SMART CITY, SMART BUSINESS: EVOLUTION AND ROLE OF TECHNOLOGY IN THE DEVELOPMENT OF THE SO CALLED "INTELLIGENT COMMUNITIES"

Smart city, smart business: evoluzione e ruolo della tecnologia nello sviluppo delle cosiddette "comunità intelligenti".

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Abstract En: The emerging patterns of urbanization around the world show different scenarios on different continents, requiring different approaches, policies, and strategies. The incredible democratization of ICTs worldwide leads to a discussion on sustainable, resource-saving and resilient smart cities, as well as smart city economic development adapted to different cities, countries and continents. Each city in a given country or continent might have different challenges to the economic development of smart cities. When former rural economies give way to urban economies, which are crucial for GDPs, then the emerging question is what "economic development of smart cities" means. This will be the main issue addressed in this paper.

Abstract It: I modelli emergenti di urbanizzazione in tutto il mondo mostrano svariati scenari in diversi continenti, che richiedono approcci, politiche e strategie eterogenee. L'incredibile spread dello sviluppo delle ICT in tutto il mondo conduce inevitabilmente ad una discussione sulle città intelligenti sostenibili e resilienti, al risparmio di risorse e allo sviluppo economico delle città medesime. Ed infatti, quando l'economia rurale cede il passo all'economia urbana, che contribuisce in larga misura al prodotto interno nazionale, la questione su cui bisogna necessariamente soffermarsi è cosa debba intendersi per sviluppo economico/tecnologico delle c.d. "Smart City". Questa sarà la questione principale affrontata nel paper.

SUMMARY: **1.** Introduction; **2.** Methodology; **3.** What is a Smart City? A definition; **4.** The economic evolution of the Smart City; **5.** The indispensable and essential role of technology; **6.** "New Urban Agenda" and economic development; **7.** Conclusion

1. Introduction.

The adjective "smart" is becoming more and more commonplace. Its etymology leads back to concepts of intelligence, reactivity of the intellect, ample intellectual capacity. In recent years, the adjective *de qua* has been associated with regulatory and administrative policies, local and national, aimed at creating new sustainable "hybrid" realities, i.e. new socio-economic contexts having a significant impact on various areas such as construction, environment, and transport. In particular, the requirements for smart urban environments concern, prevalently, (i) accessibility to mechanisms of sustainable development; (ii) the application - and interconnection - of intelligent mechanisms to urban performances and services, especially based on ICTs; (iii) the promotion of the diffusion of knowledge and the exchange of information between citizens, administrations and third parties.

The importance of Information and Communication Technology (ICT) stands out among the key attributes emerging from the analysis of definitions. Therefore, a Smart City would seem to be first and foremost a “Digital City”. Subsequently, requirements connected to city governance and to the valorisation of human capital and social relations are now imposed alongside technological requirements. In this context, technology - and its synergy with enterprises – takes on a key role in the trilateral relationship among public urban environment, enterprises, and citizens/users. In fact, a Smart City provides technological infrastructure that is innovative and competitive in setting up services for its citizens - meaning highly technical solutions to environmental and service policy problems. "Intelligent" transformation of the city context, therefore, leads to the creation of the evocative and all-encompassing term "Smart City", i.e. a city characterized by the integration of technologically advanced structures and means, and projected towards policies of sustainable growth in order to achieve improvements in quality of life standards.

Considering the above, then, is it possible to argue, *prima facie*, that the goal of a Smart City is mere digitalization? It will be analysed below how Smart Cities, organically following a strategic vision, use ICT tools as an innovative support in management areas and in the provision of public services, thanks to smart businesses and public-private partnerships, to improve liveability and to adapt itself to the needs of its users, promoting its own sustainable development.

2. Methodology.

The methodological preamble of this paper will move, at first, from a "destructured" reading of the model of smart cities, being however aware that only a multidisciplinary approach to the topic (analysing, *de facto*, not only digitization and law but also the economic aspect) can contribute to a correct framing of the topic. And in fact, again from the methodological point of view, this destructuring will be immediately followed by an attempt at a systemic reading of the different subjects

contributing to the definition of the scope of operations in Smart Cities. Both approaches - far from being contradictory - will contribute to a descriptive and analytical interpretation of the complex phenomenon of Smart Cities, to better understand its nature and characteristics.

In this regard, urban sustainability brings within itself the enhancement of different areas of expertise and different levels of government. The objective of this paper is to reflect on Smart Cities in their relationship with businesses, verifying their compatibility with urban planning and sustainable development tools, delimiting the legal perimeter of smart communities in a well-defined framework - both from an objective and functional point of view (as far as regulatory profiles are concerned) and from an exquisitely subjective point of view (identifying the actors called to the realization of smart cities and analysing their inevitable connections and interferences).

3. What is a smart city? A definition.

In our world, cities only take up 2.6% of the planet's surface, but they produce 70% of the global GDP and host more than 50% of the global population. Cities are responsible for 75% of total natural resources usage and for about 70% of greenhouse gas emissions. It is predicted that more than 60% of the global population will live in cities in the future. Cities will also experience proportional economic growth, as well as growing in population: by 2025, the 600 most populated cities alone will generate 65% of the global GDP[1].

This expansion poses risks and opportunities. On the one hand, increased population density within cities makes it possible to capitalise on economies of scale, reducing unit costs for service provision and boosting the advantages of infrastructure efficiency. Moreover, the intensification of social interactions presents a potentially beneficial effect on modernisation, inclusion and growth. On the other hand, increasing urbanisation, if inadequately managed, could contribute to an excessive use of natural resources, as a result of an increasing burden on urban infrastructure and services, such as transport, construction, electricity and water supply and health care. Additionally, as diversity grows among the population, risks of social exclusion and poverty increase as well.

Therefore, based on their function as catalysts for consumption as well as for growth, cities are compelled to carry out sustainability practices on all three of these interlinked angles:

a) environmental sustainability, i.e. preserving the natural ecosystem and its ability to supply resources, its biodiversity and its regenerative capacity;
b) economic sustainability, i.e. stabilising growth and lowering income gaps by way of establishing competitive markets, innovative solutions and optimising public investments;

1 McKinsey Global Institute, *Urban world: Mapping the economic power of cities*, p. 1.

c) social sustainability, i.e. improving the synergy amongst different cultures, religions, ethnicities, as well as civic engagement and social integration[2].

So far and until recently, city authorities only considered smart technologies for the most part as means to enhance efficiency behind the scenes. Sensor data and high-tech command centres symbolised an innovative approach to the management of complex operations and to infrastructure system automation[3].

Today, technology is being introduced more directly into people's lives. Smartphones are now fundamental for city living, providing millions of people with information about transport, road traffic, health services, safety alerts, and community news. After ten years of trial and error, city leaders are beginning to appreciate that smart city strategies begin with people, not technology. "Smartness" does not only mean introducing a digital interface into a traditional analogue infrastructure or simplifying city operations. It is about utilising technology and data deliberately, to make more efficient decisions and provide an increasing quality of life.

Quality of life can be delivered on many different levels, from the very air residents breathe to how safe they feel when walking down the streets. Many digital applications focus on this kind of everyday, very human matters[4].

Even the most state-of-the-art cities still have a long way to go in building solid foundations, carrying out the implementation of all possible applications, and attaining widespread adoption. Effective management is fundamental to smart cities – however, it is not possible for city authorities to carry out everything on their own. Businesses and citizens play an active part in achieving a city's good performance[5].

Hundreds of years ago, Adam Smith maintained that the individual deeds of many self-interested parties merge to build larger benefits to a society. Nowadays, the same kind of "invisible hand" is at play in smart cities. For example, when a company identifies a revenue-producing gap in the market of transport services,

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2 Please see, ALBINO V. (2015), *Smart cities: Definitions, dimensions, and performance*, Journal of Urban Technology, volume 22, number 1, 2015; ANGELIDOU M. (2015), *Smart cities: A conjuncture of four forces*, Cities, 47, pp. 95-106; BISELLO A., VACCARO R., D'ALONZO V. (2017), *Smart energy city development: A story told by urban planners*, Cities, 64, pp. 54-65; BATTY M. (2012), *Big data, smart cities and city planning*, Environment and Planning B: Planning and Design, volume 39, pp. 191-193; CAMPBELL T. (2012), *Beyond Smart Cities: How Cities Network, Learn, and Innovate*, Earthscan, London.

3 PARISIO V. (2018), *Smart cities, digitalizzazione delle pubbliche amministrazioni, diritto: spunti di riflessione*, in Derecho a la ciudad: el reto de las smart cities, a cura di V. Aguado, I. Cudola, V. Parisio e O. Casanovas I Ibanez, Atelier, pp. 157 ss.

4 We find that cities could improve some key quality-of-life indicators by 10-30 percent - numbers that translate into lives saved, reduced crime, shorter commutes, a lower health burden, and carbon emissions averted. Our research also examines the deployment progress made so far in dozens of cities around the world.

5 Many smart city innovations are revenue-producing ventures from private sector companies, and private actors could provide roughly 60 percent of the initial investment required to deploy the full range of current tools.

residents in underdeveloped neighbourhoods can suddenly access new ways to commute to their jobs.

When a resident studies real-time traffic data and therefore sets out to travel at a less busy hour, she refrains from entering the road with her own car, therefore avoiding making congestion worse for everybody. Many single decisions and deeds accumulate, making the city more productive and responsive overall. However, just like authorities at times must dig into the effects caused by Adam Smith's invisible hand, city governments need to coordinate the life of a smart city, react to unintentional aftereffects and guarantee that people benefit equally.

The obligation is clear. Cities come up against unprecedented challenges as populations increase and infrastructure systems feel the strain. Even though societal issues accumulate in cities, cities also constitute the world's best laboratories for solutions. The digital revolution provides cities with new tools for achieving more with less.

What does it really mean to be a "smart city"? For a long time, the definition and even the end target stayed out of focus[6]. The term has been utilised to characterise cities that are environmentally sustainable, those with a high population of knowledge workers, and places with smoothly operating infrastructure and entrepreneurial economies. In time, the concept of creating digitally connected cities became prevalent[7].

Today these ideas are combining. Smart cities are being redefined as places where different actors apply technology and data to make better decisions and bring about a better quality of life. City agencies can utilise data to react to changeable circumstances and to better prepare for what is to come. Well-informed businesses and residents can make decisions that make into more efficient resource usage for the city as a whole. Cities around the globe are dealing with alarming infrastructure challenges, but smart city technologies can modify the very essence and economics of infrastructure. Technology decreases the physical and transaction costs of collecting insight on usage patterns. Having an unprecedented amount of data available, cities can achieve more with their current infrastructure systems. Suitable investments in constructing and maintaining dependable physical infrastructure is still important but including a layer of intelligence makes it possible for cities to boost the scope and lifespan of existing resources. Even if new construction is needed, including smart

6 See ALBINO V. (2015), *Smart cities: Definitions, dimensions, and performance*, Journal of Urban Technology, volume 22, number 1, 2015, which tracks the evolution of the term.
7 In doctrine, CAPROTTI F. (2016), *Eco-cities and the transition to low carbon economies*, Springer, Berlin; CARAGLIU A., DEL BO C. (2011), *Smart cities in Europe*, Journal of urban technology, 18(2), pp. 65-82; COCCHIA A. (2014), *Smart and Digital City: A Systematic Literature Review* in R. P. Dameri and C. Rosenthal, *Smart City. How to Create Public and Economic Value with High Technology in Urban Space*, Springer International Publishing Switzerland, 2014, pp. 13- 43; COLDING J., BARTHEL, S. (2017), *An urban ecology critique on the "Smart City" model*, Journal of Cleaner Production, 164, pp. 95-101; GARAU C., MASALA, F. (2016), *Cagliari and smart urban mobility: Analysis and comparison*, 47, pp. 35-46.

technologies from the start can make the investment go further. Smart systems also accelerate the metabolism of municipal government, providing agencies with the ability to observe events as they occur, comprehend how demand patterns are evolving, and react with speedier and often less expensive solutions. Cities can make data-driven investments with shortened planning cycles.

All of this brings about a higher quality of life in cities. Before a city can become smart, it needs to be connected. The underlying digital infrastructure has to be in place, including a network of data-collecting sensors and devices, comprehensive broadband and wireless networks, and platforms on which data can be stored and shared[8].

Because many applications necessitate that individuals transmit and receive data on the go, smartphones are a crucial element of a smart city. There are now five billion mobile users in the world, and smartphones account for many subscriptions[9]. With the fast development of the Internet of Things (IoT), billions of "dumb" inanimate objects are now "smart" - that is, they have been provided with sensors and actuators and connected to the Internet. The IoT is now at work all around us. RFID tags in packages track cargo shipments, GPS systems accompany drivers to their destinations, and smart thermostats switch off heat and air conditioning when rooms are not in use. Usage has increased as the costs of IoT sensors, processing power, and cloud storage have steadily declined[10].

8 According to FRACCHIA F., PANTALONE P. (2015), *Smart City: condividere per innovare (e con il rischio di escludere?)*, federalismi.it, no. 22/2015, public authorities, faced with the difficult choice between going along with the novelty (which would suggest a "light" regulation, if not a lack of public intervention) and defining a complete regulatory framework, in this case opted for the introduction of rules aimed at least at protecting crucial interests (road traffic, urban order and safety, use of public land). Although it is extremely difficult, in part because of the absence of clear regulatory indications, to provide a legal definition of Smart City, among the factors that contribute to its definition we can nevertheless mention: the use of technology and innovation, the proliferation of "bottom-up" of initiatives (this recalls the horizontal subsidiarity mentioned in art. 118, Cost.), the logic of sharing (through the pooling of a factor, a space, a performance, a resource, a technology, a complex of information).
In this specific context, the role of public administration is not to organise - as with traditional public services - an offer of services on the market to remove the obstacles that prevent substantial equality, but to "mediate" between different private initiatives and allow the drives that arise from society to express themselves in the best way possible, with the aim of including, enhancing human capital and promoting economic development and quality of life in the city (see also PANTALONE P., PIACENTINI M., *Smart city, tecnologia e mercato: quale ruolo per i pubblici poteri?*, Diritto 24).
9 The global number of smartphone users has been projected to hit 6.1 billion by 2020, driven by continuous growth in developing economies. Smartphones are more common in cities than national penetration rates suggest, but the digital divide still persists in both high- and low-income cities. While offline populations can still benefit from some smart city applications running in the background (such as intelligent signals that help the flow of traffic), they do not have access to the full range of smart city programs. This is a particular concern for aspiring smart cities in South Asia, Africa, and Latin America.
10 According to one estimate, the number of connected IoT devices exceeded the world's population in 2017 and the total is projected to dramatically increase from 8.4 billion in

A city with strong communication networks can promptly and securely transmit the data collected by smartphones and other sensors. Cities around the world are prioritizing faster fixed and mobile broadband speeds and decreased latency, which are needed to back ever-growing data usage by residents as well as the development of higher-bandwidth applications. At the same time, less bandwidth-intensive smart city applications can benefit from the rollout of low-power wide-area networks (LPWAN), which enables a wide arrangement of sensors with much lower operating costs. Free Wi-Fi throughout a city is particularly convenient for visitors but also helps residents who do not have access to unlimited mobile data[11].

Open data platforms are the last critical element of the technology base. Smart technologies run on data and cities, with their boundless scale and complexity, produce endless amounts of it. They generate huge volumes of data on traffic flow, public transit systems, energy demand, crime incidents, waste disposal, noise, weather patterns, outbreaks of infectious disease, and countless other aspects of daily life. Yet this data only becomes beneficial once it is made accessible to actors who can develop smart applications out of it. Open data platforms do precisely that. They come in different kinds, from centralized open data portals to specialized real-time travel information platforms. They allow for secure storage and satisfactory access to the different data sources that power a smart city, and they can supply the raw material for continuing innovation[12].

2017 to 20.4 billion by 2020.

11 On this point, EVANS J., KARVONEN A. (2016), *The experimental city*, Routledge, London, 2016; FERRARA R. (2016), *The Smart City and the Green Economy in Europe: a Critical Approach*, Milano; FERRARI G.F. (2020), *Smart City. L'evoluzione di un'idea*, Mimesis; FERRARI G.F. (2017), *La prossima città*, Mimesis; FRACCHIA F. (2013), *Introduzione allo studio del diritto dell'ambiente. Principi, concetti e istituti,* Napoli, 2013, pp. 29 ss.

12 JAMES P. (2014). *Urban sustainability in theory and practice: circles of sustainability,* Routledge, London; JIN J., GUBBI J., MARUSIC S., PALANISWAMI M. (2014), *An Information Framework for Creating a Smart City Through Internet of Things*, Internet of Things Journal, 1(2), pp. 112-121; KANTER R.M. (2017) *Informed and Interconnected: A Manifesto for Smarter Cities*, Harvard Business School Working Paper No. 09-141, Boston. In particular, cities, now the dominant form of human settlement, exemplify and display the fundamental concerns of the human condition. In a period of intensifying globalization, urban life draws people into zones of intense interconnectivity. Cities are places of passion, hopes and dreams. However, they are entering a time of ongoing crisis. All urban settlements "*face a practical crisis of sustainability, just as human beings face a comprehensive crisis of social life on this planet. At the same time, there is an unacknowledged theoretical crisis. Mid-range writing tends to be characterized by disconnected contentions, and false hopes abound. Even as urban living concentrates us in close proximity, the city engenders clichés and slogans, stereotypes and self-serving assurances. Seemingly self-evident claims come thick and fast. The world's most liveable cities are prosperous. It's the economy, stupid. Cities are the engine house of economic growth. Slums are places of wretched squalor. Slums are productive places too. Electric vehicles are the answer. Planning for density is good. Inclusion is an essential good. These shibboleths all need to be substantially qualified as the basis for comprehensive understanding. Planning for density is good only when it is based on good planning and when the conditions for increased density are well designed. Electric vehicles are useful*

4. The economic evolution of the Smart City.

Today, the smart city is one of the favourite urban models behind the creation and growth of cities. As detailed by an increasing number of studies, across different geographical spaces, there is a *plethora* of smart-city initiatives defining the development of new urban settlements and the regeneration of existing ones. A single definition, image and vision of smart urbanism does not prevail. As in the case of other ideals of city-making, such as the eco-city for example, the smart-city model has been defined and applied in many ways. Recent work on the geography of the smart-city model demonstrates how the understanding of the idea of smart city has been shaped and altered through specific politico-economies and cultures depending upon equally specific geographies, therefore producing different built environments[13].

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only when renewable resources are used and when the vehicles do not become part of a fetish of green consumption. Although slums are often places of wretched housing, they can also be places of vibrant life and livelihoods. However, defending them as being 'productive too' – just like 'normal cities' – is to concede that economic productivity is the pre-eminent quantifier of what is good. Inclusion is good only when the terms of positive exclusion are negotiated with care, transparency and so on".

13 KARVONEN A., CUGURULLO F. (2018), *Inside Smart Cities: place, politics and urban innovation*, Routledge, London 18; KIGER P. (2017), *Smart Cities Promise a New Way of Living in "Urban Land"*, v. 76, n. 3/4, March/April 2017, pp. 78. In particular, the Smart City can be, and is being, invested with a broad range of ideas, concepts, and discourses. Occasionally and rather absurdly, tautological definitions are created ('the smart city is a city with a smart economy, smart transport, smart energy, smart people). Even the more sceptical voices are compelled, if reluctantly, to engage with the concept and input their own analysis. The Smart City has a strategic and political usefulness, introducing a seemingly compelling discourse of implied positive transformation without the need to state specifics and discuss implications. A second reason why Smart Cities evades easy categorisation relates to its yet loose anchoring in the urban policy landscape. It is not unusual for smart city initiatives to be spearheaded by economic development agencies or innovation agencies, rather than by traditional planning departments. This contrasts with, for example, the sustainable city or eco city, "*which have been more closely tied in with traditional planning: the garden city (and later eco city) evolved in con cert with town and planning policies; and the sustainable city emerged through the broadly established sustainable development agenda (e.g. internationally UN Habitat, and subnationally Local Agenda 21). For its part, the smart city seems to evolve on the periphery of mainstream planning. Interestingly, the key champions of the smart city agenda on both the international and national stages now include technical standards agencies, such as the International Organization for Standardization (ISO) and its respective national counterparts, which previously had little dealings in urban matters. In short, the smart city does not in easily with established urban planning functions: at the policy level, too, it requires new orientation. A third reason relates to the central premise from which the smart city derives its diverse meanings and functions: the application of digital technology and related big data. In their essence, smart city technologies are both ubiquitous and pervasive – everywhere, and in everything*". As such, the Smart City may permeate deeply into and across existing urban infrastructures, services, and institutions without, however, necessarily being visibly manifest. It may well actualise without being

However, within this constellation of smart-city projects, it is possible to detect a shared ideological pattern. At the base of the smart-city model is a common adamant faith in technology and innovation. More specifically, supporters and practitioners of smart urbanism appreciate the value of infinite sources of data and energy, through which cities can be managed and powered sustainably. By way of integration of technologies such as smart sensors, smart grids, big-data networks, autonomous transport systems and generators of renewable energy, the smart-city model outsets to improve the energy production/energy waste ratio, decrease economic and environmental costs caused by urban living, and the curb carbon emissions of cities, therefore assisting in the fight against climate change[14].

Despite these great expectations, as it is often the case with urban ideals, reality poses a different picture. Many alleged smart cities have demonstrated intelligence from an economic point of view, advancing the business of private firms working in clean tech, and defending the political economies of countries from both the Global North and South. However, this kind of economic intelligence has often been pursued to the disadvantage of the social and environmental dimensions in cities. From a social perspective, the smart-city ideal has been culpable of adding to inequality in various cities, by unequally allocating the benefits of smart technologies[15]. Moreover, while technologically innovative, smart installations have

noticed. Consequently, it should not be surprising that locating and capturing the Smart City, and rendering it concrete and accountable, has turned out to be so challenging. There is, then, an important, ongoing task of probing into the Smart City; and this must be accomplished in conceptual terms while at the same time focusing on detailed, context-sensitive description and analysis of emergent local practices.

14 JAMES P. (2014), *Ibidem*. As a matter of fact, sustainable urban development in many parts of the world continues to be a struggle. The lives of the people that such development is meant to enrich are often being made more difficult by these same developmental processes. Despite "*well intentioned attempts to the contrary, the managers of most development projects do not know how to engage with the complexity of community life. Although a paradigm shift from 'things' to 'people' has been discussed and encouraged rhetorically in some local government and corporate settings, mostly this has been translated into practice badly. Something of a consensus has emerged amongst commentators in the fi elds of education, anthropology, community development, geography and political ecology that sustainable development is something that comes from within communities rather than something that can be imposed from the outside. This nevertheless leaves us with many questions about how to actually do it. Let us fi rst go back to the big picture. How is good development to be understood? Both history and current driving forces complicate the possibilities of nonexploitative development of any kind, let alone good development. In the past local landscapes have often been changed by colonial or imperial experiences, and they are now beset by intensifying forces of globalization – most pressingly by the rolling global fiscal pressures, the competing demands for natural resources and the intensifying movement of people including rural–urban migration. In this context, the term development itself is complex and difficult*".

15 We know that the genesis and development of urban settlements is a process burdened with planetary consequences. Where the smart-city phenomenon will lead cities, societies and, ultimately, the planet, is an open question. Part of the answer lies in the ideological underpinnings of smart urbanism. Human actions are largely driven by ideas, and urbanisation, as the human endeavour par excellence, is not immune to this

been likely to adhere to old-school ecologically insensitive urban design strategies, which brought about important losses in terms of natural habitat and biodiversity. Substantially, smart urbanism seems to miss the harmony among economic, social, and environmental interests promoted by the idea of sustainability[16].

Historically, it is possible to see two major peaks corresponding to two major technological revolutions. The first wave of techno-urban development is connected to the Second Industrial Revolution: a time of ground-breaking innovation with an unheard-of distribution and application, especially in urban areas. As opposed to the First Industrial Revolution which had been chiefly brought to life by amateurs, instead of professional scientists, the Second Industrial Revolution was moved by a synergy among science, industry and economy, as manifest in partnerships between teams of scientists and private businesses[17].

The wide spreading of steel, for instance, the production of which became cheaper in 1856 with the invention of the Bessemer converter, paired with the debut of reinforced concrete in civil engineering in 1884, made it possible to build monolithic architectural structures such as skyscrapers and long suspension bridges. Soon after the introduction of these innovations, in 1885, Benz patented the first automobile: this invention was rapidly popularized in the next ten years by the Ford Motor Company, with important consequences in terms of urban living and design. The diffusion of cars led to the construction of highways and arterial roads which broadened the fabric of cities. In addition to the devouring of large amounts of natural habitat, these techno-urban developments led to a geographical and, above all, social revolution[18]. During the first half of the twentieth century, the evolution of ICT was comparatively quick and in the 1970s, with the introduction of early computers, it brought to a major technological milestone, the consequences of which on cities were going to be deep, but not instantly apparent. More specifically, the new technological model introduced by the convergence among micro-electronics, computing, telecommunications and broadcasting, was ground-breaking in as much as, in addition to the large scope of its diffusion, it generated what still is a network

causal link.

16 By investigating the nature, meaning and implications of the core ideas at the foundation of the concept of smart city, it is therefore possible to develop a critical understanding of where the smart-city phenomenon is coming from and, above all, of what urban future it is shaping. Building upon this premise, the chapter unpacks the imaginary of the smart city, taking the reader on a journey which, across time and space, explores the intellectual roots of the theory and practice of smart urbanism.

17 What Jensen describes as a “capital-intensive production” led to “rapid growth in productivity” which, through the support of novel strategies and means of mass-distribution, led, in turn, to a capillary diffusion of new technologies. In this context, technological development went hand in hand with urban development.

18 As Hall observes, in ‘the city on the highway’, car-owners became able to travel long distances to access services such as retail, education and health, as well as their workplace. Therefore, living in the proximity of the centre of the city, where most services and jobs were traditionally located, was not necessary anymore. This was the beginning of suburbanisation and the genesis of a lifestyle highly dependent on cars and fossil fuels.

architecture that cannot be directed from any centre, and is built out of thousands of autonomous computer networks with countless ways to link up, bypassing electronic barriers[19].

In spite of the fact that, like the Second Industrial Revolution, the ICT revolution was energetically and rapidly triggered by the capitalistic gains of competing private business, such as Intel, IBM and Apple, the dynamics of urbanisation stayed widely consistent until the end of the century (Hall, 1988). Especially regarding urban design, architecture and civil engineering, this immobility can be justified by examining the materiality of the technology considered. While the industrial outcomes of the Second Industrial Revolution (engines, steel, reinforced concrete and

19 OSTROM E. (1990), *Governing the Commons: The Evolution of Institutions for Collective Action*, Cambridge; RACO M. (2005), *Sustainable Development, Rolled-out Neoliberalism and Sustainable Communities*, Antipode, 37(2), pp. 324-347. In particular, "*works on neo-liberalization offer stimulating avenues for understanding the emergence of urban sustainability and transformations in urban environmental policies. By highlighting the importance of the transformations of capitalism and of state rescaling strategies, these works provide vital insights into sustainability policies. Their descriptive potential is visible at two main levels. The rollback/roll-out periodisation has proved to be very heuristic to understand the strong interest of urban political elites for sustainability at the turn of the millennium. It has also helped to understand why urban environmental policies are increasingly driven by the objective of enhancing the competitiveness of cities or controlling the factors (pollution, congestion, urban sprawl, etc.) liable to hinder that competitiveness. Second, the neo-liberalization framework also shows to what extent sustainability policies and eco-neighbourhood projects are selective in their objectives. By choosing to pursue objectives considered win-win from environmental and economic perspectives and designed to meet the expectations of the middle and upper classes, these policies are notable for their thematic, social and spatial selectiveness, which backs up some of the hypotheses put forward in work on neoliberalization. While this research agenda encourages a subtle reading of changes in the macroeconomic and political/institutional contexts that affect cities and urban policies, together with many avenues helping to explain the successful penetration of sustainability in urban policies, it sometimes has trouble getting away from a unified and too general vision of sustainability policies that in fact form a mixed bag with rationales and effects that can vary considerably (Rohracher and Späth, 2014). This abstract, all-encompassing feature of the analytical perspective (Harding 2007; Cochrane 2008; Pickvance 2012; Pinson and Morel Journel, 2016) is not a limitation specific to the neo-liberalization research agenda but applies more generally to most ambitious theoretical frameworks. Work on neo-liberalization undoubtedly does seem to pay significant attention to the variety of local and national institutional contexts and warns against "the illusions of monolithic thought or convergence theories" (Peck 2004: 403)".* However, these precautions only rarely result in careful analyses of local contexts that clearly reveal the stakeholders and their interests (Kaika and Ruggiero 2014; Halpern and Pollard 2016). In this way, neo-liberalization of urban policies involves a set of complex processes that need to be studied taking local contexts into account and identifying social, economic and political interests that lie behind those processes. Despite these limitations, it can be productive to use work on political economy that deals with the neo-liberalization of urban policies to understand the transformation of the relationship between cities and the environment. This helps "*first to bring out the structural dynamics (changes in capitalism, uneven development processes, new role of cities in economic regulations, etc.) at work in the transformation of urban environmental policies. In addition, the work helps to place at the*

cars) were defined by a distinct weight and volume, the same cannot be claimed for the results of the ICT industry. Despite being linked to a physical infrastructure, the Internet has an intangible nature, and computers, since their origins, have been evolving by ensuing the logic of miniaturisation, so as to occupy less and less physical space. Basically then, the city could not overlook the physicality of the Second Industrial Revolution, while instead, from a material perspective, it hardly became aware of the Zeitgeist of the information age[20].

Since the late 1980s, nearly side by side with the concept and exercise of sustainable growth, the world has witnessed the strengthening of the Information Age on the back of the Internet and World Wide Web, the consistent increase of democratization of digital and ICTs, and the advancement of computer hardware and software industries. Even though the initial forms of Internet were in employment since the 1960s, its universal application received a push after the World Wide Web (the Web) was invented by Tim Berners-Lee in 1989. During the 1990s, the world observed a digital boom in the use of Internet and the Web. With the increase of e-mail usage, along with the arrival of graphics-based Web browsers, Internet and the Web became an essential part of people's daily life. As an extensive amount of information started being uploaded and made accessible on the Web, a number of search engines were designed and implemented, such as WebCrawler, Magellan, Excite, Infoseek, Inktomi, Northern Light, AltaVista, and Netscape, which were subsequently joined by Google, Bing, and Yahoo![21]. Another inclusive dimension to the use of the Web was added by the launch of Wikipedia in 2001. The Internet and Web have nowadays become so customary for lots of people, particularly young persons, that it is quite hard to conceive how everyday life and the world were like without e-mail, Web search engines, online encyclopaedias and e-commerce, just to mention a few.

The ever-growing use of the Internet and the Web has been closely associated with the creation, evolution and application of ICTs. Innumerable inventions have been created in the improvement of ICTs, like personal computers (PCs), laptops and notebooks, far-away-Xerox (FAX) machines, digital and three-dimensional (3D) printers, scanners, and photocopiers. Wireless local area network (WLAN or Wi-Fi), teleconferencing, videoconferencing, and Web conferencing - including 'webinars' (Web seminars), webcasts, peer-level meetings - have become everyday words.

heart of the analysis the spatial inequalities connected with modification of urban environments and the adoption of strategies designed to preserve the environment, unevenly, in cities". As a result, so long as subtler, more contextualized analyses are produced that reintroduce the idea of "agency", work on neo-liberalization could represent a heuristic framework for research into urban environmental policies.

20 There are of course exceptions in this story, and these are the cities which have pioneered smart urbanism. From a historical perspective, the first one is arguably Los Angeles which in the 1970s was a frontrunner in the use of what we now call *big data*. A policy report found by Vallianatos (2015), shows that in 1974, the urban development of Los Angeles was being shaped by computer data.

21 RIFKIN, J (2015), *The Zero Marginal Cost Society: The Internet of Things, the Collaborative Commons, and the Eclipse of Capitalism*, Palgrave Macmillan, New York.

Internet technologies back real-time, point-to-point connections that have changed information flows, originating new fields, such as telemedicine. The consolidation of Information Age has been eased by the advancement of computer hardware and software industries, which have remodelled the economies of cities and regions, especially in the form of information technology (IT) parks and knowledge parks. Moreover, the Information Age relies on the continuing diffusion of ICTs, huge investments in the expansion of IT infrastructure around the world and the universal spread of electronic literacy (e-literacy). The appearance of smartphones in the last few years has reinvigorated the Information Age and the world of ICTs. A mix of mobile or cell phone and laptop, the smartphone is considered the greatest technological revolution since the creation of the Internet[22].

22 KRUEGER R., GIBBS D. (2007). *The sustainable development paradox: Urban political economy in the United States and Europe*, Guilford Press, New York and London; LUQUE-AYALA A. (2015), *Developing a critical understanding of smart urbanism?,* Urban Studies, 52(12), pp. 2105-2116; MOLINARI F. (2012), *Innovative business models for smart cities: Overview of recent trends*, in the Proceedings of the European Conference on e-Government, ECEG 2012. As said, a new language of "smartness" is reshaping debates about contemporary cities, along with a new set of programmes and practices that are intent on realising smart urbanism. This is visible in, for example, the importance given to 'smart cities' in the EU Strategic Energy Technology Plan (European Commission, undated), the prolific development of 'smart city initiatives' in Asia, Australia, the US and elsewhere (e.g. EPRI, 2012; SmartGrid.gov, undated), and the emergence of dedicated teams aimed at developing business opportunities in SU projects within global engineering, telecommunications and utilities companies such as IBM, Cisco, Toshiba, Google, General Electric, Hitachi and others (Luque, 2014). SU is projected, often following normative or teleological approaches, as a futuristic solution brought to the present to deal with a broad multiplicity of urban maladies, including issues of transport congestion, resource limitation, climate change and even the need to expand democratic access, amongst others. Taken together, "*these new drivers and programmes are creating a new lexicon through which the development of (smart) cities is being forged — urban apps, big data, intelligent infrastructure, city sensors, urban dashboards, smart meters, smart buildings, and smart grids. While often radically different in ambition and scope, the shift from conventional to smart logics is accompanied by new expectations of network flexibility, demand responsiveness, green growth, new services, and connected communities. These expectations, in turn, are driving investments and reshaping policy priorities leading to the accelerated rollout of SU globally. Yet, the potential, limitations and broader implications of this transformation have seldom been critically examined. Existing research in the field has focused on the technical, engineering and economic dimensions of smart systems (Jamasb and Pollitt, 2011; Bakıcı et al., 2013; Alawadhi et al., 2012; Wade et al., 2011). This research tends to have a 'problem solving' focus, concerned with achieving optimal outcomes for smart systems under current technical, political and market conditions (NEDO, 2011; Kanter and Litow, 2009; Leydesdorff and Deakin, 2011; Batty et al., 2012), with limited critical analysis (Hollands, 2008). Whilst urban studies has a long tradition of critically examining the interface between space and digital technologies (Graham, 2002; Graham and Marvin 1999; Boyer, 1992; Crang, 2010; Crang and Graham, 2007; Thrift and French, 2002), and information studies has targeted the city as one of its key domains of study (Forlano, 2009; Foth, 2009; Galloway, 2004; Middleton and Bryne, 2011), narratives and practices around notions of 'smartness' have been largely absent. In this context a limited number of practitioners and scholars are starting to question the problem-solving powers of 'smart', by asking questions around*

All of this results in an exceptional development in global information flows about the economy, society, culture, environment, and similar. Relying on the analysis of such innumerable flows, sociologist Manuel Castells announced in the late 1990s the advent of Network Society through his renowned trilogy on The Information Age[23]. In Europe, IoT is progressively seen as "the next revolution". An example of this is 'sharing economy' that has been growing over the past few years, even though the rules and regulations that control it are yet to be fully pondered. Moreover, the sharing economy is considered to have correlations with smart cities.

The ideas of smart cities and smart economy come into play when issues related to cities, their devised and sustainable growth, effective management, and incisive and participatory governance exist in abundance, within the larger context of climate change and global economic deceleration. The smart city notion is based on a mixture of ideas on how ICTs might add to enhancements in the functioning of cities, boosting their competitiveness, strengthening their efficiency, and discovering new ways to face issues of poverty, social deprivation, and poor environmental management. It is not unexpected that the concept of smart city closely relates to the idea and international practice of sustainable urban advancement. As a result, it can be assumed that the concept of smart cities and its realisation could possibly support the idea and practice of sustainable urban development that involves economic, environmental, and equity concerns.

5. The indispensable and essential role of technology.

In order to get around the city, people increasingly use bike sharing or car sharing, or the services provided by AirBnB; the Uber issue has sparked a heated debate, marked by discussions, suggestions and oversights; experts argue about the many prospects, not yet entirely examined, of better handling of physical infrastructure through IT (consider the chance of unbundling the utilization of a road or highway network, which could be in some way "unpacked", in order to get a service platform

democracy and citizenship (Townsend, 2013; Greenfield, 2013; Halpern et al., 2013), drawing attention to the specific mechanisms through which code operates (Kitchin and Dodge, 2011), pointing to the risks of big data and a city with 'sensory capabilities' (Thrift, 2014a; 2014b; Klauser and Albrechtslund, 2014) and examining how smart rationalities and techniques alter contemporary functionings of power, space and regulation (Klauser, 2013)". More recently, scholars working on the interface between politics, life and the environment —drawing on post-structuralist thinking and often outside the world of urban geography— have been examining the ways in which the material manifestations of such smart logics (through, for example, the ubiquity of environmental sensors and dashboards) are transforming modes of governing both the city and society as a whole (Braun, 2014; Gabrys, 2014).

23 More recently, Jeremy Rifkin has argued that the digitalized communication Internet is converging with a digitalized, renewable "Energy Internet" and a digitalized, automated "Transportation and Logistics Internet" to create a super "Internet of Things" (IoT) infrastructure.

that consumers can use to dialogue with). Because of the current technologies, we are observing the advancement of flexible energy distribution modules - the so-called smart grids - where users become lead characters using the exchange of data with manufacturers and distributors[24]. Urban centres support ventures with the purpose of enabling the allocation of spaces, technologies, experiences: expressions like co-working, cloud-computing, crowdsourcing, crowdfunding, peer to peer, prosumer, etc. are new terms at this point widely spread in daily speech; apps that apply information owned by local governments, or that relate to the pertinent services, quickly increase[25].

24 SÖDERSTRÖM O., PAASCHE T. (2014), *Smart cities as corporate storytelling*, City, *18*(3), pp. 307-320; TRENCHER G. (2017), *Stretching "smart": advancing health and well-being through the smart city agenda*, Local Environment; VIITANEN J. (2014), *Smart cities and green growth: outsourcing democratic and environmental resilience to the global technology sector*, Environment and Planning A, 46(4), pp. 803-819. As said, most smart-sustainable projects focus on entrepreneurial forms of urban development that utilise cutting-edge technologies to simultaneously boost the economy while reducing environmental impacts. This is the classic formula of green growth that has dominated sustainable urban development discourse for the last three decades (Schuurman *et al*. 2012, Tranos and Gertner 2012, Lee *et al*. 2014). As Haarstad (2016, p. 7) notes, "*sustainability is largely an assumed result of more efficient, cost-effective urban systems and greater availability of data*." Meanwhile, social considerations are limited to supporting job creation and encouraging citizen participation through open data platforms (Bakıcı, Almirall and Wareham 2013, Arrizabalaga *et al.* 2016, Lee *et al*. 2014, Hielkema and Hongisto 2013). Glasmeier and Nebiolo (2016, p. 2) contend that "smart" labels that we attach to everything from wireless sensors to automated vehicles are frequently unconnected to social objectives, arguing "*the unintended consequence of smart city 'making' is to privilege technologies without equivalency tests that make clear what the public values are and what the basic needs are that these values seek to promote*." This suggests that "*the starting point for smart cities should be social issues rather than the narrower goal of technology diffusion (Hollands 2015). In other words, technology-centred agendas should be demand-driven and focus on residents' needs rather than being supply-side driven and principally concerned with economic growth objectives (Söderström 2016). Thus, there is a need for smart cities to be more relevant to a broader array of societal issues (Glasmeier and Nebiolo 2016)*". The objective of enhancing public health has the potential to address the social shortcomings of smart cities. Enhanced human health is increasingly seen as a co-benefit of urban planning, particularly in the field of public health (Giles-Corti *et al*. 2016). This is, however, "*principally from an urban engineering perspective where compact cities are designed to provide sustainable public transport, opportunities for walking, cycling, exercise, reduced crime, safe and nutritious food, vegetation in public spaces and clean air (Ramaswami et al. 2016, Sallis et al. 2016). Greater well-being and health for residents is produced by a cleaner and more liveable urban environment. While these physical environment planning approaches hold much promise to promote healthy lifestyles and positively impact the lives of urban residents, there is a flipside. Scholars like Caprotti et al. (2015) underscore that the privilege of residing in corporation-driven new smart cities can constitute a luxury out of reach from poorer populations due to high property premiums*". Developments in data management and health care suggest that digital technologies have significant promise to advance human health and well-being in urban settings. In conventional smart cities, the Internet of Things (IoT) and ICT sensors link appliances,

That being said, the Smart City initiatives are essentially backed up by smart technologies, like the Internet of Things (IoT) and Information and Communication Technology (ICT) that supply the technical structure to carry out smart city projects.
Smart city initiatives cannot take place without the indispensable technology of IoT. The "things" of the IoT - devices, sensors, applications - gather the data that makes the technology solutions effective. For instance, smart water meters pertaining to water quality and management, warning the water company of leaks, or potential contamination. Smart city initiatives require large data analytics to work. The IoT produces extensive datasets that must be examined and processed to make smart city services operative. Big data platforms, part of the city ICT infrastructure, have to organize, examine and process the data collected from the IoT. City administration combines ICT solutions to link public services, simultaneously engaging communities in local governance, in order to improve cooperation[26].
Examples of utilization of IoT in smart cities include:

- city lighting. The intelligent streetlights work as Wi-Fi hotspots, equipped with a surveillance camera, charging outlets for electric cars and phones, and even determine the air quality. This multitasking street light functions as a sensor and an actuator, providing services that improve the quality of life of the citizens and collecting relevant data about the environment at the same time;
- waste management. Cities are using technologic solutions in order to attain a cleaner environment and cut waste. For instance, Songdo district in South Korea is decreasing noise pollution getting rid of garbage trucks altogether. Buildings have a smart garbage collection station where residents place the

building components, transport systems and residents to increase efficiency of energy usage and allocation of resources. Similarly, "*emerging research and experiments in medicine and public health demonstrate that digital technologies can also link residents and technological artefacts with data and information networks to optimise health care efficiency and effectiveness (Andreassen et al. 2015). For example, wireless sensors can measure physical activity and provide data-based diet and lifestyle guidance (Koch 2010), electronic communication networks can link health care professionals, patients and family caregivers to enhance health literacy and preventative care (Haluza and Jungwirth 2015), "telemedicine" can enable homecare of the elderly and relieve doctor shortages (Obi et al. 2013) while social media applications and digital devices can promote the social inclusion of care recipients (Hasan and Linger 2016). Moreover, Thomas et al. (2014) argue that dominant conceptions of urban health need to be expanded beyond illness and disease to encompass mental and social well-being. This points to an important challenge for smart cities – that of using technologies to promote not only physical health but also mental and social well-being*".

25 According to a statistical survey reported by G. Siciliano, *Smart City between definitions and measurement methodologies*, in Smart City, the city reinvents itself: Tools, policies and solutions for a sustainable future, Milan, 2015, 105 ff., it turns out that on the subject of Smart City "almost half of the studies have been carried out in in "Computer Science", followed by "Engineering" and "Mathematics".

26 One example of this is the Greater London Authority initiative, where city hall is using an open, common platform to share data with local communities.

trash bags, divided by organic and combustible. The station has sensors that recognize when is packed. The trash is automatically dispatched through high- pressure pipes directly to the recycling centre;

- connected public transport: sensors in public transportation transmit traffic data to the city transportation management software. They inform you in real-time how long you have to wait for the bus or train, notifying the system traffic congestion or delays.

It's evident that information and communications technology (ICT) plays a crucial role in smart cities by granting access to data that's gathered through information technology elements. This technology, also known as the Internet of Things (IoT), operates by communicating between linked devices while exchanging data that requires internet, wireless connections, and other communication mediums[27]. Mostly smart cities employ IoT devices to collect data and aptly process it for implementing it in a specific area. Smart city sensors and connected devices gather data from several smart city gateways installed in a urban centre and then examine it to improve decision-making.

Cities and their solution providers cannot extract the full value of data if it is kept in different systems and databases that restrict access and use. There are already vast amounts of data in our cities, but a good deal of it is in silos serving specific needs, rather than contributing to the common good. It includes government statistics, maps, details on public tenders[28].

27 Kiger P., *Smart Cities Promise a New Way of Living in "Urban Land"*, v. 76, n. 3/4, Marzo/Aprile 2017, pp. 78-85.

28 WALRAVENS P. (2012), *Mobile business and the smart city: Developing a business model framework to include public design parameters for mobile city services*, Journal of Theoretical and Applied Electronic Commerce Research, 7(3), pp. 121-135; WIIG A. (2016), *The empty rhetoric of the smart city: from digital inclusion to economic promotion in Philadelphia*, Urban Geography, 37(4), pp. 535-553. The concept of governance is used in a variety of fields and can be defined in divergent ways. Corporate governance is for example "*used in strategic management literature to refer to the way in which a company or organization is managed and how managerial and executive processes are organized, or how the market can be seen as a source of governance, influencing firms. This view is less suited for our approach: the business model matrix assumes a complex value network of several companies, rather than focusing on the internal operations of a single firm. Even when adopting a stakeholder approach in strategic management, this still starts from the perspective of a single firm emphasizing "the importance of investing in the relationships with those who have a stake in the firm... (this) depends on the sharing of, at least, a core of principles of values" . Additionally, given the initial premise of starting from the city's perspective, we require a more public operationalization of the governance concept and will thus refrain from a strategic management-based approach to the notion*". Another field where the concept is also used, and where it already has a closer link to the public sector, is the cultural industries. In critical cultural studies, "*the term is e.g. used to refer to the presence of government, management and control in determining cultural policies as well as the processes involved in developing such policies uses it to delve deeper into the tensions between industry, the cultural sector and policy makers and makes a case for "new spaces of governance of the cultural industries*". This comes back in who define governance as "*the process of decision-making and the*

Technology can make a difference in many areas: better parking, efficient lighting, improved traffic flow, smarter security, improved waste management, and disaster planning. Nonetheless, there's a lot of fragmentation so we have to find a way to link all these distinct standards and put them all in a common, unified platform. Creating a smart city counts on how adequately organizations can share and examine the huge number of data being created. Without the capacity to exchange relevant information in real time, companies engaged both in the private and public sector can't develop the applications that uphold automation, nor the software solutions that constitutes the "smart" capabilities of a city and its infrastructure.

6. "New Urban Agenda" and economic development.

In October 2016, "Habitat III" or the Third United Nations Conference on Housing and Sustainable Urban Development was held in Quito, Ecuador. The United Nations General Assembly decided to bring together the Habitat III Conference to revitalize the worldwide pledge to sustainable urbanization, and to pay attention to the realization of a "New Urban Agenda". As stated by the "Vision for Habitat III" document, the Conference considered the following three main elements for designing a model of sustainable urban development:

a) National Urban Policy that "makes a connection between the dynamics of urbanization and the comprehensive process of national growth";
b) Laws, Institutions and Systems of Governance, that "realize the normative basis of action, the operational principles, organizational structures, and institutional and societal relationships behind the process of urbanization";
c) Urban Economy: "Although there is a great beneficial association between financial development and urbanization, this potential relationship is not voluntary and self-creating. Habitat III could be the aid to establish the fundamental pillars for steady urban economic growth".

In the current urbanizing world and Information Age, this results in an agenda for smart economy in smart cities. It will be an erroneous conviction that if administrations beg and/or borrow, and invest billions of dollars in specific urban centres, smart cities will come up. It is again a mistake to think that if big capitalist and multinational corporations place industries in some cities, smart economy will grow. Conversely, the culture of Smart People in a smart city has to intentionally agree that they are replacing conventional urban economy with smart economy and

process by which decisions are implemented (or not implemented)" and identifies government as the main actor. It also highlights the added complexity to governance in an urban context, given the large number of actors involved. A policy brief by the Institute on Governance focuses more on the public characteristics of the concept and defines it as being: about how governments and social organizations interact, how they relate to citizens, and how decisions are taken in a complex world. Thus governance is a process whereby societies or organizations make their important decisions, determine whom they involve in the process and how they render account".

act in order to build a smart economy. The essential condition for this conversion is the prerequisite of smart economy. Habitat III will consider three 'operational factors' that could help optimise the benefits of the urbanization process, which are (i) urban planning, (ii) local fiscal systems, and (iii) investment in urban basic services[29].

As urbanization challenges keep rising and additional consolidation of the Information Age takes hold worldwide, it will become more and more crucial to employ every conceivable way to better urban living along with social inclusion, economic growth, and environmental sustainability.

Companies look at smart cities like major business opportunities, considering that some of the world's urban markets are bigger than entire countries. For collaborating with cities and operate efficiently there, companies will have to embrace the mindset of serving people, not just a market. They could discover new business models by searching for certain ways to help cities provide better quality of life. Even enterprises that are not smart city providers could be concerned by the way urban ecosystems develop, and they may have to adjust the way they do business in response[30].

29 KANTER, R.M. (2017) Informed and Interconnected: A Manifesto for Smarter Cities, Harvard Business School Working Paper No. 09-141, Boston, MA.

30 HAARSTAD H. (2016), *Constructing the sustainable city: examining the role of sustainability in the 'smart city'discourse*, Journal of Environmental Policy & Planning, pp. 1-15; HARTLEY J. (2005), *Innovation in governance and public services: Past and present*, Public Money&Management, 25(1), pp. 27-34; HOLLANDS R.G. (2008), *Will the real smart city please stand up? Intelligent, progressive or entrepreneurial?* in "City", v. 12, n. 3, pp. 303-320. Going deeper into detail, in a context of accelerated growth of cities and increasing demand for solutions enabling more appropriate responses to sustainability challenges, researchers have become more interested in issues related to smart cities. Because of this, recent debates on sustainable urban development have been intrinsically related to smart cities. In fact, it is currently difficult to think of a smart city without associating it with aspects of sustainability and vice versa. The concept of a smart city is not new and has evolved in recent decades, mainly as an answer to the challenges imposed by growing urbanization, digital revolution, and the demands of society for more efficient and sustainable urban services and improvement in quality of life. As a matter of fact, the concept of "smart city" has changed and expanded over time, incorporating elements concerning how residents live in the city and feel about it. All of this not only impacts on the definition of smart city, but also, very proactively, on its strategic practices of governance. Recently, several studies have been aimed at understanding smart cities in all of their different characterising dimensions, emphasising how multidisciplinary the phenomenon truly is and therefore its different aspects depending on context. Although that of "smart city" is still a diffuse concept that can have several interpretations, it is possible to identify a convergence over time on the concepts of intelligent and sustainable city. The consensus is that it must be inclusive, secure, resilient, sustainable, and based on information technologies. More studies have also been developed focusing on the challenge of transforming today's cities into "smarter cities", searching for possible drivers to enhance the process. The main research on this subject can be grouped in technology and governance studies, with these two approaches present in most articles. Technology-related approaches, in short, aim to improve the efficiency of services and infrastructure (e.g., communication, transport, supply, etc.), mainly related to information and communication technologies (ICTs). On the other hand, approaches related to governance focus on management and the

Smart cities, in short, generate new business opportunities and not merely for technology companies. They are a canvas attracting modernization and new business models from professionals in several other industries as well. Companies in multiple industries are already starting to reshape their existing product and service lines to accommodate developing urban markets from utilities that are presenting smart meters and proposing dynamic pricing plans to real estate developers that are incorporating automation systems, sensors, and mobility options into their estates.

Additionally, since administrations were frequently deficient in technical and economical capacity, mutual collaboration between the public and private is essential to improving (urban) infrastructure and services. 'PPPs are an instrument for government to provide and carry out public infrastructure and/or services using the means and competence of the private sector. Where administrations are challenged with deteriorating or lack of infrastructure and need more adequate services, an alliance with the private sector can help promoting new solutions and bring finance". As mentioned by advocates of PPPs, partnerships employ the experience and abilities of both the public and private sectors and split risks and responsibilities. While the public sector concentrates on policy, planning, and regulation by delegating day-to-day functions, the city takes advantage of the technical proficiency of the private sector.

7. Conclusion.

Based on the study of actual contributions not exclusively at the academic level, but also at the institutional and advisory level with regard to definitions, dimensions and contents of urban intelligence, as well as from the examination of some instances of smart practices, the study draws the following three points in a nutshell.

First, the smart city is essential, not a trend imposed by the continuous evolution of technologies. The main role of cities as incentive of development but also of consumption makes them mail leads of the programs for sustainable growth at the level of the United Nations and the European Union. The target are not technologies, but rather the acknowledged enabling aspect of innovative urban solutions suitable to accomplish environmental, social and economic sustainability.

In the second place, in conceiving and implementing a smart and sustainable city, it is vital to maintain an integrated method, in which the urban reality is properly treated as a "system of systems" whose connectors are the citizens enabled by technologies and backed by institutions. Lastly, in terms of content, even if there is no shortage of variants, the smart city is in most cases ascribable to the six dimensions classified by the Vienna Institute and accepted by the European Parliament: Smart Governance, Smart Economy, Smart Mobility, Smart Environment,

interactions between the various stakeholders in the city, connecting and developing socioeconomic and productive interactions among networks of urban actors.

Smart People and Smart Living. Cities can select the most relevant areas for them, the crucial point is not to look at the different strands as separate blocks. As a matter of fact, as some contributions emphasize, synergies and interoperability between systems should be conceived and used, incorporating infrastructure and services through cross-dimensional platforms to maximize added value for the residents [31].

Notably, there is a general agreement both in the literature and in the frameworks for the development of smart cities, on one side with attention to the transversely of smartness: working for different vertical silos is not appropriate, rather it is indispensable to design a "common layer" through which is possible to combine projects, initiatives, services to boost their performance. On the other side, it is essential to create a long-term vision, with some main focuses: the decision of priorities for every city; the establishment of synergies between actual projects and initiatives in the smart sector, but without a vision, and new ones; the introduction of a bottom-up approach to place the residents at the centre and create a city custom-made to meet their needs. Furthermore, it is important investigating what vocabulary and territorial definition are pertinent. If in literature "smart city" is the diplomatic crossroads of synthesis between technological (e.g. intelligent, digital, or wired city) and non-technological (e.g. creative, learning, or knowledge city) concepts, some are already beyond. Additionally, it is convenient to envision the city in a broad sense. In fact, smartness lives on variable geometries, depending on the project motif. Also it is possible to point out that the public authority can occasionally implement an assignment of direct administration or management of tasks, like it occurs when the Smart City initiative includes the handling of public goods or data retained by the administration; in statistically more frequent cases, it operates along different directions, even if arduous to trace back to units. Consider the scenario where the administration must improve or facilitate private activities that do not intercept assets directly supervised by the administration, or even exchange projects and proposals (in some instances, still upstream, the administration proceeds to analyse prototypes invented by private individuals)[32].

31 COCCHIA A., *Smart and Digital City: A Systematic Literature Review* in R. P. Dameri and C. Rosenthal, *Smart City. How to Create Public and Economic Value with High Technology in Urban Space*, Springer International Publishing Switzerland, 2014, pp. 13-43.

32 MOSANNENZADEH F., BISELLO A., VACCARO R., D'ALONZO V., HUNTER G.W., VETTORATO D. (2017), *Smart energy city development: A story told by urban planners*, Cities, 64, pp. 54-65; MULLIGAN C.E.A., OLSSON M. (2013), *Architectural implications of smart city business models: an evolutionary perspective*, IEEE Communications Magazine, 51(6), pp. 80-85; NEIROTTI P., DE MARCO A., CAGLIANO A.C., MANGANO G., SCORRANO F. (2014), *Current trends in Smart City initiatives: Some stylised facts*, Cities, 38, pp. 25-36. More specifically, in the era of the knowledge economy, urban areas should not only redistribute their local wealth, but also invest in the quality of life of their citizens. In this context, SC is a wide notion that encompasses many different socio-environmental aspects and ICT applications. However, it has so far received limited attention by academic empirical researchers. Despite a recent growing interest in the topic, public administrations still need support to structure the concept of smartness, to capture its implications, to identify benchmarks at the international level, and to find opportunities of

In order to look at these hypotheses as a whole, it is supported by the fact that the administration does not handle (or take over) a usual public service, meaning that it does not one-sidedly arrange services, directly intended for citizens, which are assembled around a "public offer" on the market: the public entity, on the other side, must negotiate between private initiatives. It is likewise clear that those choices occasionally have a very critical impact on the physiognomy of the community and on the lifestyle of citizens. The multifaceted role defined above entails the hazard that agreements will be taken at administrative level which, because of their relevance, would be a issue for the policy, while they are accomplished in a circumstance where

improvement. In this scenario of limited empirical evidence and hype on SCs, this paper can be considered a first attempt to provide a comprehensive definition of the concept and an empirical assessment of current trends at the international level. In doing so, the paper proposes a definition of SC that is based on a combination of both academic and practitioner literature. From a theoretical perspective, the exploration of taxonomies that are relevant for the definition of a SC and its application domains allows comprehensive knowledge of such a notion to be acquired. "*This knowledge goes beyond the focus of ICT vendors on digitalization, and also takes into consideration some of the aspects that are related to soft components that have crucial importance on the urban, social and economic development of a city, such as human capital. As far as its empirical contribution is concerned, the paper essentially highlights three key issues. First, there is no dominant design for SCs, as economic development and structural urban variables are important in influencing the way cities design their digitalization paths. In this context, a path dependency effect can be highlighted, as wealthier cities and those with more ''open' 'democracies exhibit higher investments in fields that are related to the development of innovative capabilities. Furthermore, a negative correlation between the scope of SC interventions in hard and soft domains has been reported: cities that are more active in the domains that are aimed at improving their capacity to ''sense and act'' through ICT systems are less likely to differentiate the initiatives launched for soft domains related to human capital, cultural heritage, and innovation. The second key issue concerns the influence of geographical variables. Again, this observation reflects the principle that each country follows its own smartness strategy, due to the importance of its local socio-economic and cultural background*". On the basis of this evidence, it is possible to claim that the exportation of best practices may not occur easily. Finally, the number of city domains covered by smart initiatives does not seem to be correlated to the size of a city, considered in terms of population, but it is significantly correlated to demographic density. This shows that both large and small cities exhibit some strengths and weaknesses in terms of innovation capabilities. Basically, small cities represent a good ''ecosystem'' to launch new experimentation at a limited scale and may exhibit less inertia stemming from past investments in ICT infrastructures. "*On the other hand, large cities usually face more critical needs and problems that entail digitalization endeavours, and they can attract technology vendors more easily as they can offer a larger potential market of more educated citizens. However, density is a factor of developing SC initiatives, as it increases problems related to urban congestion at various levels of the physical infrastructure (e.g. Transportation, energy distribution, waste and water management, etc.).Policy implications Overall, this study provides policy makers and city managers with useful general guidelines and suggests some practical imply-cations. On the one hand, the proposed definition offers a systemic and practical perspective of the SC notion as the CI enables a pre-liminary assessment to be made in order to direct the SC planning efforts towards the appropriate application domains and initiatives. In other*

they miss the usual guarantees of representativeness and responsibility typical of the political headquarters[33].

Lastly, there are some issues regarded as crucial at the operational level that the literature fails to examine thoroughly. Especially the role of enterprises as promoters and users, not only suppliers, of smart solutions; the choice of the administrative framework, with a propensity for the Public-Private Partnership; the conception, use and development of both public and private financing addressed to smart initiatives, which requires on one side the advancement of new and specific financing tools, and on the other a clarification of the regulatory framework to authorize companies to suggest new business models and extract value from the territory[34].

The last perspective is to reshape the aspect of cities, so we can also discuss planning as a subcategory of programming and coordination. When we bring up the change in the management of cities, the history of urban planning promptly comes to mind. This is a useful reminder, since it highlights the connection existing between city planning, organization of power and paradigm shifts. It is enough to think of the great revolutions that have marked the history of mankind in order to perceive how the big (also cultural) turning points in our evolution have been accompanied and partly induced by the change in the concept of cities and planning, hence confirming

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words, the analysis of the relationships between the CI and the selected contextual variables can help identify the main factors that enable the development of projects which could contribute towards increasing the smartness of a city. Moreover, a practical approach has been proposed to identify the actual efforts that are made to increase the smartness level of a city, to set strategic objectives, and to select effective actions in order to achieve the predetermined targets. In addition, three further conclusions can be drawn, based other findings of this work. Firstly, the negative correlation between hard and soft domains is an indicator that many municipalities and their technology vendors mainly focus on technology, and not on people. However, complementarities between ICT systems and the human/relational capital of the local population should be achieved to facilitate the building of a comprehensive approach for the SC evolution. Secondly, those cities that have planned a broader portfolio of investments in smart initiatives are not necessarily better or more liveable cities. Rather than reaching a good level of democracy and quality of life, these cities could turn into panoptical environments in which the citizens are persistently observed and scrutinised. For example, their vulnerability and resilience could be put at risk as their digital systems could be more easily paralysed by hackers or bugs". By requiring greater accessibility to real-time information through electronic devices, and by using taxation to entail investments in digital infrastructure, these cities could follow new unintended paths towards social divide. Policy makers and city planners should therefore take vulnerability, resilience, financial sustainability and social inclusion into consideration in their approaches to build cleverer cities.

33 RIFKIN J. (2015), *The Zero Marginal Cost Society: The Internet of Things, the Collaborative Commons, and the Eclipse of Capitalism,* Palgrave Macmillan, New York; SCHAFFERS H., KOMNINOS N., PALLOT M., AGUAS M., ALMIRALL E. (2012), *Smart Cities as Innovation Ecosystems sustained by the Future Internet,* Technical Report; SICILIANO G. (2015), Smart City between definitions and measurement methodologies, in *Smart City, the city reinvents itself: Tools, policies and solutions for a sustainable future*, Milan, 2015, pp. 105 e ss.

34 FERRARA R. (2016), *The Smart City and the Green Economy in Europe: a Critical Approach*, Milano, 47.

the connection between the management of spaces and power[35]. So far, this has mostly interested the planning of physical space. In fact, as aforementioned at the beginning of this essay, the concepts of "crowdfunding", of "collaborative production", of "collaborative consumption" are spreading terms like "peer to peer" and "prosumer".

All that has been discussed so far, is the main basis for the research community to continue developing. Urban planning, in the traditional sense, is now integrated with the new concept of virtual planning (generically meaning the relationship between public powers and Smart Cities). The purpose is to reinvent the physical spaces and to inclusively share.

The smart approach is obviously subject to risks and nonetheless sceptic opinions, particularly concerning the community, and can be summarized with the below cases.

The idea that communities are comparable to cruise ships: the people who belong to the community share places for a limited amount of time, but do not claim ownership of the accessed infrastructures and resources. Similarly, on a cruise ship, the person moves in a private space in which a power regulates a certain amount of services and uses technologies to improve the quality of life [36]. The idea that communities cohesively follow a certain amount of values, as if it was a "code of conduct", just as it happens on Twitter, opening the community to the possibility of continuous growth without boundaries. In conclusion, the community shares a common sense of trust and faith, using the same resource to multiply its benefits for the entire community (similarly to the miracle of the multiplication of the loaves and fishes). In all three examples above, it would not be possible to have the same experience in ordinary daily life, where the values of the community differ and are regulated by traditional rights and public freedom.

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35 See OSTROM E., *Governing the Commons: The Evolution of Institutions for Collective Action*, Cambridge, 1990.

36 FRACCHIA F., *Introduzione allo studio del diritto dell'ambiente. Principi, concetti e istituti,* Napoli, 2013, 29 ss.