account, which is an argument for uniting the theoretical fields of Happiness Economics, Smart Cities, Urban Competitiveness and World City Networks.

References

Batty, M., K. W. Axhausen, F. Giannotti, A. Pozdnoukhov, A. Bazzani, M. Wachowicz, G. Ouzounis and Y. Portugali. "Smart cities of the future". *The European Physical Journal Special To*pics 214(1): 481-518, 2012.

Bennet, N. & Lemoine, G. J. "What VUCA really means for you". *Harvard Business Review*, 2014.

Bélissent, J. "Getting Clever About Smart Cities: New Opportunities Require New Business Models", 2010.

Florida, R. "The Creative Class and Economic Development". *Economic Development Quarterly, 28*(3), 196-205, 2014. DOI:10.1177/0891242414 541693.

Hamari, J., M. Sjöklint and A. Ukkonen. "The sharing economy: Why people participate in collaborative consumption." *Journal of the Association for Information Science & Technology* 67(9): 2047-2059, 2016.

Hollands, R. G. "Will the real smart city please stand up?" *City,* 12(3): 303, 2008.

Tibbits, S. "4D Printing: Multi-Material Shape Change". *Architectural Design* 84: 116-121, 2014.

Townsend, A. M. *Smart cities: big data, civic hackers, and the quest for a new utopia*. New York, NY: W.W. Norton & Company, Inc., 2013. First edition.

Wall, R. *Resilient Cities*. ETH Zurich, 2016.