Smart Cities Study 2021

International study on the impact of COVID-19 on cities' Smart resilience

UCLG Community of Practice { Digital Cities }

Bilbao

Smart Cities Study 2021

International study on the impact of COVID-19 on cities' Smart resilience

UCLG CGLU | UCLG Community of Practice Digital Cities | Bilbao

Supported by:

Sweden Sverige

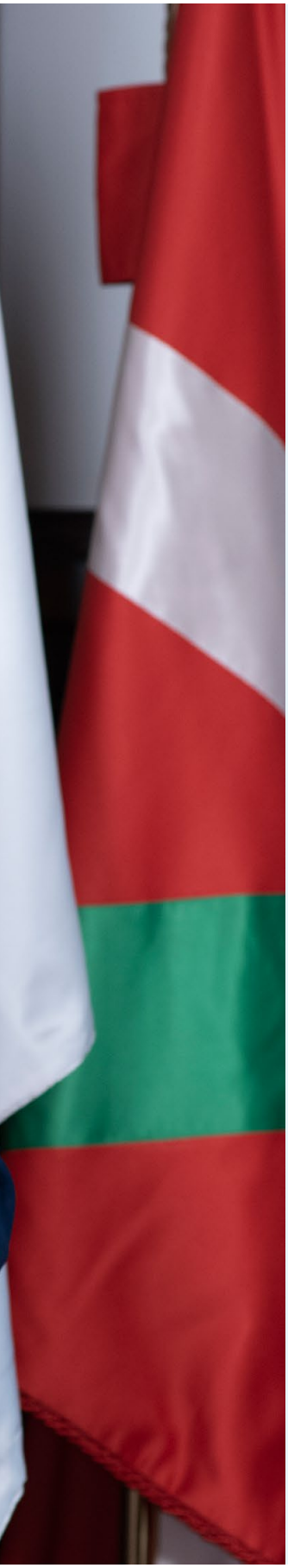
This publication was produced with the financial support of the European Union. Its contents are the sole responsibility of and do not necessarily reflect the views of the European Union.

This document has been financed by the Swedish International Development Cooperation Agency, Sida. Sida does not necessarily share the views expressed in this material. Responsibility for its content rests entirely with the author.

S&F Consultants

This study is part of the research by the UCLG Community of Practice on Digital Cities, led by the city of Bilbao. Coordinated by the Bilbao City Council, the research, revitalization of the participation of cities and preparation of the final study has been carried out by the strategic consultant, S&F Consultants.

Juan Mari Aburto
Mayor of Bilbao



I am pleased to present the **fourth edition of the "Smart Cities Study"**, written by the UCLG Community of Practice Digital Cities, led by the City of Bilbao. A study which on this occasion focuses on a subject of great importance: the impact of COVID-19 on cities' Smart resilience.

The pandemic has had a severe impact on people's lives and on the normal operation of cities. Even so, thanks to a global effort, both public and local government are now seeing light at the end of the tunnel.

This crisis has revealed the weaknesses of our cities, but it has also shown how the steps taken in recent years to improve the cities' resilience are proving worthwhile.

Putting people at the centre of public policies has helped to reduce the impact of COVID-19. There is still a long way to go, but we must not lose sight of the fact that all public policies must take people into account in order to be truly effective and inclusive.

During the process of transformation into a smart city, we must also value the sustainability factor. Improving people's lives does not only involve creating policies directed at the general public but also includes improving the conditions of the place where they live. This is the only way to ensure a future for everyone.

Without a doubt, sustainability is linked to greater resilience. We believe that, to achieve this, we must promote and make use of digital tools that enable smart public policies and conditions that permit an immediate response to people's needs in the event of changes which may occur in the future.

The construction of intelligence also includes learning from others. As cities we should not be disconnected bodies, but should articulate a global network which provides people with increasingly better living conditions. Therefore, peer-to-peer collaboration and learning processes must serve as a means to continue moving forwards towards a society able to address critical changes.

Contents

Introduction

The UCLG Community of Practice Digital Cities

The UCLG Community of Practice Digital Cities was created in 2009 with the aim of promoting the development of a shared vision and joint measures among local governments in favour of an inclusive Information Society that promotes the reduction of the digital divide and the use of new technologies as a lever for the development of sustainable and competitive cities.

The main objective of the Community of Practice Digital Cities is the update of the "Smart Cities Study".

A study set out with a global and cross-cutting approach of the different levers in which the potential for a city to grow and transform lie.

Three editions have been published to date:

2012

The first edition of the Study offers a Holistic vision of the Smart cities, bringing together six key areas of action which affect the development of cities: Economy, People, Governance, Mobility, Environment and Quality of Life.

2017

The second edition of the study focussed on the Economy, and analysed key factors associated with Smart Cities in fields including innovation, entrepreneurship; knowledge and talent; society and the digital economy.

2019

The third edition focussed on Governance. This edition analysed the key principals on smart governance and the main areas of action, open governance and advanced strategic management in cities, as factors in the transformation of Smart Cities.

1990

START OF ACCELERATED DEVELOPMENT OF INTERNET & ICT

2005

UCLG Committee Digital and Knowledge-Based Cities

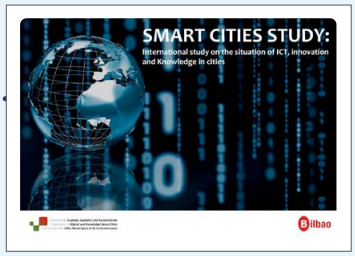
Cities & Regions World BILBAO2005

CREATION OF COMMISSION AND 2ND WORLD SUMMIT OF LOCAL AUTHORITIES ON THE INFORMATION SOCIETY IN BILBAO

2009

EXTENSION OF THE SCOPE AND OBJECTIVES OF THE COMMISSION

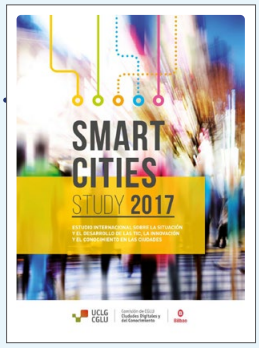
2012



PUBLICATION OF THE FIRST EDITION "SMART CITIES STUDY"

2017

SECOND EDITION OF THE "SMART CITIES STUDY"

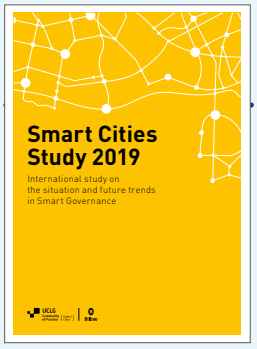


2018

CONVERSION OF THE COMMISSION INTO THE COMMUNITY OF PRACTICE DIGITAL CITIES

UCLG Community of Practice Digital Cities

2019



THIRD EDITION OF THE "SMART CITIES STUDY"

2021

FOURTH EDITION OF THE "SMART CITIES STUDY"

How do you define a Smart City?

The concept of **"Smart City"** initially referred to the use of digital tools and innovations associated with the ICT to make the services offered in the cities more efficient and to generate opportunities for economic growth in the cities.

This initial concept evolved, as it was understood that being "smart" is more than just having and using technology and it also includes using this technology to the benefit of our communities, with objectives including accessibility, respect of digital rights and the care concept and not leaving anyone or anywhere behind. The end is as important as the means, and consequently, today smartness or intelligence when referring to cities is understood as a multi-dimensional concept which is associated, among other things, with:

RESILIENCE

SUSTAINABILITY
(from a triple vision of economic, environmental and social sustainability)

ADOPTION AND USE OF TECHNOLOGY

MEASURES FOCUSSED ON PEOPLE

GUARANTEE OF DIGITAL RIGHTS

ACCESSIBILITY

EQUALITY AND SOCIAL COHESION

EFFICIENCY

EFFECTIVENESS

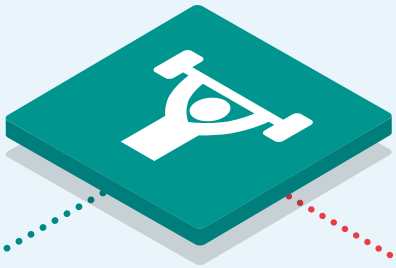
OPENNESS AND TRANSPARENCY

As the concept of "Smart City" is constantly evolving, there is often no standard definition, but several approaches to the question of how a "Smart City" must operate and what tools and capacities it requires to do so.

In any case, digital innovation is still considered as a key component for advancement in all the areas mentioned. This is why it receives special importance in this study.

From the Community of Practice Digital Cities, we believe that **it is not a case of smart cities and non-smart cities, but that there is continuous progress** towards the different characteristics making up the concept of "Smart City". This is a path to be followed by all local governments, each to the best of their abilities and taking into account the individual characteristics of their institutions, culture and people.

SWOT ANALYSIS OF SMART CITIES (in the framework of the OECD)

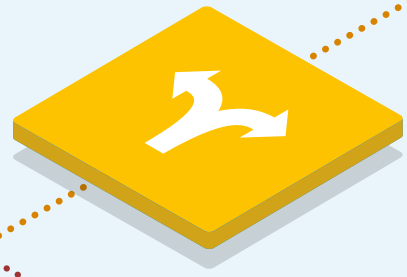


STRENGTHS

- Extended digitalisation
- Numerous experiences of transformation towards a Smart city
- Attractive for the supply side and private sector
- Results aimed at improving efficiency

WEAKNESSES

- Budgetary limitations
- Lack of infrastructure
- Lack of skilled personnel for data analysis and implementation of policies promoted by digital technology
- Lack of relevant legislative framework
- Possible territorial divides

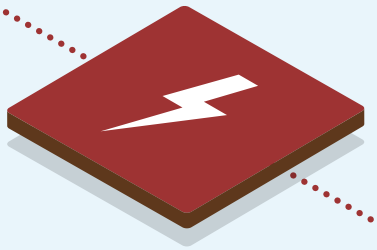


OPPORTUNITIES

- Use of data as a mean for improving welfare
- Digital inclusion
- Provision of inclusive and efficient services
- New forms of public participation
- Increased sustainability and resilience
- Improved and new ways of cooperation and exchange of knowledge between cities
- Reduction of administration in “silos”

THREATS

- Alteration of the legal and regulatory frameworks
- Possible abuse of personal data, privacy and security
- Increased inequality among digitally marginalised groups



The role of cities and local governments in the response to COVID-19

The COVID-19 pandemic has had a significant impact on society and on the institutions governing society.

An impact which has required the articulation of responses at all levels and in all areas of government. Local governments and cities, because they belong to an area of governance which is closer to the people, were the first to act in slowing the expansion of the virus and protecting their people while they continued to offer public services aimed at minimising the impact of the pandemic on institutional operations and on the economy.

Cities were **key factors when it came to responding to the COVID-19 crisis thanks to the creation of their own resources** (both at social and institutional level). In addition, they played a vital role, with the exchange of good practices and peer-to-peer learning, and as living-labs in which the principal measures launched by national governments have been implemented.

The pandemic led local governments to reconsider their course of action in cities and, in particular, the way in which they provide services to the general public. The planning of their operations, of the space, and of their projects for the future, suddenly incorporated the **concept of resilience and care** due to the toll taken by COVID-19.

Resilience is defined as the capacity of a system, community or society exposed to threats to resist, absorb, accommodate, adapt and recover from the effects of a threat effectively and efficiently, and includes the preservation and restoration of the basic and essential structures and functions through risk management.

Care is defined as those tasks, and policies, which go beyond mere goods and services, and serve to protect and regenerate the welfare of our communities. Care is not limited to the home, and as smart cities it is essential to develop care policies which reach everyone.

The exchange of knowledge and experiences such as the LLEs, solidarity and the promotion of proactivity by local governments are central elements to be able to use this knowledge.

Resilience is a characteristic which had been gaining strength in all institutional areas in the last decade. Having to globally confront such a far-reaching crisis has **increased the social perception of the need to adopt resilience and, by extension, has accelerated its adoption**.

Cooperation between cities during the pandemic served to minimise its impact, and the promotion of this cooperation will be essential for a "Smart" future. The responses and **recovery processes in all the cities served to generate knowledge** which needs to be ordered, disseminated and transferred to be able to use it.

An example of cooperation between local and regional governments during the pandemic is the series, **Live Learning Experience (LLE) led by United Cities and Local Governments (UCLG) in collaboration with Metropolis and the UN - Habitat**, which brought together over 2 800 participants (more than 260 mayors, local and regional leaders and partners) who presented more than 200 cases from the start of the pandemic on various subjects ranging from digital technologies to mental health and from migration to tourism.

This is why the international networks of cities and governments must step up their efforts to achieve smarter cities, the recovery of which **implies greater proportions of resilience and sustainability**.

"Local and regional governments have played a vital role in the protection of people and the planet through the provision of local public services during the COVID-19 pandemic. Looking towards recovery, highlighting how important it is for a city to be "smart" goes beyond the technology. It also includes the relevant provision of public services, the care concept and the guarantee of digital rights will be essential for ensuring that no-one and no place is left behind."

Emilia Saiz, Secretary General of United Cities and Local Governments (UCLG)

Smart Cities Study 2021

Context

The role of cities in responding to the COVID-19 pandemic was vital.

The Smart Cities Study from the last two editions (2017 and 2019) specifically addresses some of the six axes defined in the first edition of the Smart Cities Study in 2012, including Economy, Citizenship and Governance.

In this edition, it was felt that it would be relevant to once again broadly address some of the key lines of action of the Smart Cities, due to the outbreak of the pandemic caused by COVID-19.

RESILIENT TRANSPORT

Maintain mobility in our cities

RESILIENT ECONOMY

Maintain our cities active

RESILIENT PUBLIC SERVICES

Maintain services for the general public

RESILIENT OPERATIONS

Maintain the internal operations of institutions and inter-institutional coordination

RESILIENT EDUCATION AND TRAINING

Prepare the people for the future

RESILIENT RELATIONS WITH THE CITIZENS

Guarantee social involvement of the people

CROSS-CUTTING

BIG DATA, IA & OPEN DATA FOR INCREASED RESILIENCE AND IMPROVED DECISION-MAKING

Strengthen the use of our data

The study takes a **global and cross-cutting approach of the different levers in which the potential for growth and transformation of a city lie**, although it also focusses the analysis on the areas most affected by the pandemic, and on how the cities have responded in each one.

The Smart Cities Study 2021 is based on the idea that cities with higher technology introduction ratios in their operations were more resilient when it came to responding to the problems caused by COVID-19.

The impact of COVID-19 has resulted in major needs, and consequently opportunities to adapt urban planning. The governance of cities is based on a three-dimensional need: **Sustainability, Resilience and Inclusion**.

This governance is supported by the **ICTs**, as these enable the municipal authorities:

To warn of **abnormal changes** occurring in the cities in real time

To develop **predictive analysis** of behaviours and trends (e.g. via the IA) and to facilitate decision-making based on real data

To use **new technologies to respond to emergencies** and to immediately respond to the needs of the people

The pandemic has created an opportunity that cities have exploited to accelerate the introduction of new digital technologies aimed at improving our lives. The rules of the game have changed and in just a few months huge progress has been made in the digitalisation of the society, making it essential to ensure that the technological advances consider and respond to everyone's needs.

OBJECTIVE

General objective

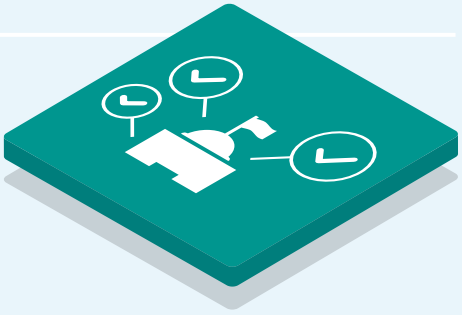
The role of smart cities will be essential for helping to recover from this global crisis without precedent and to prepare for future crises.

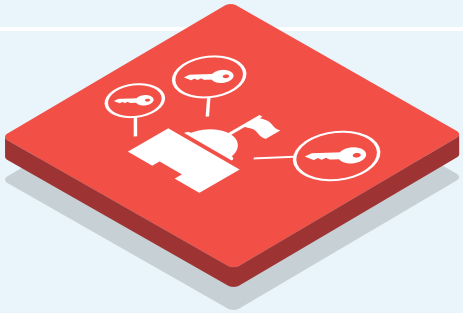
The Smart Cities Study 2021 analyses the degree of **resilience** of cities, developed by adopting "Smart" measures as a result of the pandemic.

Specific objectives

Characterise the current situation and opportunities available in different areas of governance at local level.

Identify cases of success (good practices) which may serve as a reference to other cities for moving towards the "Smart City" concept and peer-to-peer cooperation.





Identify the key elements which could hold back or could facilitate the development of these areas of governance and resilience at local level in the face of a crisis.

Methodology used

The Smart Cities Study 2021 has been drafted following the collection of information via an open questionnaire.

The purpose of the questionnaire is to collect information about the pre-COVID-19 situation in the cities, in order to determine the **departure point** for responding to the pandemic.

Information was also requested regarding the **impact of COVID-19 on the different areas of governance** and about which **"Smart" responses** were implemented by these local governments.

It also gave the option to include their **understanding of the new levels of resilience acquired** for responding to other crises. In addition, the most vulnerable groups during the crisis were identified in order to establish measures to increase resilience aimed at improving their situation.

Lastly, the cities were asked to send information about their good practices and provide details about lessons learned.

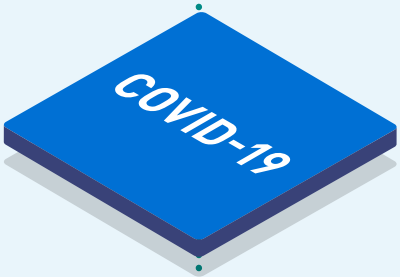
It should be noted that **this study is not intended to be a study of comparison**. Instead, it seeks to offer an insight to the true situation experienced in different cities, with different levels of digitalisation and capacities, as shown below.

PRE-COVID-19 SITUATION

Level of resilience

Level of digitalisation

Digital resources

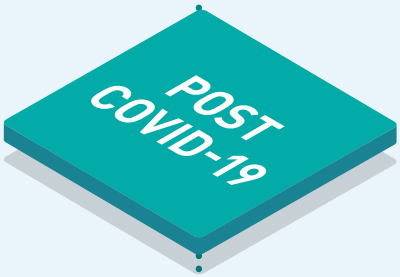


IMPACT AND ADAPTATION TO THE NEW REALITY

COVID-19 impact by area

Adaptation and measures by area

New levels of digitalisation/resilience



GOOD PRACTICES AND LESSONS LEARNED

New capacities against future crises

Better practices which can be transferred to other cities and situations

Participating cities

35 cities from a total of 20 countries took part in the study

Argentina
- City of La Plata
- IMDEC. Integración Municipal para el Desarrollo del Este Catamarqueño
- Ciudad de Villa Gesell
- Córdoba Municipality
- Villa Carlos Paz Municipality

Belgium
- City of Ostend

Brazil
- City of Sao Paulo
- City of Rio de Janeiro

China
- Xi'an Municipality

Colombia
- Bogotá Capital District
- Office of the Mayor of Bogotá

Czech Republic
- City of Brno

Spain
- City Council of Villanueva de la Serena
- Metropolitan Area of Barcelona
- City Council of Santander
- City Council of Gavà
- City Council of Bilbao
- City Council of Barcelona
- Regional Council of Barcelona

Finland
- City of Lappeenranta

Islamic Republic of Iran
- Tehran Municipality

Japan
- City of Hamamatsu

Lebanon
- Union of Dannieh Municipalities

Mexico
- City of Tequila
- Mexico City

The Netherlands
- City of Utrecht

Palestine
- Ramallah Municipality

Peru
- Lima Metropolitan Municipality

Romania
- Alba Iulia Municipality
- Iasi Municipality

South Korea
- Seoul Metropolitan Government

South Africa
- Ngaka Modiri Molema District Municipality
- South African Local Government Association - SALGA

Turkey
- Izmir Metropolitan Municipality

Uruguay
- City of Montevideo

POPULATION	EUROPE	LATIN AMERICA	AFRICA	ASIA
< 50.000	City Council of Villanueva de la Serena (ES) City Council of Gavà (ES) Alba Iulia Municipality (RO)	Ciudad de Villa Gesell (AR) City of Tequila (MX)		Ramallah Municipality (PS)
50.001→ 100.000	City of Ostend (BE) City of Lappeenranta (FI)	Villa Carlos Paz Municipality (AR)		
100.000 → 1.000.000	City of Brno (CZ) City Council of Santander (ES) City Council of Bilbao (ES) Iasi Municipality (RO)	City of La Plata (AR) Córdoba Municipality (AR) City of Montevideo (UY) IMDEC. Integración Municipal para el Desarrollo del Este Catamarqueño (AR)	Ngaka Modiri Molema District Municipality (ZA)	City of Hamamatsu (JP) Union of Dannieh Municipalities (LB)
> 1.000.000	Barcelona (Metropolitan Area, Regional Council and City Council) (ES) City of Utrecht (NL) Izmir Metropolitan Municipality (TR)	City of Sao Paulo (BR) City of Rio de Janeiro (BR) Bogotá (Capital District and Office of the Mayor) (CO) México City (MX) Lima Metropolitan Municipality (PE)	South African Local Government Association - SALGA (ZA)	Xi'an Municipality (CN) Tehran Municipality (IR) Seoul Metropolitan Government (KR)

Intelligence for resilience in times of COVID-19

COVID-19 has had a deep and multidimensional impact, visible in almost all areas of local governance, especially in the cities due, among other things, to their large proportions of personal interconnection.

The political response of the cities to COVID-19 **is mainly focussed on certain categories**, without prejudice to the existence of others:

- **Social distancing and lockdown**
- **Working practices and patterns of movement**
- **Specific measures for vulnerable groups**
- **Maintenance of the provision of public services**
- **Support for economic and business recovery**
- **Communication, awareness and digital tools**

This study focusses on the following **six areas**, where it is understood that the adoption of digital tools was a key component for providing an effective response to the impact of the pandemic, and served to increase resilience in the post-pandemic situation we now face.

MOBILITY AND TRANSPORT

PUBLIC SERVICES

INSTITUTIONAL OPERATIONS

RELATIONS WITH THE CITIZENS AND PUBLIC PARTICIPATION

ECONOMY

EDUCATION AND TRAINING

For several years, numerous cities have been making their own way towards the "Smart City" concept.

From the responses to the pandemic emergency linked to digitalisation, the **opportunity to systematise the use of several of the digital tools** has also been observed. It is hoped that several of these tools and the changes in habits involved will have a **transformative impact and become permanent components**.

Due to the limitation to social contacts and in response to this distancing among all social agents, **the use of this type of tools has accelerated**. On the one hand this has enabled further investigation of some of the **already existing tools** and, on the other, it has permitted the **creation of new technologies or ways of applying them** which may contribute to the resilience of cities. Thus, the cities **were forced to strengthen their digital capacities**. But what do we mean by high levels of digitalisation?

Having a high level of digitalisation is associated with having enabling tools and using them.

Enable means "to give the authority, resources, competency or skill" to do something. In the case of cities, **digital tools allow cities to become smarter entities**. Examples may include computer resources, data analysis and similar functions.

Even so, **"intelligence" is not only about installing digital interfaces**, but these must be **used to improve decision-making**. This requires that public administrations know how to use them and are willing to direct these tools towards the people.

According to an OECD study, **the tools used for responding to COVID-19 are mainly based on online/digital tools, internet, Smartphone applications and communication technologies, awareness, teleworking, education and the development of skills**.

Some of the specific tools used by the administrations include:

Internet of Things (IoT)

Virtual platforms

Data analysis tools

Teleconference systems (used transversally in areas including health, employment and distance learning or the relation between the administration and the people)

Although a number of different tools exist, Internet has become the essential tool for finding municipal services, information, means of participation and cultural resources.

The **remaining tools tend to be linked to the digital world**, and for this reason, they are essential for ensuring universal access, eliminating the digital divide and improving the digital skills of the people and administrations.

Cities before COVID-19

Prior to the COVID-19 pandemic, the level of digitalisation in the different areas of governance varied among the cities participating in the study.

The cities who took part in the Smart Cities Study 2021 already carry baggage in their conversion to Smart Cities, and this is **demonstrated by the level of digitalisation and the quantity of Smart resources and tools** they had before the start of the pandemic.

On the whole, cities with a high **level of digitalisation is some areas of governance**, also took charge of digitalising to a greater or lesser extent the remaining areas.

To understand the starting point in each of the participating cities, they were asked about the **"Smart" tools and resources they had in the different areas analysed in the study**.

The application of Smart resources and tools in the different areas of governance requires a public infrastructure and services of **connectivity and public access to Internet**.

The **general resources** that the participating cities already had prior to the pandemic include:

Municipal WiFi networks and free Internet access points
Broadband and fibre optic internet
Computer equipment available for public use
4G cover
Network of connected devices (IoT)
Public guidance services and digital assistance for the general public

80%

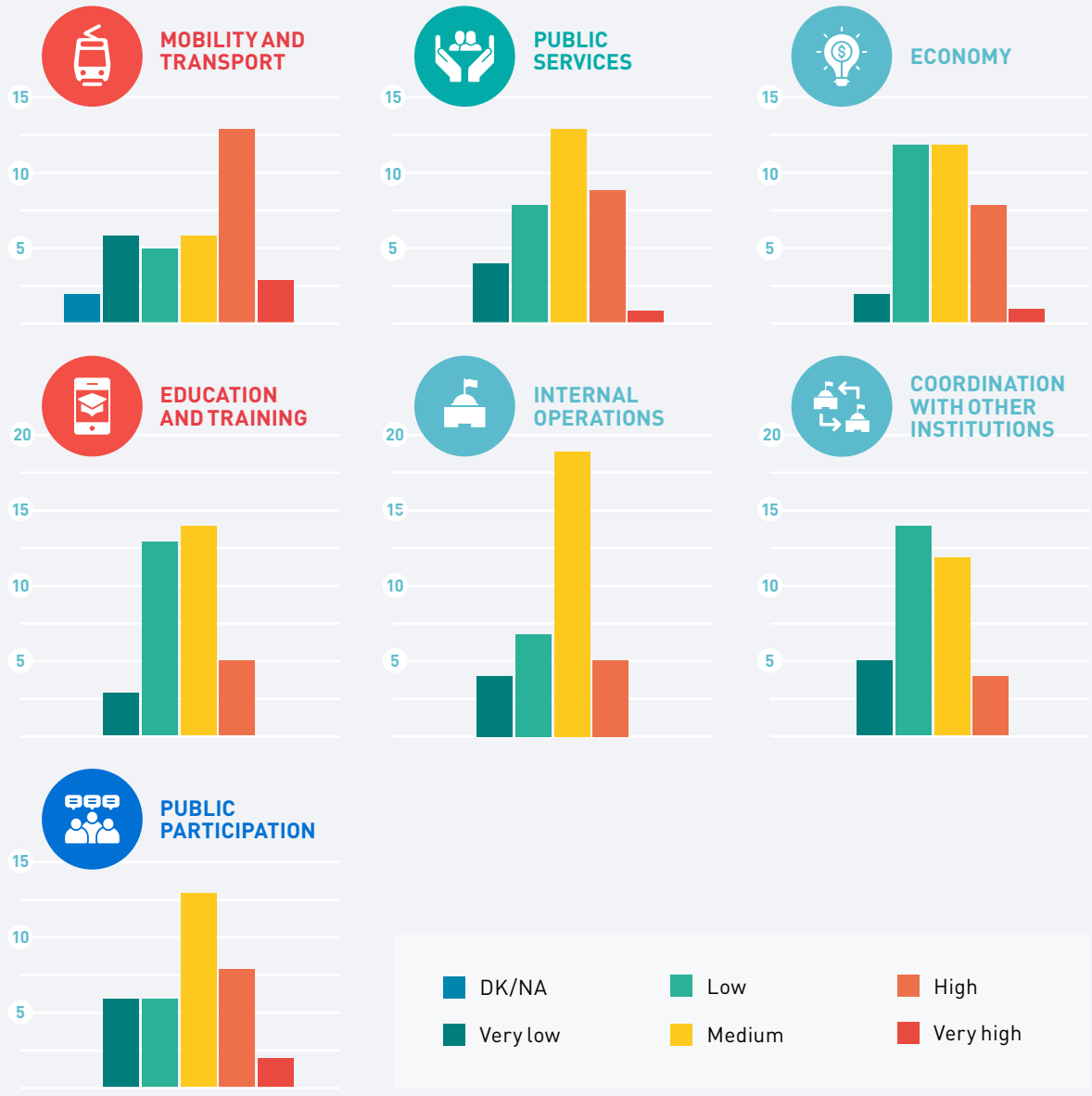
of the participating cities consider that the "Smart" resources / tools allowed them to respond sufficiently or greatly to the pandemic with increased effectiveness and efficiency

The starting point was very different in the cities.

While it is true that a **large number of cities** participating in the study **used the same "Smart" tools**, most of these state that prior to the pandemic, the **level of digitalisation was not very high in any of the areas analysed**.

The general opinion in the cities participating in the study is that **the existing tools permitted a more effective and efficient response to the pandemic**. However there is still a long way to go to achieve greater adaptation of some Smart tools to respond to specific problems.

LEVEL OF DIGITALISATION BEFORE COVID-19



MOBILITY AND TRANSPORT

37%

of the participating cities stated they had a high level in the area of mobility and transport

The area of **mobility and transport** is by far the area with the greatest level of digitalisation prior to COVID-19.

Among the **Smart tools and resources that the cities already had**, the following were indicated:

- Screens with real time information
- Monitoring and mobility sensor networks
- Open data platforms of mobility and logistics
- Apps about transport routes
- Apps developed by the municipality for taxi services, bike rentals and other mobility solutions
- Pedestrian crossings, traffic lights and smart bus shelters
- Traffic management software and systems, people and vehicle mobility and optimisation of routes based on Big Data (e.g. optimised night-time routes)
- Catalogue of APIs of the city (including access to public transport GPS)
- Mobility as a Service App with integration of urban mobility services
- WiFi service in public transport
- e-Ticketing services in public transport
- Parking Apps and smart car parks based on IoT
- Control and ordinance of Park and pay with real time reading of number plates and digital management of payment

PUBLIC SERVICES

37%

of the participating cities stated they had a medium level in the area of public services

In the **public services** area, the cities participating in the study had a variety of Smart tools which on the whole were used to respond to the pandemic:

- e-Service portals
- Apps, collectors and e-services based on geographic information services (GIS)
- Proceedings with the online administration
- Virtual visits of the town
- Digital customer service offices and Digital One-stop services for municipal services and proceedings
- Conversational bots
- Administration appointment management software
- Online reservations/rental of municipal premises

Due to the impact of the pandemic, special attention was given to the **area of e-Health**, in which the following tools and resources were mentioned:

- Integrated platforms and Apps with electronic clinical history, virtual appointment services and management of medical prescriptions.
- Municipal health portals and open data about health in the municipality (with information, resources and services)
- Remote teleassistance systems
- Apps for specific groups of patients (e.g. amyotrophic lateral sclerosis, rheumatism, blood pressure, high risk pregnancies, etc.) and for elderly people living alone
- Information platform on Health and Consumer inspections in establishments
- Interactive digital map of the health units
- Connectivity for all the health units
- Regional/national government health Apps and portals

INSTITUTIONAL OPERATIONS

40%

of the participating cities stated they had a low level of digitalisation in their coordination with other institutions

54%

of the participating cities stated they had a medium level of digitalisation in their internal operations

In turn, the **internal operation** of the governance bodies was placed at a medium to high level of digitalisation, and a number of cities had digital tools linked to the day-to-day institutional operations. **Coordination with other institutions**, in turn, was placed as an area in which the level of digitalisation was low, and on the whole coordination was understood to be carried out via other channels.

The tools most used by the cities were as follows:

- **Connectivity tools between municipal offices**
- **e-Management tools (including ERP and CRM systems for the digital processing of the work in the administration)**
- **Digital file platforms**
- **Digital proceedings between administrations**
- **Local data collection and analysis systems to support decision-making**

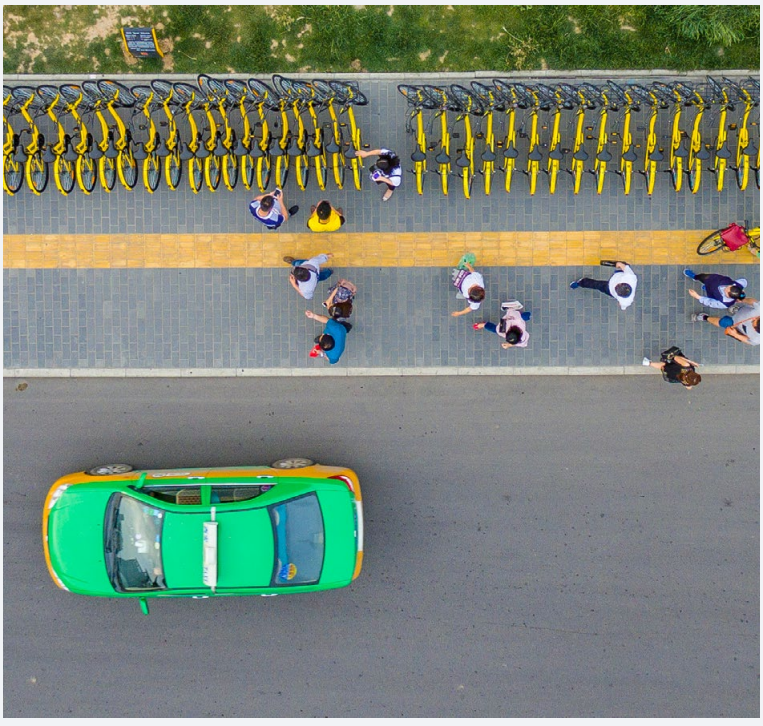
RELATIONS WITH THE CITIZENS AND PUBLIC PARTICIPATION

37%

of the participating cities stated they had a medium level of digitalisation in their public participation

With respect to public participation and relations with the general public, **there were significant differences between the cities**, although there were a variety of common resources and tools:

- Municipal transparency and accountability portals
- Open government platforms
- Public participation platforms (including participatory budgets) and e-democracy / e-voting
- Virtual meetings and live transmission of events and meetings
- Business Intelligence Tools
- Portal and apps for sending petitions, suggestions and complaints to the municipality (some including GPS systems for locating the complaint)
- Apps for consultation of proceedings and services
- Electronic processing portal and identification and digital signature tools for submitting applications
- Digital communication and interaction with the public: social media, e-mail...
- Digital inclusion programmes



ECONOMY

68%

of the participating cities stated they had a low or medium level of digitalisation in their economy

With respect to the area of the economy, prior to the pandemic some cities surveyed had:

- **Digital interaction with businesses, with online services and web platforms for businesses**
- **Public-private collaboration initiatives relating to the Smart city**
- **Municipal Market places**
- **Smart industry and Smart park initiatives and deployments of FTTh directed at the production sector.**
- **Open APIs with municipal data available to businesses**

EDUCATION AND TRAINING

40%

of the participating cities stated they had a medium level of digitalisation in the area of education

In the area of eduction, although **there was a wide range of available resources**, their application was generally considered to be medium to low:

- Interactive training platforms (Moodle, Google Education or own platforms)
- Technological infrastructures and equipment prepared to implement technology-based teaching-learning systems
- Educational plans with digital education methodologies and training of government employees in ICTs
- Online educational resources for classes in schools and colleges (Online educational games, online radio and television for schools, electronic books, activities...) and system for the exchange of educational resources
- Professional and technical training web sites
- Online universities
- Digital network of municipal libraries
- Virtual classes
- Online training platform for life-long education
- Remote access for parents to nursery school records
- Online enrolment
- Free computer, robotics and programming classes

It is significant how the vast majority of cities stated that they did not have very high levels of digitalisation in any of the areas analysed prior to the pandemic.

Impact of COVID-19 on Smart cities

MOBILITY AND TRANSPORT

Smart transport is intended to provide innovative services relating to the different means of transport and their interconnection and to traffic management.

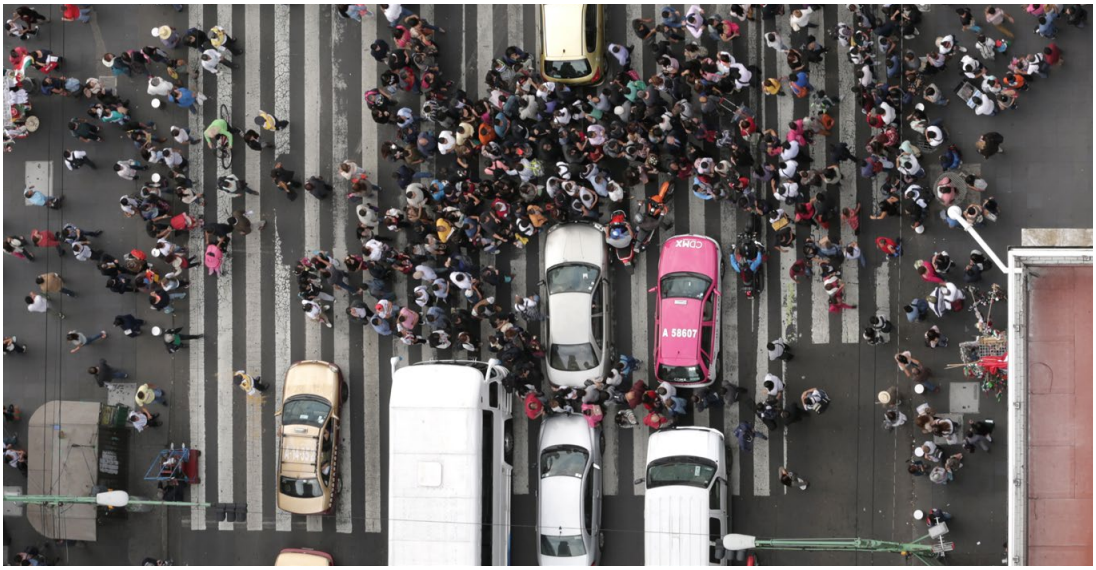
Historically, the transport of people, goods and services have been **areas on which cities have focussed when applying digital tools**.

Smart transport implies that **transport users are better informed and that they use the transport networks in a safer, more coordinated and improved manner**.

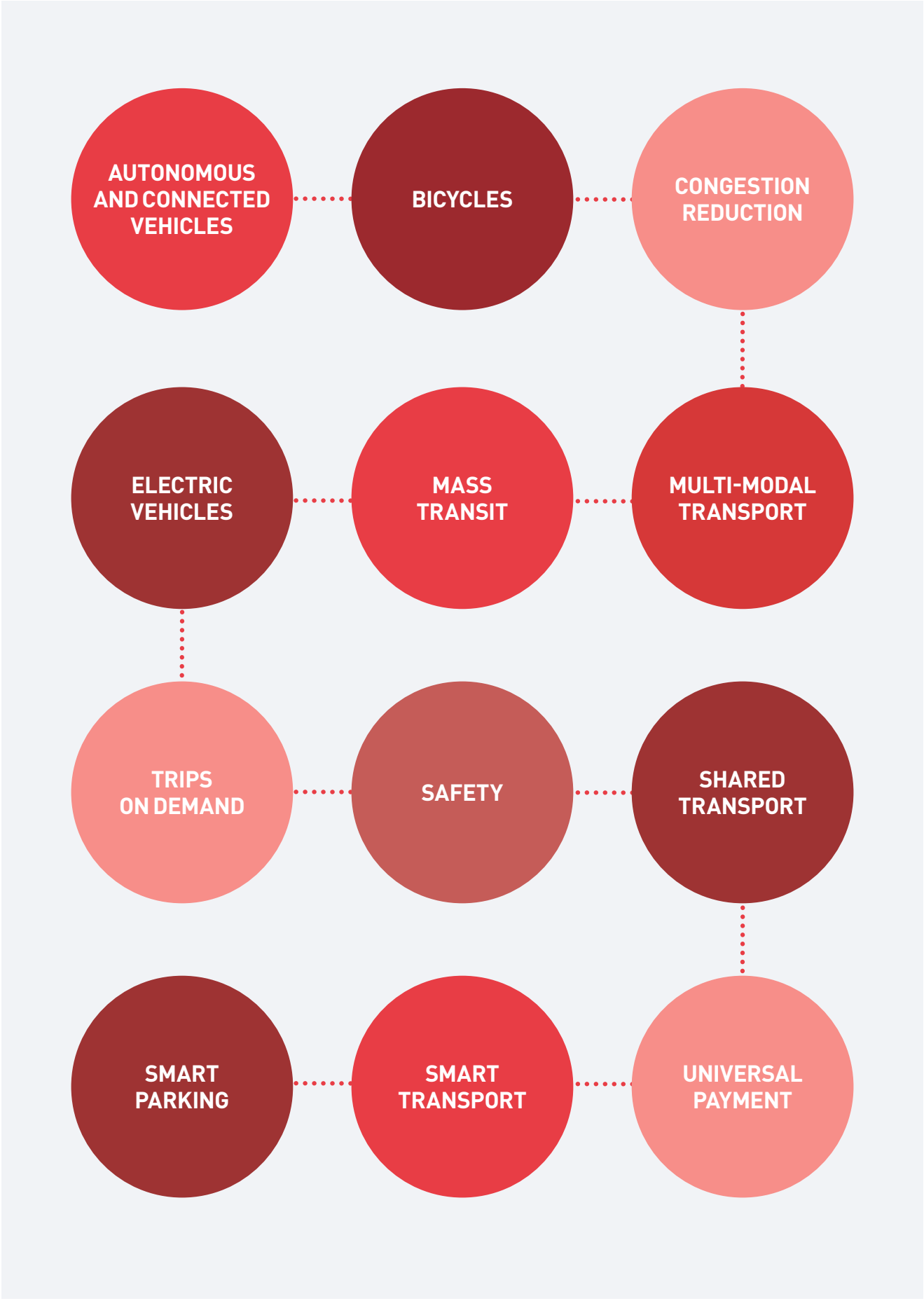
Transport and mobility have become critical areas for the operation of the cities, as **the transport network links and interconnects other services**.

For example, mobility is associated with systems including:

- Emergency services
- Health
- Infrastructures
- Industry
- Public lighting and its optimisation
- Weather conditions and its impact on infrastructures
- The environment



ICT and Internet of Things (IoT) tools in Smart cities have been applied in areas including:



The **streets of the cities are used by all types of vehicles** (including passenger vehicles, lorries and other freight vehicles, metros, buses, shuttle services, trams, light-rail systems, and very light-duty micromobility vehicles including electric scooters, bicycles, etc.) and **by the general public** with varying conditions of mobility.

Vehicles and transport make the economic and employment and social and cultural life possible in the city and are expected to operate efficiently, safely and at a reasonable cost.

Well-planned and implemented Smart transport systems are able to improve the conditions of the city:

Habitability
Sustainability
Feasibility (workability)

On the whole, **traffic congestion is usually a factor which has a severe impact on the operation of the services in the city**, logistical transport activities, and on air quality.

With the COVID-19 pandemic, the crowds of people also become a problem that cities had to overcome.

The rate of transmission largely depended on the density of the cities and the mobility of the inhabitants.

GOOD PRACTICE

MEXICO CITY

Infection identification system in closed spaces (QR system)

The Government of Mexico City, with the aim of preventing infections in closed spaces, has introduced a QR code system for the identification of positive cases. Visitors to commercial establishments are required to scan a QR code (option via text message available) to register their visit and to enable them to be contacted subsequently in the event that they coincided with a positive case during their visit.

The QR system is used to find people who were in the same space at the same time as a confirmed case of COVID-19 in order to notify them and allow them to take the necessary precautions.

Although initially the system was only introduced in non-essential stores, its scope was later extended to all types of establishments, and even included the city's public transport system. In its first week, almost 71 thousand businesses obtained their QR code.

37%

of the participating cities stated they had a high level of digitalisation in the area of Mobility and transport prior to the pandemic

43%

of cities participating in the study consider that the impact of COVID-19 in this area was high

It should be noted that several of the cities participating in the study **restricted the mobility of their inhabitants** (both interurban and linked to local mobility) and established resources to **diagnose the condition of areas of transit**.

The technologies existing to respond to the pandemic are related to the **use and analysis of real-time data to improve spatial intelligence and understand the demand response patterns, or to manage fleets and assets**.

Existing technologies

54%

of the cities used measures based on real-time information about the flow of people / travellers to control crowds

57.6%

measures for the control of movements within the city and between other cities

60.6%

measures and technologies for the control of capacity in crowded areas

The technologies existing to respond to the pandemic are related to the **use and analysis of real-time data** to improve spatial intelligence and understand the demand response patterns, or to manage fleets and assets.

A number of cities have introduced **information and monitoring systems (Open Data) on the flow of people and transport**. The real-time identification of points of interest with a risk of crowds has made it possible to keep the general public better informed about risks when visiting certain places.

Some cities have conducted **trend analyses by time slots and days of the week for more detailed crowd control**. In addition, the public has been offered information about possible alternative routes to avoid the overcrowding.

GOOD PRACTICE

METROPOLITAN AREA OF BARCELONA

System for information about the level of occupancy of beaches

In order to prevent crowds on the beaches of the eight metropolitan city councils along the coast of Barcelona (Gavà, Castelldefels, Viladecans, El Prat de Llobregat Barcelona, Badalona, Sant Adrià de Besòs and Montgat), a system has been introduced to provide information to the public about the occupancy level of the beaches.

This information has been automatically updated by each of the city councils, and the Metropolitan Area of Barcelona has centralised it, transferring it to the webapp, Infoplatges and providing the information in a traffic light format (green, amber and red) according to the level of occupancy. This has required the involvement of beach surveillance companies, responsible for updating the data.

The provision of information in the area of mobility and transport has been established as an area of special relevance, and the **introduction of information screens and IoT devices with real-time information** have become widely-used tools.

GOOD PRACTICES

METROPOLITAN AREA OF BARCELONA

Dual stop on the urban transport line

The Metropolitan Area of Barcelona, in an effort to prevent crowds at the metropolitan bus stops, has introduced two stopping points for buses at the same stop, each one marked with a banner and a number. This means that two buses can stop at the same stop at the same time, allowing people to get on and off the buses at the same time while avoiding the formation of crowds. This is one of the 21 priority measures in the metropolitan proposal agreement for defining and specifying the new metropolitan mobility after the COVID-19 crisis.

CITY COUNCIL OF BILBAO

Smart Tools in Mobility

The City Council has numerous applications and services in Smart in the area of mobility: red-light running detectors using image recognition, advanced management of free places in the OTA service using real-time registration plate readings, OTA management with mobile phone App, real-time tracking of Bilbobus fleet and information for the general public, smart bus shelters, public electric bike service with real-time monitoring, etc.

The participating cities have also reduced venue capacities, such that access control is a common practice. Sometimes, the capacity control is based on **social distancing monitoring systems** using **video analysis** information and **mobile phone data**.

GOOD PRACTICE

CITY OF MONTEVIDEO

Control of capacity using artificial intelligence techniques

Montevideo Administration has incorporated, as part of its beach control system, a system for calculating the occupation of the beach based on real-time images obtained using drones. This solution was developed on the basis of artificial intelligence algorithms which process the images and generate alerts.

The purpose of this initiative is to establish crowd indicators in public spaces using artificial intelligence techniques and images. This has been possible thanks to a platform able to provide real-time services for the management of the information.

Sometimes, the measures for the control of movements inside the city and between other cities has also included similar **monitoring systems**.

Capacity on public transport itself has also been reduced as a common practice for fighting the pandemic. The adjustment of maximum capacities in transport using **public-private coordination and real-time management of pedestrians and vehicles** has facilitated the operation of transport systems with reduced capacity.

GOOD PRACTICE

CITY OF TEQUILA

Analysis of the load capacity of a destination in real time

The city of Tequila, in order to guarantee that the density of pedestrians and vehicles does not reach critical levels in public spaces during the holiday period, has installed sensors for obtaining real-time data on capacities.

In this way it is possible to guarantee the safety of the visitors and their experience at the destination. The real-time data collection and analysis is carried out with Tequila smart information systems.

In addition, a large number of cities have made special reference to the **improvement of cycle lanes and the promotion of the use of bikes, scooters or other micromobility resources** to facilitate the reduction of capacity in public transport systems and to also promote sustainable mobility.

In this area, digital payments made their mark during the pandemic, thanks to recommendations to minimise physical contact (including touching the same surfaces or objects). This has led several cities to accelerate the introduction of **digital payment systems on public transport**.

GOOD PRACTICE

TEHRAN MUNICIPALITY

Application of interactive urban cycling

Tehran Municipality has developed an urban cycling application to promote the use of bikes in daily travel. With this initiative, the Municipality aims to create a change in the transport model, and encourage the use of bikes rather than private cars. The application has three functions which are; location and itinerary, monitoring of routes and information on benefits and awareness campaigns. The project uses GPS technology, together with other Smartphone applications, to offer a variety of services including localisation, the generation of itineraries, maps of stations or bike shops, gamification, etc. At present there are more than 5800 registered users.

GOOD PRACTICE

CITY COUNCIL OF VILLANUEVA DE LA SERENA

Smart Pedestrian Crossings

The City Council of Villanueva de la Serena has introduced a system of smart pedestrian crossings. This aims to improve road safety, obtain real-time data about the flow of pedestrians and vehicles, and analyse it to detect patterns of behaviour and introduce new urban mobility strategies based on smart decision-making. To make this possible, pedestrian crossings have been equipped with light signals and thermographic sensors which detect pedestrians ready to cross. These images and data are collected by the Smart Mobility platform, which offers accurate information about pedestrian capacities and different types of vehicles, statistics and comparisons, notifications which offer advice about incorrect use, video-surveillance, etc. This initiative has been deployed at 12 crossings and the mobility patterns of the public have already changed in search of safer routes.

PUBLIC SERVICES

COVID-19 has revealed the existence of shortcomings when it comes to providing digital public services.

The **provision of public services is the main activity of local administrations**, and covers a large number of areas, ranging from maintenance of the city infrastructures to support, "care " and services for their residents.

Due to its impact, public access to the support on which they depended was hindered, encouraging cities **to introduce new approaches for a better provision of these services**.

Some of the most common problems encountered when offering public services during the pandemic caused by COVID-19 are listed below:

Suspension of face-to-face public advice services

Inequality of access to public services

Inadequate support for prevention and early intervention services

Difficulties with the legal identification of the people administered to

Little training on the use of digital services

When the term "Smart" is used in the context of public services, this is done indicating the ambition of the public sector to provide public services in an efficient and resilient manner with the adoption of emerging technologies.

The concept also reflects the availability of **features linked to interconnection, efficiency, sustainability, effectiveness, capacity, transparency and collaboration**. Thus the concept reflects both the objectives and the potential results of the innovation and the implementation of digital technologies and information in the public sector.

The next step towards Smarter public services is to involve the citizens in the design and presentation of public services.

This is what has become known as Smart governance or e-governance and is described in more detail in the section on Public Participation and relations with the public of this report.

Progress in digital technology, among other things, can also be used **to improve access to public services**, for hard-to-reach groups. Even so, **the application of digital measures must be carried out in an inclusive manner and must not replace face-to-face services**, thereby placing individual users at a disadvantage.

The use of technology has made it possible to guarantee and improve access to public services, and to share information in a flexible manner between administrations and with the general public.

It is possible that technological transformation, extended to the public service, may affect almost all public services and increase the efficiency of the processes involved.

This change requires that the administration has suitable management capacities and solid technological strategies, and is willing to adopt new working practices and new emerging technologies.

In regard to the information provided by the cities taking part in the study, prior to COVID-19, the level of digitalisation of public services was considered to be medium by the majority of those surveyed (37%), and low or very low by 34%.

49%

of the cities considered that COVID-19 had a high level impact on the provision of public services

The responses of the participating cities regarding their experiences on the implementation of resources and tools can be divided into three areas:

1. **General measures to improve public services**
2. **Measures in the area of health**
3. **Measures in other areas**

86%

of the participating cities transferred face-to-face services to online environments in response to the pandemic

COVID-19 led to situations in which **face-to-face contact between administrations and the public had to be stopped or kept to a minimum**.

Several administrations tried to replace this lack of contact by offering digital public services.

86%

of the participating cities launched public advice services

The creation of digital access services was common (83%), as was the provision of online proceedings (80%).

The cities participating in the study presented different solutions linked to the offer of digital services:

- Creation of platforms, web sites, Apps and digital one-stop services
- Digital appointments with the administration
- Digitalisation of administrative proceedings (e.g. municipal census certificates, building permits, weddings and divorces, etc.)
- Use of digital identity systems, digital signatures, electronic record of power of attorneys and electronic notifications for completing proceedings
- Publication of guides and implementation of e-learning channels about access to digital services of the administration
- Implementation of chatbots with general information about the municipality and its public services
- Extension of the public advice channels (phone channels, use of video conferences, etc.)
- Update of municipal Apps to improve their usability, make them more accessible and improve their safety.
- Provision of computers in civic centres for online procedures

GOOD PRACTICE

CÓRDOBA MUNICIPALITY

Digital identity

Córdoba Municipality, via the Digital Neighbour platform (Vecino Digital, VeDI), has contributed to the implementation of digital identity for the general public and for municipal officers. The impact of the platform has been so great that 850,000 members of the public and 97% of the municipal employees have their digital identity.

GOOD PRACTICE

CITY COUNCIL OF BARCELONA

Inclusive digital training

In the digital training area, the council offered help to the public when carrying out different electronic proceedings, offering support and digital training to boost their autonomy. These electronic procedures included: the processing of digital identification, the application for and downloading of online information, the request for appointments at the different administrations, the modification of data in electronic offices, consultations about proceedings, job seeker registrations, employment searches, the creation of an e-mail account, or the opening of an online bank account, among others. In addition, practical training sessions were carried out with reduced-size groups of users, focussing on digital identification and electronic procedures. The support and training mainly took part in civic centres. The sessions were attended by 5327 people up to April 2021, and help was provided in the processing of 8775 procedures.

GOOD PRACTICE

CITY COUNCILS OF GAVÀ AND CASTELLDEFELS

GAVIUS: from a reactive to a proactive public administration

The City Councils of Gavà and Castelldefels have set up the Gavius project, aimed at reducing the digital divide between the systems used by local administration and the industry 4.0 environment of the general public. Its purpose is as follows: to simplify and streamline the processes which the public are currently required to do to access social aids. It will create a mobile application which will use predictions based on quality data and the use of artificial intelligence. With this it will be able to notify the public about the social aids available to them, process their applications and award the aids. At the same time, it will develop an aid for the municipal officers from social services and a resource management and planning tool for managers and politicians.

e-Health

66%
of the participating cities created new care services via Apps

51%
had access to remote health care

COVID-19 has demonstrated that some public services are more accessible at local level, including the response to the pandemic of public health systems where decision-making at local level has been essential. The cities presented different measures in the area of health:

- **Online doctors' appointments and telemedicine services and portals.**
- **General health portals with real-time information and databases (including hospital occupation)**
- **Consultation platforms about COVID-19**
- **Platforms for monitoring cases associated with COVID-19, degree of risk of infection and vaccination monitoring.**
- **Specific chatbots with information about COVID-19**

GOOD PRACTICES

CITY OF HAMAMATSU

Haruno Medical MaaS (Mobility as a Service) Project

Hamamatsu has supported the use of digital technologies to strengthen medical care in areas which are more difficult to access, such as mountain regions. The purpose of this initiative is to provide online medical care, specifically monitoring of the treatment and medical care during this, as well as the delivery of medicines to the home. This initiative is being conducted in collaboration with medical and pharmaceutical personnel who offer online medical care.

XI´AN MUNICIPALITY

Electronic health identification code

The city of Xi'an has launched the creation of an electronic health identification code, aimed at slowing the advance of the Covid-19 pandemic, by identifying the health of the public with different levels of risk. The system helps the public to travel safely, reducing the risk of spreading the pandemic. This initiative is based on the modelling of the people's data, and their subsequent classification by level of heath risk. In addition, the system generates suggestions for the general public according to the levels of risk, and appointments for vaccination. Moreover, the system also focusses on the traceability of frozen products, to reduce the risk of transmitting the pandemic between the environment and humans.

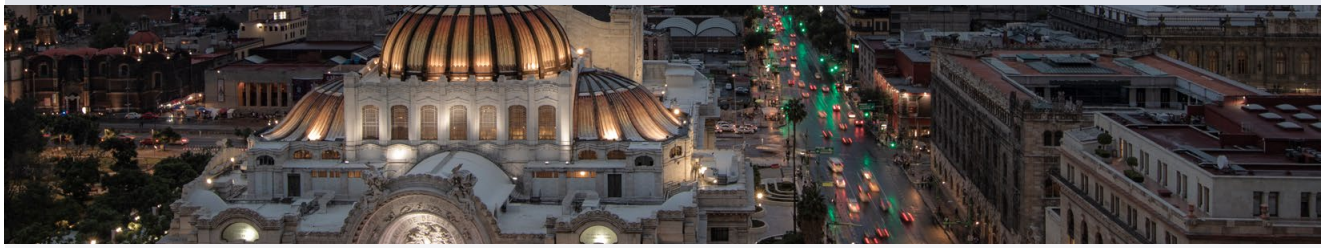
GOOD PRACTICE

CITY COUNCIL OF RIO DE JANEIRO

Covid-19 Panel of Río

The City Council of Río de Janeiro has provided the public with a panel associated with the evolution of the Covid-19 pandemic, with daily information about the number of cases, recovery rates, vaccination and analysis of the risk by region of the city. The aim is to extend public access to geo-referenced information relating to the pandemic. This is made possible thanks to the use of geo-processing technologies to map the scenario of the pandemic in the city of Río de Janeiro. In addition to providing access to data about the pandemic, the panel has served as a source of data for comparative studies between the incident rates and risk in different regions and the respective levels of urbanisation, population density, provision of public services and housing conditions.

MEXICO CITY



Consultation of hospital availability

The Government of Mexico City has developed an application (App CDMX) and a web page (hospitales.covid19.cdmx.gob.mx) where the public can consult the availability of beds in the hospitals appointed to treat cases of Covid-19, both in Mexico City and in the State of Mexico.

The purpose of this tool is to the transfer times of patients requiring immediate medical assistance, making it possible to identify the available beds (high, medium or low availability) using a colour-coded system, as well as to make the maximum possible use of hospital capacity. The hospitals are displayed on a map of the City and the information, which is updated everyday, can be filtered by the availability of general beds or intensive care beds.

Model of automated screened

The government of Mexico City has set up an automated system which permits the monitoring, and follow-up, of the symptomatology of possible cases of Covid-19. The system requests a series of contact details and symptoms from the user to facilitate the generation of a general diagnosis, which classifies the case as low, moderate or high risk. The follow-up may take the form of a medical assessment by video call, referral to a hospital or the sending of an ambulance to the home. In addition, the system can be used via text messages, web or via a local line, meaning that Internet access is not required to access the system. In May 2021, more than 1 000 000 users were registered in the system.

GOOD PRACTICE

CITY COUNCIL OF BARCELONA

Manufacture of PPE

The City Council of Barcelona implemented a practice in the area of health based on the 3D digital printing of Personal Protective Equipment (PPE) in the municipal installations. Since what is known as the Network of public Fab Labs started to produce personal protective equipment, in close collaboration with the community of makers of the city, only a few days after the state of emergency was declared. Between march and June more than 24 000 materials were produced for protecting vulnerable groups and those working on the front line of the emergency.

As well as measures in the area of health and general measures, the cities **have continued developing other particular public services, with measures that have also had a unique impact**.

Examples in the **area of safety** include the establishment of a channel for reporting digital crimes; in the **area of sport**, Apps were set up for reservations in municipal spaces for the practice of sport associated with the limited capacity and remote gym initiatives; in the **city maintenance area**, a digitalised control of cleaning activities was set up and artificial intelligence was used to optimise the services; and in the **social action area networks** were created to address the needs of disadvantaged people affected by the pandemic.

CITY OF LAPPEENRANTA

Virtual outdoors gym

The city of Lappeenranta, with the aim of promoting physical activity in the community during the Covid-19 pandemic, decided to promote open air gyms and sports centres, whose classes and sessions could be recorded using different digital channels, including, for example, Youtube. In addition to the online classes, it was also possible to receive sports advice and monitoring using tools such as Teams.

Digital library

In light of the restrictions on mobility and meetings adopted to address the problem of Covid-19, the city of Lappeenranta had to digitalise all the services offered at their library. On the one hand, the online reservations system enabled the option to request books from home. In addition, the organisation of digital events was also encouraged. These included storytelling sessions, writers' conferences, book clubs, musical performances, etc.

VILLA CARLOS PAZ MUNICIPALITY

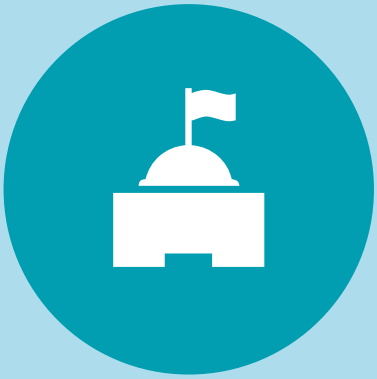
Online social action network

The online social action network is an initiative carried out by the Government of the city of Villa Carlos Paz, with the aim of helping people who have been economically affected by the consequences of the Covid-19 crisis. This network collates the needs of the public, which may range from food and medicine to psychological help. The tool collects user data, including the geo-reference of the person's home, and designs routes for the distribution of aid around the different districts of the city. To date, help has been provided to more than 8 000 homes.

TEHRAN MUNICIPALITY

MyTehran Platform and the Super Application – Public services and public participation

The City Council of Teherán launched MyTehran, one of the flagship projects of the Smart Tehran project, which acted as a one-stop service for the provision of urban services to its inhabitants. MyTehran is an application which offers a large number of public services, from the payment of taxes, to emergency services, or the location of nearby car parks. The application was created with multiple objectives, including the welfare and satisfaction of the inhabitants of Tehran; the provision of services; digital transformation; the development of the electronic administration, the promotion of new businesses, improved communication with the public and special services associated with Covid-19. A total of 40 services are now offered by MyTehran, which already has more than 3 million users.



INSTITUTIONAL OPERATIONS

(INTERNAL OPERATIONS AND COORDINATION WITH OTHER INSTITUTIONS)

The **institutional operations** within the Smart Cities can be analysed from a dual perspective:

Internal operations, which refers to measures within the administration itself

Coordination with other institutions, which refers to relations with other administrations whose measures have an impact on the general public and with whom it is necessary to coordinate and share information

Innovation within the administrative processes, also understood as the integration of ICTs and other technologies in the daily operations, is closely linked to three areas:

Process efficiency

Administrative capacity

Organisational resilience

On the whole, the **public administrations have taken longer than the private sector to incorporate digital elements in their mode of operation**, and consequently COVID-19 has also caused accelerated changes which are difficult to assume.

Innovation in the internal operations of the local administrations is largely based on bureaucratic and legislative flexibility, on working habits, budgetary capacity and flexibility, the capacity to introduce regulations, and on the digital skills of the public service workforce.

The update of internal operations for **responding to emergency situations usually requires changes in different areas** which need time to be implemented:

Governance structures (responsibilities, tasks, functions...)
Human resources (skills, contracts, training...)
Tools (ICT resources, manuals...)

During the pandemic, many municipal governments **encouraged their staff to work remotely as a preventive measure**, sometimes even before measures of this type were introduced at national level. Even so, several administrations were not prepared for remote working on a large scale and had to adapt gradually to the new reality, including updates to their computer equipment, training of their staff, updates of the tasks to be carried out and the way in which they were to be performed, etc.

With respect to **institution coordination**, regardless of the levels of decentralisation, the cities need to collaborate with a large number of players. On a purely institutional level, collaboration is with national or regional governments and with other cities, but extra-institutional interaction with urban players and the general public is also common.

Institutional coordination is affected by factors including complexity and interdependence between different departments and institutions, the difficulty or ease of working at different government levels and spheres, the overlapping of responsibilities or the action of areas in which the responsibilities are not clear and integration between government units, access to useful and reliable information and the skill of the personnel involved in the coordination tasks. Some of the **problems of institutional coordination** tend to arise from:

Excessively centralised service, with little communication between administrations and tendency to work in "silos"
Lack of integration between different services (e.g. social and health care)
Inability or refusal to share data between services

In the process towards the smart transformation of the cities, having **tools for maintaining stable and operational interaction enables cooperation and the exchange of relevant information** (including access to real-time information in the event of shared systems) and, therefore, coordination for the establishment of more comprehensive policies.

Responding to the pandemic required the monitoring of the social and economic situation, the generation of **relevant political responses and coordination of action plans for recovery**. The design and implementation of multi-dimensional and comprehensive responses to COVID-19 took place thanks to the coordinated responses between different governmental and administrative levels.

The technological tools for achieving "Smarter" operations often involve the **implementation in the the public sector of tools already in use in the private sector**. These might include up-to-date office automation tools, interoperable telematic communication tools, shared storage systems, etc., as well as the implementation of systems associated with the use and analysis of data, including shared monitoring and follow-up systems, Open-data and more advanced analysis technologies based on artificial intelligence.

54%

of participating cities considered the level of digitalisation prior to the pandemic to be medium

40%

considered the level of digitalisation in relation to coordination with other institutions as low

These figures place the area of institutional operations as one of the areas with the lowest level of digitalisation

44%

of participating cities consider that the impact of the pandemic on their internal operations was high

44%

of participating cities consider that the impact of the pandemic on their coordination with other institutions was high

These figures, although they indicate a high level of impact, are lower than in other areas of governance.

85%

of participating cities have made it possible for their staff to telework

71%

of participating cities have provided digital resources and tools to the same (e.g. computer equipment or remote access to internal digital environments)

65%

of the participating cities have launched training programmes for their own staff (in some cases offering online training sessions)

The **introduction of teleworking** involved technical changes including the provision of computer equipment and software licences and the creation of platforms for the internal management in simplified digital form (for the management of procedures, municipal legislative journals, operating management of public service complaints and incidents, administrative and financial management, communications management with electronic notification, communications management with health applications, management of claims and applications, geo-location of tasks, digitalisation of forms, traceability of social care systems, environmental control, etc.).

The **implementation of VPN systems, remote desktops and other collaborative environments** has also been necessary. For greater security, the acquisition of devices and implementation of procedures for electronic signatures among government employees. Lastly, there was also a need to introduce remote call-centres, in particular the migration to IP systems, especially to deal with critical services.

GOOD PRACTICE

BOGOTÁ CITY COUNCIL

Online emotional and psychological care programme

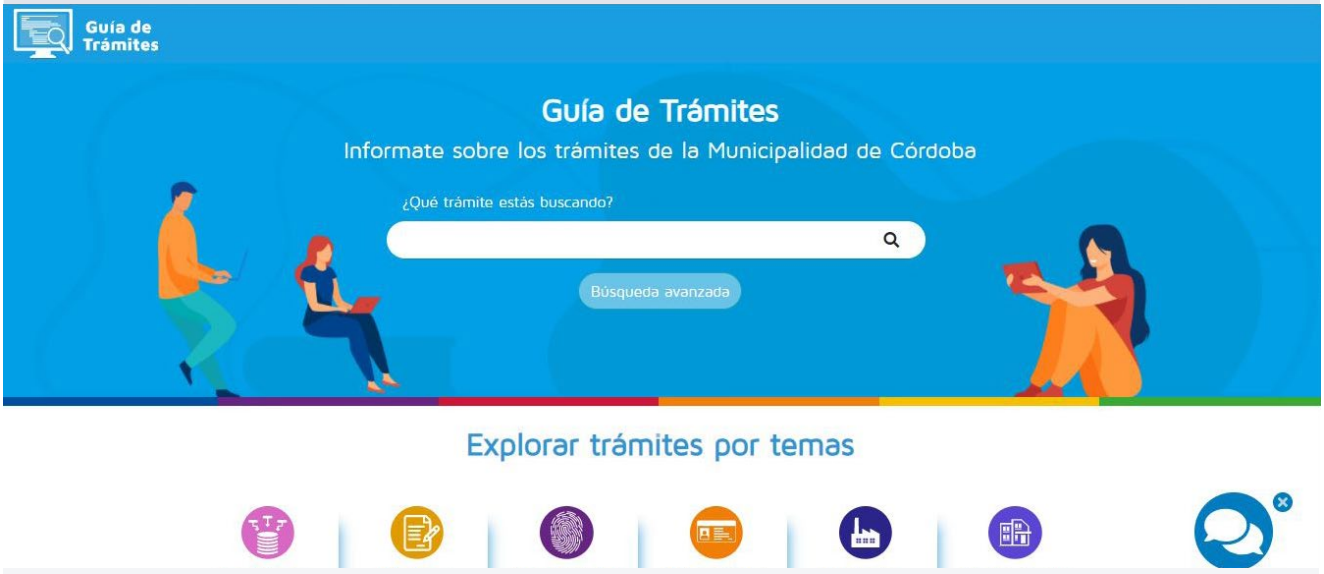
As a good practice linked to teleworking during COVID-19 which which is more than just a technical application, the Bogotá City Hall introduced a programme of online emotional and psychological attention for the employees of the municipal administration.

With respect to **coordination with other institutions**, 68% of the cities have introduced tools for coordination with other departments or administrations and 59% have introduced specific programmes for sharing information.

One of the most frequently used coordination tools is the **attendance and organisation of virtual, face-to-face or mixed meetings** and participation in supra-municipal decision-making bodies whose decisions affect municipal operations.

GOOD PRACTICE

CÓRDOBA MUNICIPALITY



Simplification and Modernisation of the Public Administration

The Córdoba Municipality joined a project based on coordination between institutions during the pandemic. This was the single payment of a single fee between the municipal, provincial and national administration to simplify the proceedings. In addition, with adhesion to a provincial law for the simplification and modernisation of the public administration, it enabled the elimination of legislative barriers that were making its digital transformation impossible. This law made it possible to break the cultural inertia of the municipal areas to start on the internal management changes.

GOOD PRACTICE

BOGOTÁ CITY COUNCIL

Bogotá Government Centre

Bogotá City Council has created a web platform called "Bogotá Government Centre", in which control panels, digital maps and strategic documents about various areas of the city are coordinated, through the integration of multiple technologies and data display and analysis tools available in different entities of the administration.

This platform permits the coordination of different areas of the administration, including secretaries, project management teams, consultants, etc. In addition, thanks to this tool a new method of monitoring has been developed based on the permanent update, analysis and reporting of data and information of the Capital District, improving and optimising the decision-making process by the mayoress and her management team in the different processes of the administration. In this way it is possible to ensure improvements in the living conditions of the people with respect to the drastic changes faced by the city in the economic and social area as a consequence of the health crisis brought about by COVID-19. This web platform also seeks to optimise the times for reporting and presenting the results to the mayor and her team, using automatic updating tools and the identification and interoperability of the data sources of each area.

Thus it has become an interactive and collaborative model which forms part of the administration's technological commitment to the city and public management. In short, the platform has helped to streamline the administrative processes, and improve the management of people and the occupational climate.

The **cross-reference of data between different departments to guarantee public services** in certain critical areas (e.g. between the areas of health, social action and public safety) has proved important for the correct operation of the institutional operations in some cases.

A number of the practices analysed include **broad integration of the administrative activities among different institutions** due to the use of unified internal operating tools.

GOOD PRACTICE

REGIONAL COUNCIL OF BARCELONA

Information systems in the cloud for municipalities

The Regional Council of Barcelona (supra-municipal administration of the province) supplies the districts of this province with several information systems in the cloud (in SaaS [Software as a Service] mode) for the everyday operations of these districts (Accounting, Case Management, Human Resources, Population Census, etc.). These online digital systems allow the city councils in this province to carry out their main tasks via these systems. These systems are replicated in data processing centres (DPC) to increase their resilience in the event of possible disasters.

RELATIONS WITH THE CITIZENS AND PUBLIC PARTICIPATION

Citizen participation in public governance is an area which has been gradually gaining ground.

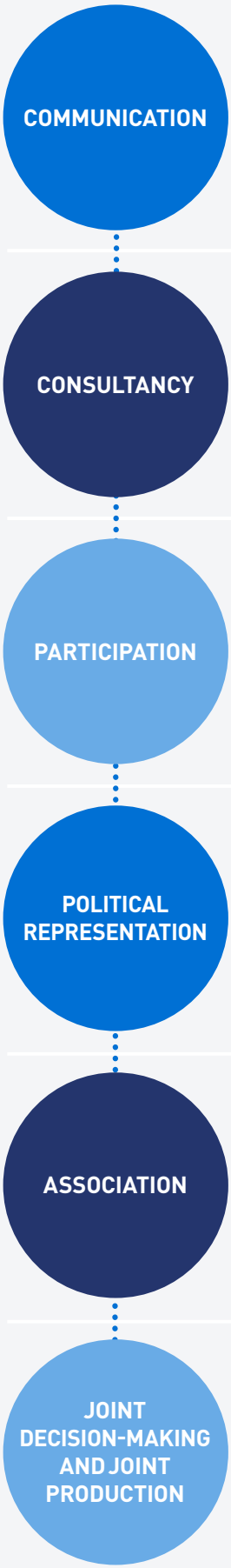
Questions such as **transparency, accountability and co-production or co-governance** are considered key areas for providing inclusive public services at the service of the public, factors which form part of the definition of what a Smart City should achieve.

Relations with the general public using digital technologies have helped to **reduce costs** as previously it was necessary to coordinate means of participation.

Nowadays there are numerous digital platforms for promoting public participation, encouraging collective action and providing access to the information required by the public.

Technology may serve to change the relationship between municipal governments and the citizens.

THE MUNICIPAL GOVERNMENT - CITIZENS RELATION



The tools which can be used for these relations are not necessarily different at different levels, but depend on the use made of them by the government departments. These may include:

Public service tools (CRM and ticketing)
Active listening: blogs, wikis, social media...
Participation portals and tools
Safe identification tools
Electronic votes, with formal voting systems or tools that permit the measurement of public opinion (online surveys)

In the case of COVID-19, most of the physical forms of public participation in the drafting of policies were stopped or postponed. As a result, **digital tools took on significant importance**. It should be noted that numerous electoral processes all over the world had to be postponed because of the pandemic.

Public participation has also become established as an **element to be used for crisis management**.

Providing information for coordinating the behaviour of the public by involving them in public policies has proved to be a useful tool, particularly due to the urgent need to comply with different directives. Even so, **the cities have also used technological tools to measure public opinion**. This has served to obtain some feedback and be able to implement continuous improvements in the system.

Digital inclusion in the new forms of public participation was also established as a fundamental challenge which will continue to require an institutional response. In certain cities, it is still common to find that part of the population does not have computers or smart phones, with stable Internet connections or with the knowledge to interact digitally. Consequently, questions such as the digital divide, accessibility to platforms or the training of people in the use of the technology are essential for coordinating inclusive public participation.

82.4%

of the participating cities introduced digital public participation measures

67.6%

of the participating cities maintained political relationswith the public via digital means

50%

of the participating cities created or promoted municipal forums

The **level of digitalisation** prior to COVID-19 in the cities participating in the study was low or very low for 34%, medium for 37% and high or very high for 29%, making this an **area with significant differences depending on the city**. It should be noted that a number of cities had **open government or public participation platforms**, although with different levels of involvement.

The **impact of the pandemic** in this area was **very high for 37%** of the cities, and high for 29%. This may be linked to the limited interpersonal relations.

The use of **web pages, social networks and municipal Apps** for providing information to the public was a relatively common measure. Some of the measures focussed on providing information about aids offered by the cities to mitigate the effects of COVID-19 or to provide information about **municipal transparency, or interacting with the public**, for example through the promotion of social action programmes in which the public suggests activities and to publicise various initiatives.

GOOD PRACTICE

CITY OF MONTEVIDEO

Active listening application on social media

Public opinions tend to be expressed on social media more than in institutional channels. To collect the opinions of people who do not use conventional channels, the Montevideo Administration developed a social media active listening application.

GOOD PRACTICE

VILLA CARLOS PAZ MUNICIPALITY

Tree census

Public involvement in the care of the city is one of the ways to improve its development. Villa Carlos Paz Municipality, using a Mobile App and Web Platform, conducted campaigns to enable the public to take part in: Replacing, taking a census of and keeping tabs on the city's trees, monitoring all the species; the number of tree specimens existing; their overall condition and the presence of health problems, information about the context and the potential risks.

In general, **several digital public participation platforms were set up or strengthened** (e.g. to create participatory budgets, participatory processes about how to focus the post-Covid economic recovery, online surveys to support the government decisions and planning, or the implementation of online public barometer tools).

Even so, in addition to using digital platforms, interaction with the public was also coordinated with **video conference meetings**, with the representation of the different districts via video conferences and public debates online.

The **transparency portals**, which many municipal governments already had, served to provide the public with useful information for giving accountability.

In addition, the introduction of **Open Data portals for informing the public and of Control Panels** with information about the pandemic.


ECONOMY

Progress towards the process for transformation into "Smart City" should serve to increase the efficiency of various activities of the city.

Each city has their own conditions when it comes to running their economy. Although, on the whole, the cities centralise activities from the services sector to some extent, different sectors carry different weights around the world. **Digitalisation affects the economic sectors in different ways**, and as a result, **measures which may be beneficial for one city in the economic sphere cannot necessarily be replicated in another**.

The **transformation into Smart City may be disruptive for certain industries**, forcing businesses to reassess their products, services and business models to respond to the different requirements of their potential customers.

Therefore, companies also need **specific capacities to take action in smart cities and to interact with society**. In addition, Smart Cities also present important market opportunities for every type of industry.

The transformation into Smart City is taking place faster in urban zones with greater economic development, especially in those areas with a high number of "digital natives".

COVID-19 has led to an u**nprecedented economic recession on a global scale**, with huge decreases in levels of employment, value markets and personal income. In addition, the need to resolve problems in different economic sectors has become apparent.

COVID-19 resulted in the **almost total shutdown of some economic sectors** depending on each city, with special mention given to tourism and the hospitality industry or culture, although all sectors were affected one way or another.

In particular, COVID-19 had a high impact on the SMEs, which were further behind than other businesses with respect to digital transformation.

Digitalisation offers **opportunities for SMEs**, such as **improving the efficiency of their products, innovating in products and services, improving their market intelligence, accessing global markets or knowledge networks at a relatively low cost**. Even so, in reality the majority of SME have not yet taken advantage of the benefits of the digital transition.

According to figures from the OECD, on the whole, the divide between the SME and large businesses is narrower with respect to **connectivity and web presence**, but is broader with respect to **e-commerce and more sophisticated applications**.

COVID-19 accelerated and forced companies to make the digital transition, distance working being one of the most paradigmatic examples of its impact.

In addition, many companies had to set up **online sales channels**. Lastly, **the relation between companies and the administration** also moved to digital channels.

The cities participating in the study indicated that, prior to the COVID-19 pandemic, the level of **digitalisation in the economic sector** of their cities was generally low (34%) or medium (34%).

COVID-19 had the greatest **impact on the economy**, and 60% of the cities considered the impact to be very high and 31% high. This fact became apparent throughout 2020 and 2021, and how long the impact will go on for remains to be seen.

85%

of the participating cities launched measures to facilitate teleworking in the companies

45%

of the participating cities supported the digitalisation and penetration of ICT in the companies in their cities

70%

of the participating cities promoted digital trade or createdlocal marketplaces

27%

of the participating cities provided information about the situation of the companies during the pandemic

The participating cities focussed their effort on three types of measures with different levels of digital technology application:

Economic support measures

Technical support measures

Smart Initiatives

The **economic support measures** include the implementation of economic revitalization campaigns and the promotion of local trade, online credit for businesses, and the reduction of municipal taxers for the most affected.

GOOD PRACTICE

CITY OF HAMAMATSU

Rewards with points and cash vouchers

To support those traders whose activity was most affected by the Covid-19 pandemic, the city of Hamamatsu introduced a system of points and vouchers, to encourage household expenditure and collaboration among establishments. The initiative aims to encourage consumers to do their shopping in the participating establishments by offering points for payments made with a card. These points can be exchanged for products, and make the holder eligible to take part in competition draws for meals at restaurants around the city.

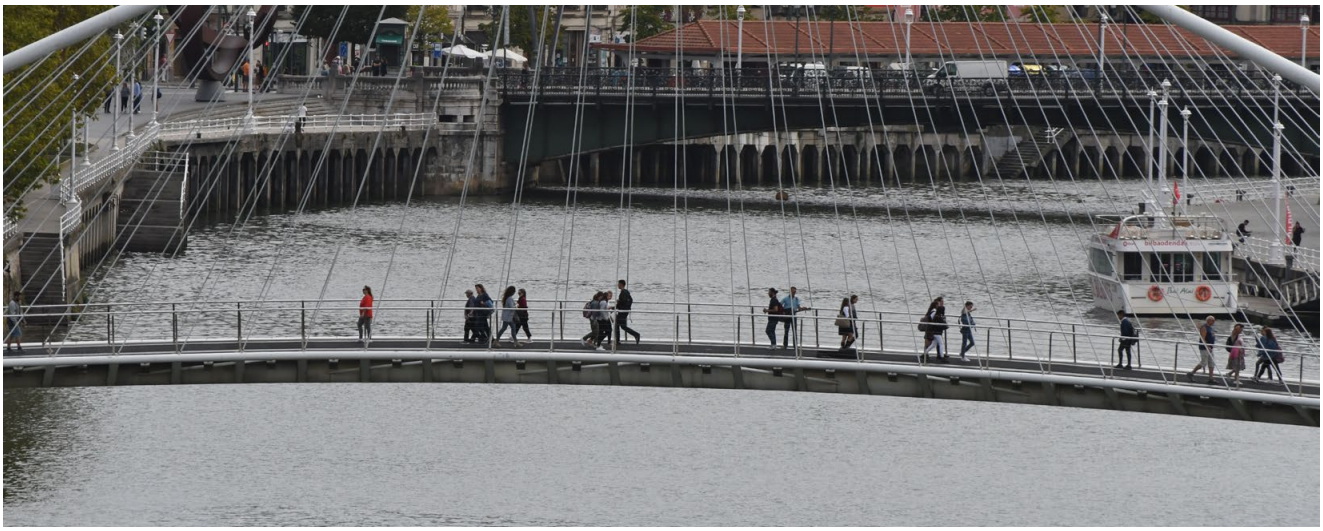
Technical support measures include online coaching workshops, public consultancy services for SMEs, networks of virtual labour rights offices, the creation of a digital platform for SMEs on resilience in Cybersecurity or support for the creation of digitalisation plans for companies and self-employed individuals.

GOOD PRACTICE

CÓRDOBA MUNICIPALITY

Digital transformation and industry 4.0 programme

The Resilient Córdoba Programme is a challenge aimed at industry 4.0 and/or digital transformation projects from associations of micro, small and medium sized companies (Mipymes), who aim to improve their business models and generate a positive impact on the city of Córdoba, ensuring an efficient use of their energy and material resources. Based on the proposals presented, a jury will select two institutions as winners of the Challenge, who will receive seed capital for the implementation of the digital transformation proposal amounting to $3 500 000 for the first and $3 000 000 for the second.



Lastly, the **Smart initiatives** include the implementation of tourist and cultural activities using virtual means, the creation of municipal marketplaces for products and services, the organisation of virtual fairs, the reduction of cash payments through the development of electronic payment services or e-ticketing or the creation of an online transfer exchange system for traders.

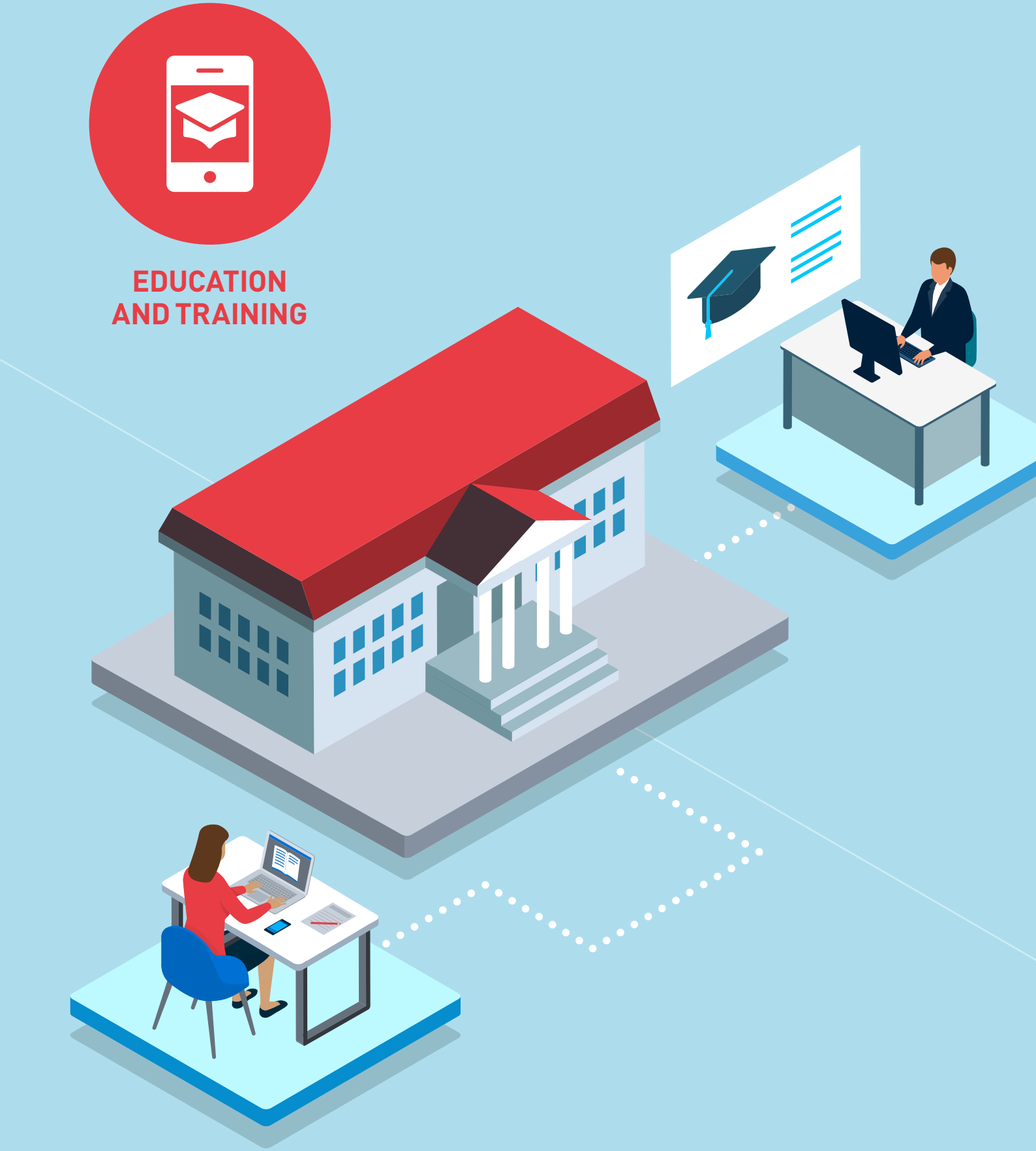
GOOD PRACTICE

CITY OF HAMAMATSU

Food delivery platform (Foodelix)

Hamamatsu has created a food delivery platform which manages the entire process, from the selection of the menu and order to billing and delivery, thanks to the collaboration of various social agents. The platform helps to link existing meal delivery establishments and the information about the available food, to delivery service providers, such as taxi companies and users of the platform.

EDUCATION AND TRAINING



Education in a Smart City seeks to create a public that is able to acquire skills independently and adaptively.

Responding to the educational needs that each individual faces through their life is not possible with an education based solely on content. Therefore, **education should also include elements of resilience**.

Nowadays, the **way to acquire this educational resilience can only be understood through the use of digital tools and resources**. Education and training can not be limited by the place at which the classes are taught and practised.

Digital tools enable the inclusion of different elements in education and training. On the one hand, they open **channels for the acquisition of information and communication**, and on the other, they permit the **introduction of advanced tools for personalised follow-up based on data**, and real-time **monitoring of the learning process**.

40%

of the participating cities consider that the level of digitalisation in the area of Education and training before COVID-19 was medium and

37%

that the level of digitalisation was low

46%

of the participating cities consider that the impact of COVID-19 on this sector was considered to be very high and

34%

that it was high, and one of the most severely affected areas

On the whole, municipal powers do not extend beyond the enabling of information and communication channels, and their own educational activities which can be offered from the municipalities themselves. Although teaching initiatives have been of great relevance for coordinating responses in this area, **local governments have also played a role in the coordination of responses**.

Prior to the pandemic, the cities had numerous tools, in particular interactive interaction platforms (Moodle, Google Education or their own platforms) and educational and training plans which including digital elements and teaching about ICTs. Virtual classes and courses are not a new concept, but have been in place for some time. However, they did not become widespread until now as there was little need for them.

The lockdowns imposed all over the world meant that many schoolchildren had to continue their education from home. To respond to this need, the cities concerned extended the use of existing platforms and generated platforms and support measures which guaranteed a smoother learning experience.

At the same time, **preparing society to respond to COVID-19 was not an easy task**. On numerous occasions, municipal governments assumed responsibility for **training the general public in the use of tools which were in both private and working environments**.

Measures adopted to minimise the negative impact of the pandemic

91%
of the participating cities moved face-to-face teaching to digital format

74%
of the participating cities provided their inhabitants with digital resources and equipment (either on loan or free of charge)

79%
of the participating cities launched digital training measures

GOOD PRACTICE

CITY COUNCIL OF BARCELONA

Virtual entrepreneurship classes

Since March 2020, Barcelona has launched 6 000 virtual classrooms, making digital training possible in various areas in streaming. 3 771 people took part in the virtual classrooms in the field of entrepreneurship and business. Including training associated with business ideas, business plans, marketing, legal forms and the development of online contact for entrepreneurs.

While the **creation of virtual classrooms** is of note among the attendance-based classes in digital format, the provision of classes on television and radio is also to be highlighted. Although these are less interactive channels, they made it possible to reach a large part of the population in areas where connection to Internet was not fitting. In this respect, the **strengthening of the municipal WiFi capacities** was essential for enabling online education.

GOOD PRACTICES

MEXICO CITY

WiFi infrastructures

The strengthening during the pandemic of the free WiFi network introduced in 2019 proved a valuable support for the education of 186 000 students in the regions with reduced access to internet, making it possible to connect to 17 173 available connection points (April 2021). This network allows up to 40 users per station to log onto internet at the same time, without limits or interruptions.

CITY OF MONTEVIDEO

Deployment of connectivity in various regions of the city (wifi ABC)

Following the closure of the schools, Montevideo Administration implemented an initiative to ensure that all the students, especially those from more vulnerable backgrounds, had free access to internet, and could follow their virtual classes. Within 10 days they connected more than 50 points in the vicinities of premises belonging to the Administration where connectivity already existed, enabling students without internet access to obtain materials and connect to their classes.

The **digital training programmes** were accompanied by advertising and supplemented with the provision of free virtual content and resources.

A number of cities offered **municipal technical support for training in the use of computer tools and video conferences**, including the preparation of manuals.

GOOD PRACTICE

CITY COUNCIL OF BARCELONA

Digital coaching for families

Barcelona City Council introduced an active service with six ICT officers to provide support to families with fewer digital skills in order to train them and help children with their online studies and use of digital educational platforms. This service supported the Education Authority's measure to distribute digital devices. The service was offered remotely and face-to-face at the Ateneos de Fabricación de la Fábrica del Sol and Ciudad Meridiana and attended by 21 families.

The use and analysis of data in the different areas

The use and analysis of data is one of the characteristics that serves to equip cities with the "Smart" complement.

The continued use and analysis of data by public institutions also enabled **measurement of the success of the public policies applied**.

Transparency, data ownership and the use of open algorithms became a fundamental aspect so that the different governments used technologies and data in an ethical manner that was fair to the people. COVID-19 has highlighted the importance of digital rights and data protection and the need to decide up to what point it must be possible to use individuals' personal data in a situation of crisis or when creating more resilient cities.

The use of data and the different approaches to how these data are shared has generated and continues to generate debate. For example, the digital tracing of contacts has been used to fight the pandemic in yet one more public health practice.

Different solutions have been applied with different implications for the privacy of individuals, and were received differently depending on the idiosyncrasy of the cities. **Certain barriers** to sharing data include:

- Lack of integration
- Cultural rejection to sharing personal data
- Barriers linked to data protection regulations
- Silos between different agencies

In the near future, the role of data in the provision of public services will take on more importance as the use of digital technologies and Artificial Intelligence (AI) become more relevant in the public sector.

When discussing the sharing of individual's private data, cities face the challenge of finding areas in which to innovate while respecting existing regulations.

When it came to responding to the COVID-19 pandemic, the access, **sharing and use of data enabled the adoption and direction of innovative solutions** which on occasions were also disruptive and critical.

50%

of the participating cities believe that they have appropriate access to key data and to data analysis tools to respond to immediate challenges

The **tools and resources** available to the cities participating in the study for taking decisions include:

- "Smart city" platforms with control panels, statistics and the generation of advanced reports
- Specific big data and data analysis tools and units
- Open data portals / Data hubs and data platforms by sector (including environmental, mobility or financial)
- Data platforms allocated to public awareness in different areas
- Information and monitoring boards (e.g. Tourist monitoring systems, criminal activity monitoring...)
- Artificial intelligence tools to support decision-making
- Business Intelligence tools and portals (Pentaho BI Suite, Microsoft Power BI...)
- Geo-referenced GIS data portals about resources and services affected during the pandemic
- Data governance models
- Value-based ethical assessments on the use of digital technology

GOOD PRACTICE

CITY COUNCIL OF BILBAO

Public portal of geographical data GeoBilbao

The City Council of Bilbao has created a virtual map for identifying the key elements in the management of the pandemic, making an inventory of them and locating them on the map of the cities. These include: chemists, supermarkets, health centres, homes for the elderly, location of basic social services, etc. In addition, these elements are linked to the post codes of the inhabitants, and to street furniture (benches). The map also includes measures established during the de-escalation, promoting the distribution of information about new recreational areas to minimise the formation of crowds at the times designated for going out: green belt, green beaches, terraces... The information provided in this digital tool was updated in real time by the people responsible for the services, and shared by all the officers involved in the management of the crisis. It is therefore an easy-to-use and constantly-expanding tool for the public dissemination of information about the city's essential services. At present, a data manifesto is being prepared with other officers from the city to promote trust and ensure the ethical use of data and the protection of people's rights with applications solely and exclusively for improving people's quality of life.

CÓRDOBA MUNICIPALITY

Data-based management

Córdoba Municipality has developed data boards for public servant decision-making, using business intelligence tools (including Microsoft PowerBI and Data Studio). The aim is to collect data and information about digital applications developed for the general public, and in this way have access to the data generated by the inhabitants through their interactions on this platform and to provide feedback about the services. For example, one of these boards is the "Guide to Procedures Board", to determine which services are most used by the public.

CITY COUNCIL OF BARCELONA

Sentilo – Internal operations

The City Council of Barcelona introduced an IoT platform (software permitting the connection of devices, sensors, actuators, etc., generating a network so that these can communicate and develop information) called Sentilo.This serves to: Isolate sensors and actuators from the Information Systems; create a database of sensors/actuators which form the core of a future Management and Maintenance system that keeps them operative; act as a buffer against disconnections; and is simple and easily reusable by other organisations. New functions have been added to this platform. The latest of these is intended to make Sentilo into a High Availability system able to manage 10 million entries a day but with limited horizontal growth capacity. The platform is fully operational, processing more than 4 million entries a day and an expected growth of up to 10 million in the next 5 years. As it is an open code project, other cities and organisations, including the City Council of Terrassa, the City Council of Reus, the Regional Council of Barcelona, the Regional Council of Barcelona, etc., have incorporated Sentilo into their smart city platform strategy.

The cities taking part in the study have confirmed the use of the available data and data analysis for making decisions associated with the response to COVID-19.

With regard to specific areas, the use of data and data analysis is of note for the coordination of policies in the **Public Services** area with

54%

making reasonable use

23%

much use of the data and

In the Area of Economy the use of data and data analysis is

40%

making reasonable use and

37%

much use of the data

Although there are **differences regarding the extent to which the data have been used for decision-making in the different areas of governance**, a clear conclusion is that this use has been cross-sectional, appearing in all these areas.

There was some concern in the participating cities **about the availability of large quantities of data, which were not however directed towards decision-making**. Consequently, an area of opportunity exists with respect to the effective use of these data for local governance.

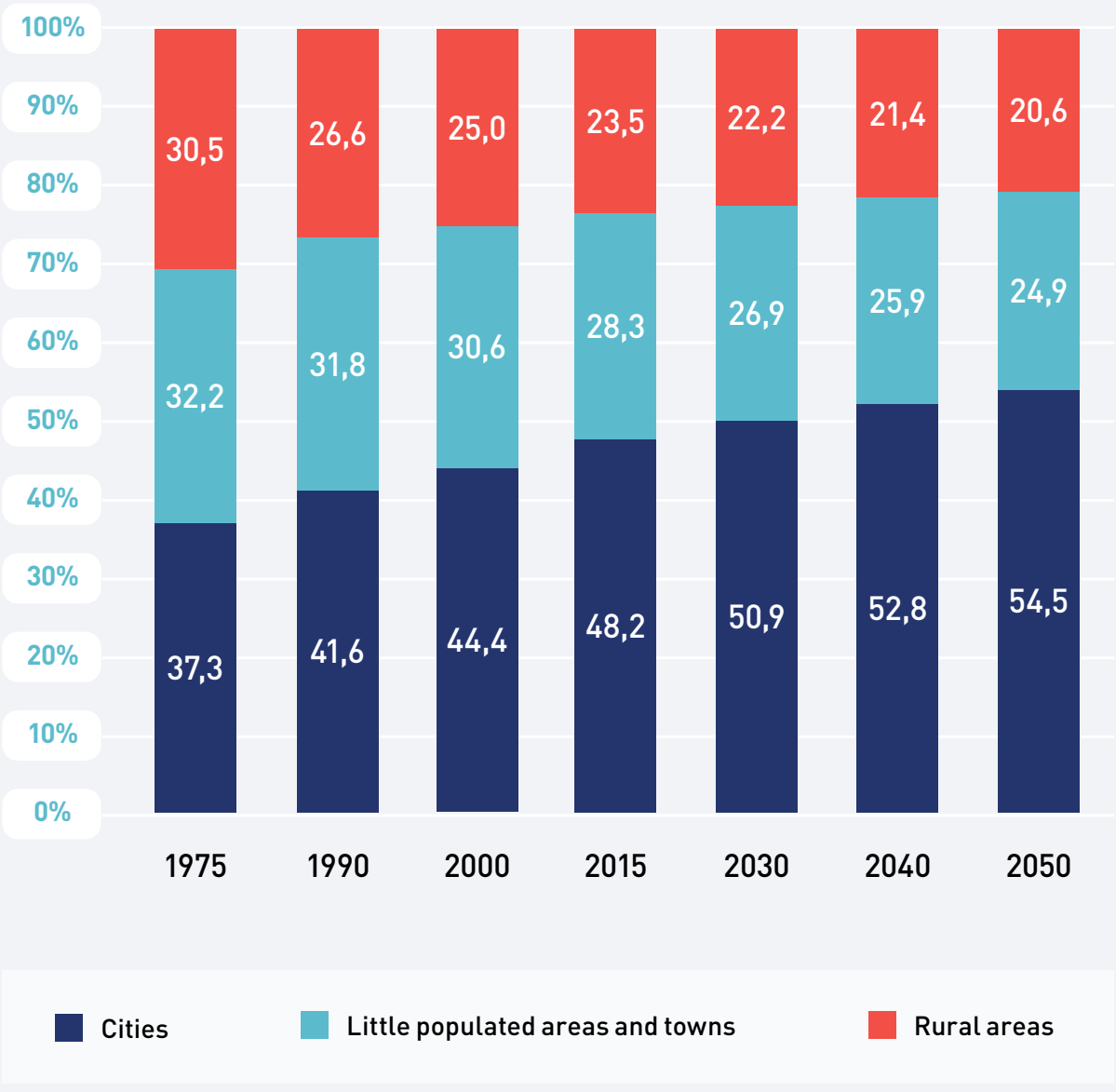
It should be noted that **politically there is a dichotomy between the application of restrictive measures against COVID-19 and their economic impact**, which may be linked to a high level of data usage for more empirical decision-making in the area of the economy.

Smart transformation for a resilient future

According to figures from the OECD, at present almost half the world population live in cities and this is expected to increase to 54.5% in 2050.

Thus the **importance of the cities as centres of population will continue to rise**, and consequently the measures implemented in the cities will affect the majority of the population.

PERCENTAGE OF GLOBAL POPULATION BY LEVEL OF URBANISATION, 1975-2050



Source: OECD/European Commission (2020), "World population shares by degree of urbanisation, 1975-2050", in Cities in the World: A New Perspective on Urbanisation, OECD Urban Studies, OECD Publishing, Paris.

The challenges faced by cities stem from macro tendencies such as climate change, demographic change, digitalisation, etc., which are affecting the whole world.

This is why cities must **establish themselves as yet another operator and collaborate with other levels of governance to respond to these challenges**.

Increasing resilience to crises similar to the COVID-19 crisis involves **improving governance practices and focussing on**:

Cross-cutting resilient thought and research into new ways of applying measures of resilience.

Better adaptability of the system as a whole

Preparation, investing in **technologies** for better local knowledge

Reliable data and information

Engagement with the community to better understand social needs and to involve the community in problem-solving

Appropriate **ethical directives** for achieving measures accepted by society

It is impossible to predict all the impacts of a crisis, and therefore it is difficult to have 100% resilient systems in place. Even so, COVID-19 has shown that the pursuit of resilience in different parts of society may help to prevent unwanted impacts.

In the future, new crises in the world are to be expected:

Health crises, of a similar nature to the COVID-19 crisis.

Climate / environmental crises, which due to the effects of climate change cause extreme changes in the climate and consequently, extreme rises or falls in temperature, either cold spells or heat waves, floods, desertification, landslides, mass migrations, destruction of ecosystems, etc.

Social-demographic crisis, with sudden social and demographic changes that change the needs of the population and for which an effective response from the public sector is a challenge.

Economic crises, with potential shutdowns of basic services and an impact on the capacities of the public sector for funding their activities, and with severe impacts on people's quality of life.

In this study, cities were asked about their **capacity to address these different types of crisis**.

PERCENTAGE OF CAPACITY TO ADDRESS THE DIFFERENT TYPES OF CRISES

In general, depending on the answers obtained, the conclusion reached is that **the perception about addressing different crises from the public sector tends to display a general lack of preparation, especially with respect to potential social and demographic or economic crises**.

60%

of the cities participating in the study predictably, after the COVID-19 health crisis, believe that their cities would be quite prepared to deal with a health crisis in the future

Even so, it is clear **that on a global level there is tendency to establish measures linked to resilience against climate change**, which seems to lead several cities to see themselves as quite (46%) or very (6%) prepared for a crisis of this nature.

There is general agreement among the cities participating in the study that the Smart City transformation process supported by digitalisation will help to confront these possible crises in the medium-long term.

In general, the cities believe that **the transformation process may particularly help to confront a health crisis, although this perception extends to all the crisis types the cities were asked about**.

The **process of transformation into a Smart City involves intervention in the different areas which have been analysed in this study**. Even so, and although the **process of transformation into Smart Cities is usually comprehensive**, municipal governments tend to allocate greater effort to certain specific areas. This is due to technical and budgetary limitations and to the perception of utility of the application of measures in each area.

When the cities were asked about **which of these areas of action should be given higher priority in the process of transformation to Smart City** to increase the resilience of the cities, they indicated the following:

Public services

Data analysis and management

Economy

In addition, by acting in specific areas, COVID-19 has demonstrated that coordinating responses for everyone, without excluding anyone, is a fundamental challenge in the processes for generating resilience for the general public.

Crises usually expose the weakest points of the social systems, and reveal the weal points of interconnection between operators. This results in problems for the exchange of information with vulnerable communities and also makes the provision of services more difficult.

COVID-19 has demonstrated that **inequalities exist in the population of which the social and economic are the most significant**. It is agreed that the health repercussions of COVID-19 were not perceived in the same way in areas with different social and economic levels, and that the impact was greater in marginalised areas, where the mortality rates sue to virus were higher.

Going beyond the health problems experienced, and by way of example of how marginalised communities were affected, some studies suggest that **truancy particularly affects children at risk**. Similarly, the destruction of employment also mainly affects that part of the population which does not have an economic buffer for getting through certain stages of the crisis.

The crisis also revealed that **the disparate level of skills and resources in the different social groups when it comes to interacting in an increasingly digital world**. Connectivity, digital accessibility and digital literacy became even more essential aspects during this crisis.

The cities are particularly well-placed for responding to the needs of the vulnerable population, as they some of the government bodies closest to the people (physically and in regard to the services they provide).

GOOD PRACTICES

OFFICE OF THE MAYOR OF BOGOTÁ

Against the digital divide

In a move to close the digital divide, the city council provided more than 105 000 electronic devices equipped with connectivity and internet, intended for the more vulnerable students enrolled in the capital city's public education system. The 'Ruta 100K ¡Conéctate y aprende!' (100K Route. Get connected and learn!) programme was set up in the framework of this initiative, as a strategy which involves a three-point comprehensive intervention: access to devices, connectivity and training for the development of digital skills.

CITY COUNCIL OF BARCELONA

Measuring the digital divide

Barcelona conducted a survey which has provided them with a diagnosis of the digital divide in the city, including a comparison with the results of the survey conducted by the City Council of Barcelona and the 2016 MWC Foundation. The survey, based on 2500 interviews, made it possible to identify the more vulnerable groups in terms of digital inclusion. The results of the survey will help to encourage public policies and measures aimed at achieving full digital inclusion of all the groups.

91.2%

of the participating cities considered that measures should be strengthened, aimed at improving the resilience of the parts of the community with higher proportions of vulnerability and which were more affected that the rest by this crisis

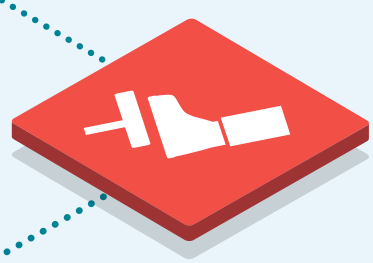
The process of transformation to Smart Cities requires that special attention be given to the digital divide and to those groups at risk of exclusion.

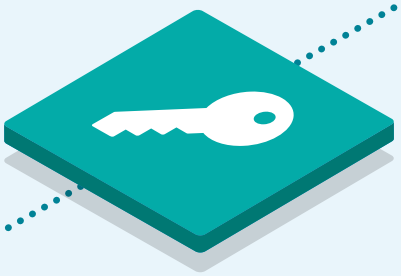
With respect to the **key components which may act as a brake or be enablers** for the transformation into Smart Cities, we are clearly at a historic moment in which the enablers are ahead of the brakes.

KEY COMPONENTS FOR THE TRANSFORMATION INTO SMART CITIES

BARRIERS

- Lack of general training
- Lack of suitable and understandable tools
- Lack of knowledge about how to use the available data
- Difficulty understanding the benefits of Smart Cities





ENABLERS

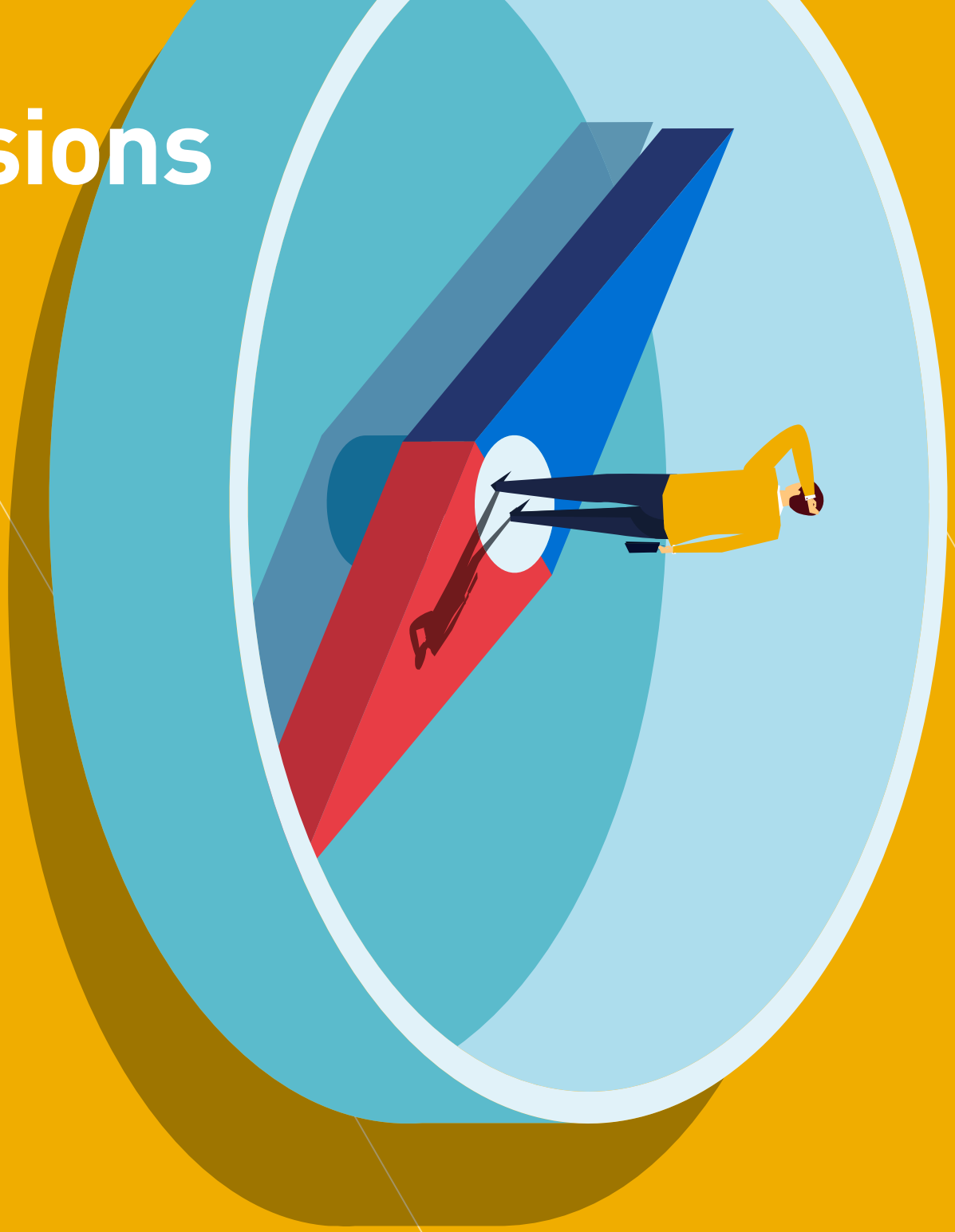
- Necessity makes cities leave their comfort zones
- Increasingly more prepared infrastructures
- Global process shared among several cities
- Changes in perception of the role of the public sector in development
- Possible collaboration with the public and with private operators if the benefits are clear
- Increased perception about the importance of resilience
- Tools which are becoming globally consolidated in which only the type of use changes
- Perception that the change is possible and necessary

There is consensus about the **groups which should receive support** to strengthen their inclusion in the digitalisation process:

1. **Rural and outlying communities without or with only limited access to Internet**
2. **Socially and economically marginalised communities in areas where basic needs are not met**
3. **Communities in areas with limited or inadequate access to education**
4. **Students and the education sector**
5. **The elderly**
6. **The dependent population**
7. **Immigrants**
8. **Workers from the trade and services sector**

In any case, each city participating in the study presents their particular problems and is aware of which specific communities should be given support to increase resilience.

Conclusions



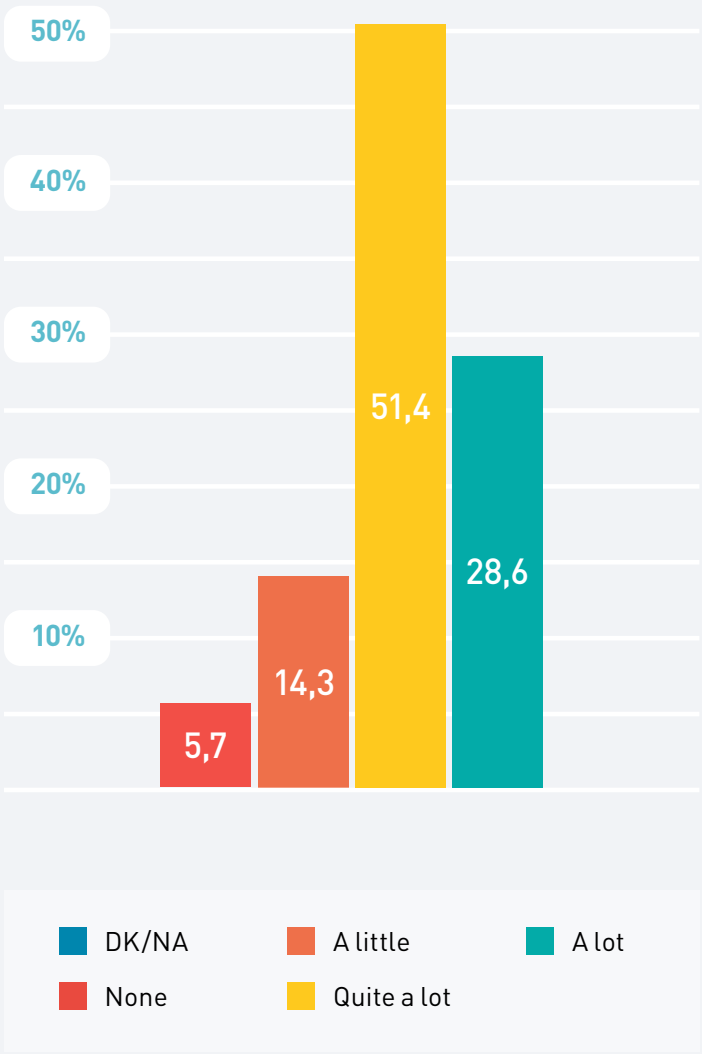
The COVID-19 pandemic had a medium, high or very high impact on all areas of governance, far above the impact on the rest of the economy.

The **use of Smart tools was present in all areas of governance**. In addition, according to the participating cities, on the whole, already having Smart resources and tools allowed them to respond to the pandemic more effectively and efficiently.

63%

of the cities participating in the study consider that COVID-19 has motivated them to improve their digital tools and resources in order to achieve greater resilience

SMART RESOURCES AND TOOLS TO RESPOND TO THE PANDEMIC MORE EFFECTIVELY AND EFFICIENTLY



The **set of new measures adopted by the cities served to combat the negative impact of COVID-19 in all areas of governance**, although with major variations among the different areas.

In the areas best able to fight off the impact of the pandemic, the positive impact of the new measures in the protection of Public Services and of Education and training are to be highlighted. In addition, some cities are unsure about the impact that measures focussed on coordination with institutions and on the economic area may have had on mitigating the effects of COVID-19.

In any case, **there are numerous tools and good practices in each of the areas of governance of the Smart Cities**. The cities have used a range of new tools, and there is no reason why their usage should not continue after the post-pandemic recovery.

The **use of data has also been cross-cutting in decision-making**, and it is hoped that discussions on the ethical ways of using personal data will continue to take place.

The **process of transformation into a Smart City is considered an essential tool for building resilience against future crises**. This process should consider the whole population, trying to prevent the digital transformation of public policies making them inaccessible to the vulnerable parts of the city's population, in particular, and of society, in general.

This process should consider digital rights, which are vital for an inclusive and resilient recovery from COVID-19, and which must also form part of the **renewal of the social contract in the Pact for the Future that UCLG seeks to establish for people, the planet and governments**.

The cities participating in the study consider that the measures adopted, in general, have served to very much or sufficiently improve the resilience of the different areas of governance, which also strengthens the desire to implement deep changes for use in future scenarios.

Photography credits

p. 04 Communication Department, Bilbao City Council

p. 06 Communication Department, Bilbao City Council

p. 12 Department of Sustainable and Smart Development, Montevideo Administration

p. 20 Lucas Law, Unsplash

Department of Planning, Modernization and International Relations, Córdoba Municipality

Department of Planning, Modernization and International Relations, Córdoba Municipality

p. 27 Smart Tehran Center, Tehran Municipality ICT Organization (TMICTO)

p. 32 Department of e-Administration and High Technology, City Council of Villanueva de la Serena

p. 33 Foreign Affairs Office, Xi'an Municipal People's Government

p. 34 International Relations Department, City of Sao Paulo

p. 36 Commision of Technology and Digital Innovation, City Council of Barcelona

p. 38 Digital Agency for Public Innovation, Mexico City

p. 41 Digital Agency for Public Innovation, Mexico City

p. 43 Commision of Technology and Digital Innovation, City Council of Barcelona

p. 45 Department of Sustainable and Smart Development, Montevideo Administration

p. 46 Moisés García Soto, Tequila District

p. 47 Smart Tehran Center, Tehran Municipality ICT Organization (TMICTO)

p. 48 Department of e-Administration and High Technology, City Council of Villanueva de la Serena

p. 51 Mayor´s Office, City of Lappeenranta

p. 54 Kobu Agengy, Unsplash

p. 56 Foreign Affairs Office, Xi'an Municipal People's Government

p. 57 Marcos de Paula, City of Rio de Janeiro

p. 58 Digital Agency for Public Innovation, Mexico City

p. 59 Mufid Majnun, Unsplash

p. 60 Mayor´s Office, City of Lappeenranta

p. 65 Digital Agency for Public Innovation, Mexico City

p. 66 Department of Sustainable and Smart Development, Montevideo Administration

p. 67 High District ICT Council, Office of the Mayor of Bogotá

p. 68 Department of Planning, Modernization and International Relations, Córdoba Municipality

p. 69 High District ICT Council, Office of the Mayor of Bogotá

p. 70 Commision of Technology and Digital Innovation, City Council of Barcelona

p. 72 Directorate of Modernization and Quality Management, Municipality of Villa Carlos Paz

p. 75 Department of Sustainable and Smart Development, Montevideo Administration

p. 78 Communication Department, Bilbao City Council

Alba Iulia Municipality

p. 80 Foreign Affairs Office, Xi'an Municipal People's Government

p. 84 Digital Agency for Public Innovation, Mexico City

p. 85 International Relations Department, City of Sao Paulo

p. 86 Commision of Technology and Digital Innovation, City Council of Barcelona

p. 88 Headway, Unsplash

p. 90 Smart Tehran Center, Tehran Municipality ICT Organization (TMICTO)

p. 92 Communication Department, Bilbao City Council

p. 95 Communication Department, Bilbao City Council

p. 99 Union of Dannieh Municipalities

p.102 Directorate of Modernization and Quality Management, Municipality of Villa Carlos Paz

p.105 Smart Tehran Center, Tehran Municipality ICT Organization (TMICTO)

p.109 Alba Iulia Municipality

UCLG CGLU

UCLG Community of Practice | Digital Cities

Bilbao