

# HANDBOOK

GENERAL PRECONDITIONS FOR THE SUCCESSFUL DIGITAL IMPLEMENTATION OF MUNICIPAL SERVICES

# **Connective Cities**

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# SMART CITIES CONTEXT; WHAT IS IT ABOUT?

The Smart Cities Council defines a smart city as one that "uses information and communications technology (ICT) to enhance its livability, workability and sustainability" <sub>(Source Visvizi & Lytras, 2019)</sub>

City planning has often been a matter of concern, for architects, urbanists, engineers, geographers, philosophers, theorists, and politicians. Smart cities are also a corporate business and there has often been a tension between markets and politics.

Smart cities are divided into eight main indicator groups, namely: Smart Governance, Smart Economy, Smart Living, Smart Environment, Smart mobility, Smart Citizen, Smart Branding, and Demography. Of the eight main indicators, governance and economy indicators almost dominate all journals with a total of 70%. (Source Visvizi & Lytras, 2019)



Percentages based on the grouping of indicators into eight major groups of indicators

## 1.1 Indicator groups

Education and health (both from the perspective of the availability and of the quality of the services) are topics that carry major connections with demographic evolution, quality of life, and with social urbanism too. Policy areas have undergone shifts in perspective, namely from short-term approaches to medium- and long-term planning and from emergency to preparedness and prevention. Therefore, both have a lot to gain from functional and quality improvements, notably of a technological nature, be it telemedicine or IoT applied to hospitals and education. (Source Visvizi & Lytras, 2019)

Cities raise the issue of **mobility**, which in turn requires careful planning and high efficiency, to meet both principles of good life and of sustainability. Although not being the only subject in the smart city context that has led to debates on environment, issues such as energy use or pollution are pervasive. The debate on clean energies and renewable sources is also much focused on cities, given that they concentrate high levels of energy consumption and of natural resources use and therefore require increased rationalization, which the smart cities technological tools may foster. (Source Visvizi & Lytras, 2019)

Security; Major conurbations, high concentration of people in a given area, high mobility, and poverty coupled with major wealth distribution gaps, all account for insecurity, to mention only some of the challenges cities face.

But security is also about data security, a major challenge for the smart city and also a major problem, from the point of view of individual rights. (Source Visvizi & Lytras, 2019)

**Smart People;** Smart city values its smart citizens because the city residents are the most valuable resource of the city. The initiatives should create an urban environment that yields a high quality of life for its residents. The attitude of city residents towards smart city technologies will play a role in technology acceptance. The concept of smart people embraces various factors like affinity to lifelong learning, social and ethnic plurality, flexibility, creativity, open-mindedness, and active participation in public life.

It's a reckoned phenomenon that the **population** in the world is growing, although not in an even way. It is also undeniable that present days' lifestyles induce human concentration in cities as never seen before. The United Nations (2015) estimates that 66% of the world population will be living in urban areas by 2050, which means roughly two-thirds of the humans. Both processes combined, especially in the parts of the world where demographic regimes are still undergoing transition, are leading to the creation of megalopolis that certainly beg the question of city planning (United Nations, 2017), the alternative being huge, eventually anarchic, gatherings of human beings. The use of "smart" tools therefore becomes inescapable, in the sense that it enables functional arrangements otherwise probably impossible.

A different question may yet be the reality of smaller cities, some of them in highly developed countries, where going smart certainly means a quest for sophistication and increased quality of life, rather than the management of high demographic pressure. (Source: Smart Aarhu, 2015).

Conspicuous is therefore the fact that, in addressing examples of smart cities across the world, some of them are located in highly developed and highly technological countries and areas, Aarhus or Vejle in Denmark; The Hague or Amsterdam in the Netherlands; Barcelona in Spain; Montre´al or Calgary in Canada; Berkeley or Miami in the United States; Singapore; Tokyo in Japan, etc., whereas others are growing with the population growth of developing countries, e.g., Ciudad de Me´xico; Rio de Janeiro in Brazil; Istanbul in Turkey; New Delhi in India, etc (100 Resilient Cities, 2018; European Union, 2018). Consequently, the smart city concept bears a connection with the expansion of urbanization, but not necessarily with population growth. Besides, it is interesting to remark that technology is rapidly reaching developing countries also in this way, thus paving new avenues for human development. (Source Visvizi & Lytras, 2019)





1.2 Ten steps to follow for smart cities.

The development of smart cities – enabled, powered and integrated by digital technologies – is set to be one of the crowning achievements of societies worldwide in the 21st century. Already, the everyday lives of people living in countless cities are being made easier, more fulfilling and more secure by previously undreamt-of services enabled by digital. Yet the transformation of our cities has barely begun. And looking forward, as citizens' expectations grow, urban populations continue to expand, energy efficiency and sustainability rise in importance and government systems are upgraded over time, the pace of progress and innovation isn't likely to let up.

These ten steps are proposed by Is Innovation of the Public Sector Center for dealing with the challenge of smart cities. It involves local government, private initiative and the general public. (Source: IE Insights., 2 016)



# DIGITALISATION; ECONOMIC DEVELOPMENT AND TECHNOLOGY.

Digitalisation certainly is one of the most dynamic developments of our age, in which opportunities and risks are closely intertwined. Future developments are likely to be of a complex nature, with start-ups, small companies, and flexible operations emerging alongside traditional companies and industries. To date, the employment effects of such developments are not fully understood and cannot be predicted with precision. Therefore, fears about declining employment rates are mounting at the same time as skills mismatches persist in EU labour markets. Constructive collaboration and increased awareness among the main actors, i.e. governments and the social partners is key in this situation. The broad variety of socio-economic structures and different levels of economic development in the EU may well require specific analyses and approaches to manage the effects of digitalisation on labour markets and employment. (Source: Mergel, 2019)

As a logical consequence of digitalisation, digital technologies are being introduced into a growing number of workplaces in the service industry. For instance, almost 60% of employees in the banking sector report the introduction of new technologies into their workplaces during the past three years. Employees require specific competences, i.e. "e-skills", to become proficient operators of such technology. This means that curricula in vocational education and training need to be updated accordingly and related training measures implemented.

Reliable knowledge concerning skills needs and gaps is required in order to address this skills mismatch in curricula. Indeed, the EU is already active in this field, particularly through agencies such as CEDEFOP. Allowing the social partners to take the lead in such "skills intelligence", for instance in the form of sector skills councils, has already proved a successful practice. Against this background, it is regrettable that the Commission is considering weakening their role by replacing social partner skills councils with multi-stakeholder skills alliances. However, as the problem of the skills mismatch persists despite the skills intelligence available, the lack of strategic implementation and investment would seem to be the chief problem. (Source: Mergel, 2019)

Smart cities are currently benefiting from a positive buzz from supporting organizations and thus from a lot of economic support. Taking advantage of this support and the multitude of technological possibilities, cities must devise smart city projects, decide how they will use and advance their ICT infrastructure, and optimally exploit their assets. A key challenge is to carry out these actions in coordination with the citizens because the ultimate goal of building a smart city is to improve their quality of life.

"Smart cities are not only about ICT, energy and transport infrastructures: Smart cities are about smart citizens, who participate in their city's daily governance, are concerned about increasing the quality of life of their fellow-citizens, and about protecting their environment" (Craglia and Granell, 2014). The technologies should be accessible for all citizens, including the poor, the disabled, the elderly, and other vulnerable people (Kharas and Remes, 2018). Citizens have to be motived and rewarded to get involved in all changes (Lytras and Visvizi, 2018) even if the final decisions remain with public authorities.

(Source Visvizi & Lytras, 2019)



# 2.1 Measures of performance

Measuring the performance of a city as a smart city is an uphill task. A measurement system, identifying six layers and levels of a smart city, is presented as follows

- Layer 0: The City Layer. Smart cities must start with the "city" not the "smart." This layer conveys the traditional components present in every city.
- Layer 1: The Green City Layer. This is inspired from new urbanization theories raised by LEED initiatives.
- Layer 2: The Interconnection Layer. This is integral to the smart city concept referring not only to "infrastructural green islands" but also to city-wide diffusion of green economies.
- Layer 3: The Instrumentation Layer. This comprises of real-time connections outlets such as radiofrequency transmitters, traffic signals, streets, smart meters, infrastructure sensors, and traffic sensors.
- Layer 4: The Open Integration Layer. Smart cities applications should be able to intercommunicate, and share among others data, content, and services.
- Layer 5: The Application Layer. Cities are being empowered technologically, as the core systems on which they are based become interconnected.

Layer 6: The Innovation Layer. Smart cities create a fertile innovation environment for new business opportunities.

(Source Visvizi & Lytras, 2019)

Although smart city performance is a very complex task, an ideal, harmonized measurement framework for smart cities would need to (OECD, 2020):

- capture the impact of digital innovation in cities on outcomes for residents across multiple sectors, i.e. measure not only inputs and outputs of smart cities (i.e. what "goes into" a smart city), but also outcomes in terms of well-being, inclusion, sustainability and resilience;
- assess whether smart city initiatives benefit everyone rather than selected population groups;
- take into account stakeholders' engagement in building smart cities;
- be usable by national and local governments alike; and
- monitor progress over time and across places in a comparable way.

With the objective to assess the extent to which smart cities leverage digitalisation, engage stakeholders and improve people's well-being, and to build more inclusive, sustainable and resilient societies; the proposed OECD Smart City Measurement Framework was built around three pillars (OECD, 2020):

- Pillar 1: Indicators of the degree of digitalisation and digital innovation at the city level (input and output indicators)
- Pillar 2: Indicators of the engagement of various stakeholders in building the smart city
- Pillar 3: Indicators of the four core objectives of the smart city (mainly outcome indicators), namely well-being, inclusiveness, sustainability and resilience that are shaped by the smart city dimensions and stakeholder engagement (from Pillar 1 and Pillar 2).





Bringing these three pillars together, the proposed OECD Smart City Measurement focuses on people and consider urban residents not only as recipients or users of smart cities, but also as designers of smart cities; encompass not only digitalisation in cities, but also how digital innovation can improve well-being outcomes, inclusion, sustainability and resilience to address local and global urban challenges through digital innovation; enable benchmarking of cities across countries; and allow monitoring over time. (Source: OECD, 2020)

## 2.2 Challenges in smart city implementation.

Whatever the technology initiatives being undertaken, smart cities are pioneering developments leading our urban environments into new and uncharted territory – meaning they inevitably face a number of challenges. While these challenges can be seen to some degree in all markets globally, their nature and relative importance vary in different territories, reflecting a vast range of factors – technological, infrastructural, political, social, economic and more. (Source: pwc, 2019)

#### Data

- · Data overload; noisy, heterogeneous data (volume,
- variety and velocity of data)
- Interoperability issues
- $\cdot$  Management of open data

#### Security

- Complex and massive attacks (cyber terrorism) due to
- interrelated critical areas
- $\cdot$  Large-scale ramifications of an attack
- $\cdot$  Shared responsibility for securing the city

#### Vendors

- Public-private collaboration
- $\cdot$  Coordination among multiple stakeholders

#### Tech

- City-wide network coverage
- $\cdot$  Network capacity
- Retrofitting existing infrastructure

#### Policy

- Lack of IoT standards
- $\cdot$  Legislation and policies
- Embedded or rigid public sector processes
- $\cdot$  Slow government procedures and reaction times

#### Citizens

- $\boldsymbol{\cdot}$  Lack of confidence in using and benefiting from smart city services
- · Citizen participation and privacy concerns
- Inclusivity and socioeconomic consequences

#### Talent

- Lack of training workforce
- Shortage of funds for training
- · Aging workforce

#### Resource

- $\cdot$  Funding, ROI
- Business models
- $\cdot$  Meet growing energy demands

# DIGITALISATION OF PUBLIC SERVICES.

Digital technologies have permeated our everyday lives. Business, politics and science have taken up this development and are increasingly concerned with the digital transformation. Two terms are frequently discussed in the public sector, e-government and smart city. E-government primarily stands for the digital provision of public information through the use of internet and web-based technologies, while SmartCity addresses the use of digital technologies to increase the quality of life of the population in addition to the efficiency of urban or regional processes. Public services play an essential role here. This means all the services that the state provides for its residents in order to cover both their existential and their political needs.

The Internet and the Web led the public sector into the era, which is now moving in a directional era with the rapid advancement of digital technologies. The term smart stands for user-friendliness (from a marketing perspective) as well as the intelligence and ability to react quickly to new events (from an organizational and technology perspective). (Source: D'Onofrio & Stucki, 2021)

## 3.1 Objectives of the digitization of public services

Digitization enables information to be transported quickly and easily over large physical distances. This can facilitate access to services and different parties can easily communicate with each other even without physical contact. The global corona pandemic has given digitization a boost for precisely these reasons. The residents were able to interact and obtain services despite contact restrictions and reduced radii of movement. The goals pursued with the digitization of public services naturally go beyond these points. The following points are often mentioned as goals pursued by the development of digital public services (Bertot et al. 2016; European Commission 2016; United Nations 2020)

- Increase efficiency in handling administrative matters
- Simplify access to public services
- Create closeness to the inhabitant
- Establish transparency about democratic processes
- Create trustworthiness
- Expand the participation of local residents
- Improve the quality of public services
- Promote sustainable development
- Enabling mobility for residents and companies
- Create the competitiveness of locations
- Support economic growth

(Source: D'Onofrio & Stucki, 2021)

In order for the digitization of public services to succeed, various conditions must be met. Suitable infrastructures or systems and communication networks are required as a foundation. In addition, incentive systems or clear value propositions are useful to get residents on the digital channels. If more and more matters between residents and authorities are being handled in digital space, identification means should be used that meet the legal and practical requirements of this digital business. Digitization is based on IT systems. In order for services to be digitized, technical infrastructures are required, i.e. primarily systems and communication networks so that data and information can be transmitted, stored and processed. The residents must be provided with high-performance networks across the board so that they can obtain digital services (Bertot et al. 2016; United Nations2020; Schulz2020). Service providers need data centers in order to be able to process the growing amounts of data in a timely manner. In terms of efficiency and scaling, common infrastructures for different authorities or even countries should be considered. (European Commission 2016).

## 3.2 Incentives and guard rails for the use of digital administrative services

The example of the COVID certificate illustrates another problem of digital services. In order for the investment in the development of digital services to pay off, they must also be used. Incentive systems are ideal for this. In the case of the COVID certificate, the incentive is given because it allows the holder advantages such as easier travel. In the private sector, incentive systems for customers to migrate from analog to digital services are widespread. For example, many companies offer their customers discounts if they receive their invoices as e-bills (so-called e-bills) instead of on paper. In the context of public services, which are committed to the principles of equal treatment and universal access, such strategies are problematic, as population groups with a weak affinity for the digital world, such as the elderly or people from educationally disadvantaged backgrounds, are disadvantaged (Martini2017). For these reasons, the radical, private-sector approach of completely abolishing analog channels is problematic. An analogue alternative should always be offered to a public digital service. The approach to be followed should also be called digital first and non-digital only public services are all those services that the state provides for its residents in order to meet both their existential and political needs. Public services are the building blocks of state activity and the points of contact between state and residents. The digital transformation is taking place in public services, as services are offered on digital channels, digital technologies become a central element in the provision of services or even a digital product is the result of the service. Digitization is based on new technologies, which require new skills and framework conditions. Artificial intelligence opens up possibilities to automate public action, for example. If, however, one day administrative or even court decisions are to be made by an artificial intelligence, clear guidelines and techniques are required to ensure that decisions are firstly understandable and secondly are not based on learned prejudices. Corresponding digital ethics, as well as a deep understanding of the digital technologies used, are required. One example I the rejection of the e-ID law in Switzerland which clearly shows that, in addition to the new complexes of topics, the classic problem areas for public services such as the catalog of services, financing, service provider, regulation, Price or quality need to be clarified.

## 3.3 Building the resilience of e-government

Cybersecurity is a key factor in the transformation to resilient e-government. Security measures need to be strategically incorporated from the outset, during the design phase. The global community is increasingly embracing ICTs as a key enabler of social and economic development but cautions that misuse is raising questions about State security and protection of individuals and businesses in the explosion of global connectivity. It is important for governments to improve the management of ICT-driven approaches to guarantee continuity of online services as well as to safeguard people's data and privacy. (Source: United Nations, 2019)



The United Nations, based on the e-government survey in 2018, posits that a change in existing procedures, as well as heightened cybersecurity consciousness among civil servants, are required, noting for example, that ransomware attacks are increasingly affecting businesses and consumers, and indiscriminate campaigns are distributing massive volumes of malicious emails. In May 2017, the WannaCry ransomware cyberattack caused major disruptions to critical information infrastructures of companies and hospitals in more than 150 countries, prompting a call for greater global cooperation.

The most common barriers to e-government resilience are insufficient training and accessibility, as well as e-illiteracy. There is a need for trust, security, and privacy, which can be established through the following cybersecurity measures: (i) adopting a harmonized set of laws at regional and international levels against the misuse of ICTs for criminal or other nefarious purposes; (ii)integrating adequate technical capabilities in detecting and responding to cyber-attacks, and to ensure a climate of trust and security; (iii) and establishing minimum security criteria and accreditation schemes for software applications and systems. A secure e-government system requires collaboration among vendors, industries and manufacturers to ensure that devices are secure by design and that users can interact with them to perform updates and makeconfigurations changes, among others. The digital transformation must be thoughtfully strategized and continuously updated to ensure security and relevance along the path to sustainable development. <sup>(S aurce: United Nations, 2019)</sup>

## 3.4 Digital Service Teams

National governments are setting up digital service teams to respond to complex governmental and societal challenges in a responsive and agile manner.

DSTs emerge as a third space between centralized and decentralized IT departments that are triggered by large-scale IT failures and the need to abandon black swan IT projects tasks that traditional CIO offices were not able to handle so far. DSTs design principles have been replicated from the initial idea of the UK's Government Digital Service team and implemented in other countries, such as the U.S., Canada, Italy, or Finland

Digital service teams (DST) have emerged as a third space of IT governance in between centralized and decentralized CIO offices. They can be described as organization structures that are focusing on the redesign of services and processes with the goal to provide digital government services faster and in a more user-centric way than existing e-government efforts.

# PUBLIC DIGITAL SERVICES: TODAY AND TOMORROW.

As we already analyzed, the growing flow of urbanization poses new challenges for urban areas. It is starting with socio-economic initiatives, hygiene, education, waste management, and mobilization. On the other hand, there are a variety of demands in an increasingly modern and developed community, such as a comfortable living and working environment, decent public space, and ease of mobility. In addition, efforts to develop urban infrastructure and services have begun to be pursued by major cities in the world.

urban infrastructure and services have begun to be pursued by major cities in the world over the last two decades, with the goal of creating improved environmental, social, and economic conditions.

Is not possible today to talk about smart cities or digitalisation and not mention the pandemic of Covid-19, this has affected every sector and at the same time, started acting for the future.

Cities around the world are shaping their way out of the COVID-19 crisis to emerge smarter, more sustainable and more inclusive. Many cities have joined the "smart city wave" over the past two decades, and many others have joined in the wake of the pandemic, with digitalisation taking center stage in recovery strategies.

Digital technologies have been critical. They have made it possible to relay real-time lifesaving information, maintain the delivery of essential public services (such as healthcare through telemedicine) and bridge social isolation. With countries grappling with repeated episodes of lockdown at different scales and physical distancing requirements reshaping urban environments, many cities are expanding, accelerating and mainstreaming the use of smart city innovations. In the longer term, the capacity to leverage the benefits of digital innovation for all will be critical to help cities rebound from the crisis and accelerate the transition to a new urban paradigm for a more sustainable and resilient future. (Source: OECD, 2021)

## 4.1 Public digital services during COVID 19

As a measure taken against COVID-19, social distancing became a top priority during the pandemic, forcing many people to reduce physical contacts and switch to digital contacts. The use of public digital services (PDS) in policing activities such as online crime reporting systems experienced a boost compared to pre-Corona times by 147% (BKA, 2020). Further, the COVID-19 lockdown led to the unique situation that, in addition to voluntary users independent of COVID-19, a previously unreachable user group was forced to use PDS to help fight the pandemic (forced users).

With the COVID-19 lockdown, the overall role of PDS in policing changed: The formerly optional PDS became a temporary essential solution to reducing physical contact. This forced situation resulted in both increased use overall and an extended user group with heterogeneous use motivation (voluntary and forced users). Technology acceptance models offer a theoretical framework for comparing forced and voluntary users because the systematize key factors and antecedents of technology acceptance and specify voluntariness as a moderator of technology acceptance that influences both the level and predictive values of acceptance factors. (Source: Schauffel & Ellwart, 2021)

Every crisis can also be an opportunity, as crises create learning and space for change. The COVID-19 crisis led to sudden and forced changes in professional and public lives toward digital solutions. The top priority during this pandemic was public health. The second priority, however, should be to make this time of change a turning

point for the digitalization of work processes. Forced users during COVID-19, in general, plan to stay digital in the future, though the user's motivation to use a digital system makes a difference regarding technology acceptance. Researchers should uncover user groupspecific needs and characteristics. Providers should consider this user group specificity in design and marketing so that PDS are beneficial for heterogeneous users and providers.

(Source: Schauffel & Ellwart, 2021)



4.2 Transforming cities to increase resilience and sustainability

Based on the e-government survey in 2018 of the United Nations, the results provide an overview of assessment models and present the findings of a pilot study, carried out in 40 municipalities around the world. The challenges and opportunities of applying e-governance to local government units are presented through specific cases. E-government improves public services, citizen engagement, and transparency and accountability of authorities at the local level. E-government also strengthens resilience and sustainability and better align local government operations with national digital strategies. <sup>(Source: United Nations, 2019)</sup>

Among the top 10 of the 40 pilot cities, Moscow ranks the highest, followed by Cape Town and Tallinn (second, tie) and by London and Paris (fourth, tie). According to the Local Online ServicesIndex (LOSI) used in determining this ranking, the remaining cities in the top 10 are Sydney, Amsterdam and Seoul (seventh, tie), and Rome and Warsaw (ninth, tie). The LOSI covers the technical and content aspects of the city/municipality websites, as well as electronic services provision and e-participation initiatives available through the portals.

Politicians, policy-makers and public officials are creating new policies to promote resilience and sustainability especially in the areas of poverty eradication, equal opportunity for all, support for vulnerable groups, land development and planning, economic development, smart growth, pollution prevention, energy, resources, and water conservation, inner-city public transit, eco-projects, and alternative energy. Public administration processes are being re-engineered to integrate these policies into local planning and development efforts, even as these administrations are striving to keep pace with the speed of technological innovation. (Source: United Nations, 2019)

Improving local e-government is inseparable from the pursuit of sustainable development goals. The 2030 Agenda recognizes the importance of technological innovation in the implementation of the Goals and contains specific references to the need for high quality, timely, reliable and disaggregated data including earth observation and geospatial information. Many of the specific targets of the 2030 Agenda are directly or indirectly related to local e-government assessment indicators. Local governments are indeed the policy-makers and catalysts of change. They are also the level of government best-placed to bind the SDGs with local communities. The development of electronic services and the increasing number of citizens participating in decision-making will motivate efforts to achieve the SDGs and will assist in making cities sustainable, inclusive, safe and resilient.



# REFERENCES

- Visvizi, A., & Lytras, M. (2019). Smart Cities: Issues and Challenges: Mapping Political, Social and Economic Risks and Threats (English Edition) (1.a ed.). Elsevier.
- Smart City: The main assist factor for smart cities. Available from: https://www.researchgate.net/publication/348925177\_Smart\_City\_The\_main\_assist\_factor\_for\_smart\_cities [accessed Nov 10 2021].
- Lytras, M., & Visvizi, A. (2019). Smart Cities: Issues and Challenges. Elsevier Gezondheidszorg.
- Musa, S. M., Ajayi-Majebi, A., Ashaolu, T. J., & Sadiku, M. N. O. (2021, octubre). Smart cities (N.o 2). International Journal of Scientific Advances.
- Rizal, M. N., Nugroho, L. E., & Ningrum, T. P. (2021, enero). Smart City: The main assist factor for smart cities (N.o 5). INTERNATIONAL JOURNAL OF INNOVATION IN ENTERPRISE SYSTEM.
- Rintaningrum, R. (2021, octubre). THE IMPORTANCE OF DIGITAL LITERACY. .
- European Economic and Social Committee. (2015, septiembre). Effects of digitalisation on the services sector and employment (N.o 1).
- van Dijk, J. A. G. M. (2019, octubre). The digital divide.
- Mergel, I. (2019, agosto). Digital service teams in government (N.o 1). Elsevier.
- D'Onofrio, S., & Stucki, T. (2021, septiembre). Digital Public Services. Springer.
- Schauffel, N., & Ellwart, T. (2021). Forced Virtuality During COVID-19. Hogrefe.
- Speirs, M. (2010, enero). Crossing the Digital Divide: Strategies and Implications.
- Ketil, B. (2019, febrero). Understanding social and cultural aspects of teachers' digital competencies.
- United Nations. (2019). United Nations E-Government Survey 2018. United Nations.
- Measuring Smart City Performance in COVID-19 Times: Lessons from Korea and OECD Countries. (2021). Van Haren Publishing.
- pwc. (2019, mayo). Creating the smart cities of the future.
- IE Insights. (2016). Roadmap for smart cities [Ilustration]. https://www.ie.edu/insights/infographics/a-road-map-forsmart-cities/
- otos from Pexels



