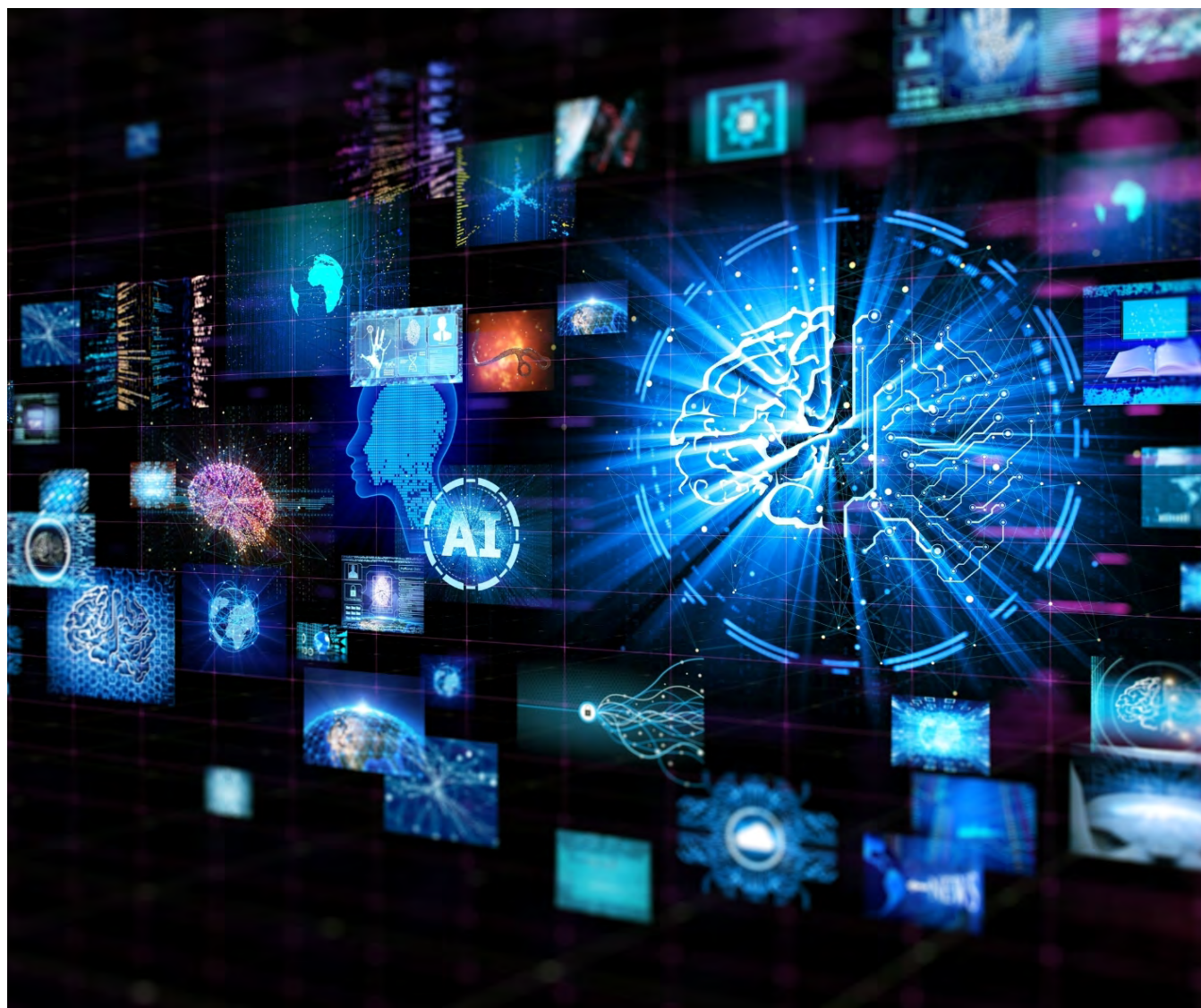


SMART CITIES, ARTIFICIAL INTELLIGENCE AND DIGITAL TRANSFORMATION LAW

A Handbook for Students and Professionals



Edited by E. E. Akin, S. Klimbacher, G. Ziccardi

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Eylül Erva Akin, Simona Klimbacher and Giovanni Ziccardi

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by Gabriele Suffia*

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1. The growing importance of cities and the perception of cities

Over the last century, the urban population has increased dramatically. This significant growth positioned the cities as central hubs of economic activity, cultural exchange, and innovation. The concentration of resources, talent, and infrastructure in urban areas not only fuelled economic development, but also presented unique challenges.

According to many scholars (O'Brien *et al.*, 2019), these challenges include, but are not limited to, escalating urban poverty, soaring costs associated with urban living, severe traffic congestion, a pronounced shortage of housing, insufficient investment in urban infrastructure, limited financial and governance capabilities within urban settings, increasing social inequality and crime rates, and environmental degradation.

In addressing these multifaceted issues, the concept of “smart cities” emerged at the end of the last century as a plausible solution with technology and automation at its centre. After many decades, the term “smart city” remains a popular umbrella term for “a technologically modern urban area that uses different types of electronic methods and sensors to collect specific data”, as this brief definition in Wikipedia tries to explain. However, the complexity of the urban dimensions is more and more evident in many circumstances, as both scholars and legislation are facing what a “smart” city means.

The debate is crucial not only to deliver better public services, or better allocate resources, but also from a security perspective. As an unwanted “part” of the digitization, for example, in recent years several cities experienced ransomware attacks which caused significant disruptions to their operations. These attacks can cripple the infrastructure of cities, affecting services like emergency response systems, utility services, and municipal functions.

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This chapter will discuss the idea of a smart city, present the relevant legislation at the European level and offer insights on the most up-to-date research on the topic.

2. The idea of smart cities

As more individuals migrate to urban areas in search of better opportunities, cities have become pivotal in shaping economic trends and driving technological advancements.

The first way to see the origin of smart cities, consequently, is by applying technological enhancements to city management and life. The necessary urban planning and management to sustainably accommodate the growing urban populace wouldn't have been possible without a growing usage of technology, especially digital computing. In the same way, new technologies are described as fundamental tools to improve the quality of life for a city's inhabitants.

Automation is fundamental to the current concept of smart cities. Although this notion appears to be a recent development, early indications of such "smartness" were evident in proposals like the "Magic Motorways", sponsored by General Motors and presented at the 1939 New York World's Fair. The impressive "Futurama" diorama, designed by Norman Bel Geddes, envisioned a future world (at the time, expected for 1960) in which automated highways stretched between skyscrapers and sprawling suburban landscapes. The powerful idea behind "Futurama", highlighting the long-standing vision of integrating automation into urban and transportation planning, is still present in our perception of smart cities. The features of the city presented are quintessential to our contemporary notion of smart cities, highlighting the critical role of technology in urban development and efficiency.

The "Futurama" concept planted seeds within the collective imagination, followed and integrated by many examples of this "smartification": dashboards, control rooms and human-machine integrations populated the (sci-fi) imaginary for decades in the late 1900s, particularly in the US and Europe. The visions from 1939, in many respects, are not too dissimilar from the futuristic ideas that have been revisited and reimagined in numerous subsequent contexts. And, while at that time the term "Magic Motorways" was used, the digital era today is often still shrouded in an aura of the unknown, bordering on what could almost be described as magical.

The reflection on the smartification of cities developed theories and saw many phases.

A brief history of smart cities is attempted by G. R. Halegoua for The MIT Press (2020), starting in the 1950s. It offers an insightful exploration into the evolution of smart cities, highlighting the promises of smart cities in managing

public life and enhancing its predictability through sensors and Big data (in particular, the predictability of trends, of future urban activities and conditions).

From the mere analysis of “urban dynamics” (1969 work by Jay Forrester, in Halegoua, 2020) to the possibility of responding, adapting and predicting users’ needs and behaviours, Information and Communication Technologies (ICT) became more and more integrated into the physical urban environment.

The question arises: how do we evaluate the success of these integrations? How to measure this “success”?

Over the past two decades, city rankings have emerged as a pivotal tool for evaluating the allure of urban areas. These rankings provide a quantitative measure of a city’s appeal, factoring in aspects such as liveability, innovation, and smart technology implementation. The metrics aim to offer valuable insights into the effectiveness of smart city initiatives and their impact on urban life.

A popular one, often referred later in defining smart cities, was the ranking elaborated in 2007 by the Centre of Regional Science (SRF) of the Vienna University of Technology (Giffinger *et al.*, 2007). It identified six areas that quickly became “key strategic action fields” for developers and practitioners: - Smart Government, - Smart Economy, - Smart Environment, - Smart Living, - Smart Mobility, - Smart People. Rankings define benchmarks and promote a vision in which success is obtained when reaching these benchmarks.

This technological empowerment of the cities is what is popular in the so-called “Smart from the Start Cities” and “Retrofitted Smart Cities”. The firsts are cities that are built from scratch around benchmarks of efficiency and “smartness”, like the Songdo International Business District, Seoul (a prominent example of what some authors describe as a new private high-tech city (Courmont and Le Galès, 2019)). The second ones are cities already existing, that are “retrofitted” to accommodate digital technologies.

This approach, often referred to as the “Corporate View” of smart cities (because it is often sponsored by private companies who sell tech solutions to city bodies) (Halegoua, 2020), emphasises the integration or realignment of cities with advanced technologies. This perspective embodies a top-down vision, where the transformation of urban spaces is driven by technological innovations either from the inception of city planning (“Smart from the Start”) or by integrating technology into existing urban frameworks (“Retrofitted Smart Cities”).

This model underscores a strategic approach to urban development, prioritising technological solutions to improve city living, infrastructure, and governance, instead of other types of solutions.

A famous example of the concept of the “corporate view” in smart city development is seen in Rio de Janeiro. The Brazilian city established one of the pioneering city “control rooms” in 2010. This facility, managed by IBM, was designed to integrate and oversee various urban systems and services. However,

this initiative has faced critique from numerous scholars who argue that the control room resulted in a dependency, or “lock-in,” effect for the public administration concerning its relationship with IBM.

This critique highlights concerns about the autonomy of public entities in the governance of smart cities and raises questions about the long-term implications of such partnerships. The case of Rio de Janeiro serves as a cautionary tale, argues Halegoua, emphasising the need for balance between leveraging technological advancements and maintaining control over urban governance.

3. Smart city criticism

Smart city critics, however, frame the digitisation of cities differently. In reality, they focus the attention on how cities were always born around documents, dating back to early human experiences with the writing system. Documents were always part of human life, and the simple fact that they are now digitised, or produced and managed by machines, doesn’t constitute a change in the paradigm of “documentality” (Ferraris, 2014, 2021), as described in the words of the Italian philosopher Maurizio Ferraris.

Cities are the structural organisation of human settlements and the technology is (just) necessary to process data. Following this approach, it’s certainly true that our era presents characteristics different from the past, but in the sense that it’s a revolution (Floridi, 2017) in the paradigm of “documentality”. We now live in the so-called “infosphere” (Floridi, 2020), and cities are “naturally” smart cities because they are in the infosphere.

Smart city critics argue that the primary focus is to understand the city as a place where people live with the technology of their time, and not a place in which technology needs to be implemented to solve problems. This shift could change our perception of the problems triggered by urbanisation, reminding us that the solutions could also not be technological.

The experience of Bletchley Park, for example, presents a contrasting example often regarded as the first “smart community”. This community-centric model focuses on leveraging the collective intelligence and expertise of individuals to solve complex problems, most notably during World War II for code-breaking efforts. This perspective diverges from the technology-centric approach seen in modern smart cities by placing a greater emphasis on people rather than technology. This approach suggests that the essence of a “smart” community lies not solely in its technological advancements but in its ability to harness the potential of its people to improve collective outcomes. It highlights the importance of human collaboration, knowledge sharing, and problem-solving capabilities in creating effective and efficient solutions (with, or without, the usage of technology). Technology, in fact, serves as a tool to enhance human capabilities and it’s not a purpose in itself.

This path is explored in the so-called “Social cities” (Halegoua, 2020), which emphasise sociality and put people first. In the same way, many scholars are proposing to shift the idea of a smart city, from the city itself to its citizens. This passage, from the book “Smart Cities” by G. R. Halegoua clearly explains the point: “Approaching smart citizens as foundations for smart cities recognises citizen agency in addressing issues that governments and their tech partners attempt to ameliorate. This perspective re-envision smart cities as spaces of collective intelligence and collaboration where people work together to address concerns beyond efficient services, such as education systems, poverty, housing, as well as ideas and issues generated from urban communities” (Halegoua, 2020).

4. Smart cities and legislation

To deal with the topic of smart cities and legislation, two important premises must be made: the existence of legal imprecisions and the existence of legal fragmentation. Legal imprecision pertains to the vagueness of the “smart city” term, which is reverberated in how the term is used in the legislation. Legal fragmentation refers to the lack of uniform legislation across countries, even with similar experiences and traditions. Definition is the first problem for a scholar, particularly a legal one. The definition of “Smart city” is at the centre of a debate that has lasted for decades. As reconstructed by scholars, IBM officially registered the term as its trademark in 2011 (Söderström *et al.*, 2014; Breuer and Pierson, 2021). The first usage seems to date back to 2007, as mentioned Centre of Regional Science (SRF) report by the Vienna University of Technology mentioned earlier. However, as Breuer and Pierson explain (2021), “Previously, scholars had been discussing concepts of wired city, digital city, telecommunications city, informational city, or intelligent city, cities and urban, all with similar connotations; announcing changes to urbanisation based on ICT for better or worse”.

The inconsistent usage of the term has led to its limited usage in the legislation. Since 2013, the term has been more frequent in strategies and policy papers (it also entered the official Italian lexicon (Russo, Rindone and Panuccio, 2014).

Recent landmarks are the European strategy “Shaping Europe’s digital future”, which mention smart cities in its webpage “Smart Cities and Communities”, for their aim “at the well-being of its inhabitants, businesses, visitors, organisations and administrators by offering digitally enabled services that contribute to a better quality of life” (website European Commission, “Smart Cities and Communities”).

Another reference occurs with the European Commission initiatives on cities, which mention smart cities in its webpage “Smart Cities” as “a place

where traditional networks and services are made more efficient with the use of digital solutions for the benefit of its inhabitants and business. A smart city goes beyond the use of digital technologies for better resource use and less emissions. It means smarter urban transport networks, upgraded water supply and waste disposal facilities and more efficient ways to light and heat buildings. It also means a more interactive and responsive city administration, safer public spaces and meeting the needs of an ageing population” (website European Commission, “Smart Cities”).

There is no doubt that the European debate on smart cities sees these words as a starting point in pondering and shaping the legislation.

It is worth mentioning that the European Commission is supporting the digital transformation of cities and communities through a variety of tools, like the Living-in.EU movement, which aims to expedite the digital transformation of cities and communities in a manner that prioritizes citizens. It emphasizes ethical and socially responsible data usage, co-creation, and citizen engagement, adhering to open and interoperable standards. Local data platforms, “Data Space for Smart Communities” and the “DIGITAL programme” are all initiatives that promote standards, facilitate data sharing across Europe and offer financial support supplementing the primary funding expected from national sources, including Cohesion Policy Funds or the Recovery and Resilience Facility.

A new field of research is opened also with “Local Digital Twins”: they involve the development of virtual representations of physical assets, processes, and systems within cities and communities (see more later in Paragraph 5 of this chapter).

A relevant tool is constituted by the so-called “Smart Cities Marketplace”, a platform that aims to bring cities, industries, SMEs, investors, banks, researchers and many other smart city actors together. The matchmaking process is organised in three phases building on each other:

- Explore (the projects and the initiatives collected in the platform);
- Shape (a dialogue between all key stakeholders involved); and
- Deal (to ultimately close deals and finance projects).

Related policies are the “Energy and smart cities”, the “Sustainable transport for smart cities”, and the “Digital single market and smart cities”.

Despite the proliferation of policy instruments, the legislation on smart cities is still highly fragmented, as it touches not only European exclusive competences (Article 3 TFUE: customs union; the establishing of competition rules necessary for the functioning of the internal market; monetary policy for euro-area countries; conservation of marine biological resources under the common fisheries policy common commercial policy), and Shared competence (Article 4 TFEU: internal market; social policy, only for aspects specifically defined in the treaty; economic, social and territorial cohesion - regional policy; agriculture

and fisheries except conservation of marine biological resources; environment; consumer protection; transport; trans-European networks; energy; area of freedom, security and justice; common safety concerns in public health matters limited to the aspects defined in the TFEU; research, technological development and space; development cooperation and humanitarian aid), but also numerous matters at national and local levels.

Starting from the base of a hypothetical pyramid, at the local level we can recall the relationship and interaction between local authorities and different stakeholders, including citizens.

At the state level, for instance, we can mention the organisation of the State and the organisation of the public sector, as well as the relationship between the State and the local authorities.

At the European level, many steps were taken to regulate aspects crucial also in smart cities, creating a common ground that is not limited to strategies and soft-law mechanisms.

One example is the GDPR (General Data Protection Regulation), which plays a pivotal role in the realm of smart cities, safeguarding personal data privacy amidst the web of interconnected technologies. With “consent” not the only source of legitimacy in data collecting, the focus is on the accountability of the subjects involved in the data processing for the smart city. This legislation aims to help cultivate confidence in smart city innovations, trying to find balances between individual privacy and public interest.

All the other relevant legislation on the Digital sector potentially intersects the area of Smart cities, like the Digital Markets Act, the Digital Services Act and the Data Act.

Peculiar interest could constitute the Data Governance Act, another cross-sectoral instrument that aims to regulate the re-use of publicly/held, protected data, by boosting data sharing through the regulation of novel data intermediaries and by encouraging the sharing of data for altruistic purposes” (website European Commission, “Data Governance Act Explained). It applies to both personal and non-personal data. In case of the former, it offers safeguards supplementing the provisions of the GDPR to build a trustworthy data reuse and sharing infrastructure, a prerequisite to making more data available on the market.

Another relevant legislation is the AI Act, particularly with its provisions prohibiting AI systems from providing social scoring of people by public authorities or by private actors.

The social scoring could be defined (Recitals 17, not binding, and Article 5, binding) as the evaluation or classification of individuals or groups by public or private actors using AI systems, based on an aggregation of data points related to their social behaviour across various contexts or on known, inferred, or predicted personal or personality traits over time.

The “social score” (similar to what is experienced in China) creates concerns because it may result in discriminatory, detrimental, or unfavourable treatment of individuals or groups, in contexts unrelated to where the data was initially gathered, or in a manner that is disproportionate or unjustified relative to the gravity of their social behaviour.

The relationship between the topic of smart cities and social scoring is pivotal in shaping how innovations can be done in the European urban context. Practises which can lead to outcomes that violate dignity, non-discrimination, equality, and justice, must be considered unacceptable by the European legal standards. Space for “lawful evaluations done for specific purposes in compliance with relevant laws” is, however, open and subject to further developments.

5. Future research

Future developments in the smart city paradigm could be represented by any of the developments in the Digital sector involving or intersecting the use of data.

For the purposes of this Chapter, we limit the discussion to the regulatory sandboxes in the context of AI, comprehensive forms of city management and the metaverse.

The regulatory sandboxes, mentioned in the AI Act as an encouraged way to facilitate the development and testing of innovative AI systems under strict regulatory oversight, are controlled environments in physical, digital or hybrid form, within which businesses and startups can test new technologies, products, and services under regulatory supervision but with certain relaxations or exemptions from standard regulatory requirements. These sandboxes intend to provide a safe space for innovation, allowing companies to experiment and iterate on their solutions while ensuring consumer protection and compliance with regulatory standards. Member States are encouraged to establish at least one AI regulatory sandbox at the national level, but they can also join other Member States in their efforts.

Comprehensive forms of city management are, for example, the so-called Digital Twin Cities. The idea, and its definition, comes from product lifecycle management. A digital twin “consists of three crucial parts: physical products, virtual products, and the connections tying them” (definition of Prof. Grieves (2003), in Deng *et al.*, 2021). It applies potentially to every physical product, but in the case of a city it’s composed by the city itself and a sort of “virtual replica”.

Digital twin technology is described as having a huge impact on cities, even if intended as the digitisation of systems simpler than a city (for example, a building or a train station). These digital twins leverage AI, data analytics, and machine learning to create dynamic digital simulation models. They could

enable real-time city management and informed policymaking through models, visualization, and scenario building.

A further dimension for smart cities is the metaverse and its implementation. Virtual reality, augmented reality, or the metaverse, could, in fact, profoundly shape the city reframing spaces and the physical relationships, between themselves and between citizens and spaces.

6. Conclusions

The impact of technology on the city is a topic that is less prone to determinism than it seems. The results can be unpredictable and promised revolutions didn't obtain what they were supposed to obtain (for example, the advent of digital didn't result in the disappearance of papers). Contrarily, the actual usage of technologies has shaped the world in new ways.

The expansion of AI (or its contraction compared to expectations) can either change fundamental components of the city or remain limited to superficial aspects. It will depend on the usage of technology (and not on the technology in itself), as no usage of technology is ideologically neutral.

The role of practitioners, scholars and public servants is to keep in mind that “along with spaces themselves, “smart city” terminology and values are under construction” (Halegoua, 2020). Citizens, and citizens' needs, must be central more than the cities in themselves.

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