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Smart cities and regions – prospects for a human rights-based governance approach

Governance Committee

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Resolution 486 (2022) 2
Recommendation 480 (2022) 4
Explanatory memorandum 6

Summary

Over the last 20 years, the fast development of smart cities and smart regions have shown that new technologies alone do not make a city or a region smart. In addition to leveraging digitalisation, smart cities and smart regions must engage all the relevant stakeholders including the citizens to improve people's well-being and service efficiency and to build inclusive, sustainable and resilient communities.

New technologies fundamentally transformed societies, in particular during the Covid-19 pandemic and are creating both opportunities and challenges for local and regional governance. Notwithstanding their potential, serious concerns remain inter alia with regard to data privacy, use of artificial intelligence and the digital divide.

This report aims at placing communities at the centre of smart cities and smart regions initiatives, by advocating for a more human-centred and sustainable approach to technology. It argues that cities and regions should proactively lead policies of digitalisation and promote innovation based on community needs and demands, while being particularly committed to human rights, democracy, social cohesion and sustainable development.

In this regard, digitalisation initiatives must include efforts to address privacy concerns, to promote digital equity and widespread access to Internet, especially in rural communities and for marginalised population groups, and to ensure constant and adequate public oversight. Smart cities and smart regions can provide opportunities for the use of open data to strengthen local democracy and to improve the delivery of public services but can also boost key efforts at local and regional levels to meet the demands in terms of sustainable development, notably to ensure clean energy transition and mobility.

1 L: Chamber of Local Authorities / R: Chamber of Regions
EPP/CCE: European People's Party Group in the Congress
SOC/G/PD: Socialist/Green/Progressive Democrats Group
ILDG: Independent and Liberal Democrat Group
ECR: European Conservatives and Reformists Group
NR: Members not belonging to a political group of the Congress

RESOLUTION 486 (2022)[2]

1. The Congress of Local and Regional Authorities of the Council of Europe refers to:

a. the Priorities of the Congress 2021-2026, in particular Priority 6.e. Digitalisation and artificial intelligence, Priority 6.d. Environmental issues and climate action; Priority 6.c. Reducing inequalities in the field;

b. the Additional Protocol to the European Charter of Local Self-Government on the right to participate in the affairs of a local authority (2012);

c. Congress Resolution 458 (2020) on Developing urban-rural interplay;

d. Congress Resolution 435 (2018) on Transparency and open government;

e. Congress Resolution 417(2017) on Open data for better public services;

f. Congress Resolution 290 (2009) on E-democracy: opportunities and risks for local authorities;

g. Congress Resolution 282 (2009) on Digital divide and e-inclusion in the regions;

h. the Council of Europe Human Rights Commissioner's Recommendation "Unboxing Artificial Intelligence: 10 steps to protect Human Rights (2019);

i. the OECD Council Recommendation on Artificial Intelligence (2019);

j. the United Nations Sustainable Development Goals (SDG) in particular SDG 3: Ensure healthy lives and promote well-being for all ages; SDG 9: Build resilient infrastructure, promote sustainable industrialisation, and foster innovation; SDG 10: Reduce inequality within and among countries; SDG 11: Make cities and human settlements inclusive, safe resilient, and sustainable; SDG 12: Ensure sustainable consumption and production patterns; SDG 13: Take urgent action to combat climate change and its impacts; and SDG 16: Promote just, peaceful and inclusive societies for sustainable development, provide access to justice for all and build effective, accountable and inclusive institutions at all levels.

2. The Congress points out that:

a. Cities and regions across Europe and beyond are gradually introducing smart technologies to improve human well-being and public service delivery. The ever-increasing amounts and types of data available represent an important opportunity for local and regional governance.

b. Smart cities and regions, especially those equipped with artificial intelligence, can present risks and challenges in terms of human rights, democracy, governance and citizen participation. Issues concerning data protection, and control, transparency and accountability are at the forefront of concerns. Smart initiatives can also deepen digital divide among urban and rural areas and for vulnerable groups of population and reinforce social and economic inequality and discrimination.

c. Smart technologies should be used as a tool to serve human rights, democracy and sustainable development, mitigating potential risks and maximising their benefits for all. They should be used to improve the quality of local and regional democracy, public services, pollution control, energy efficiency and mobility for more human-centred and sustainable cities and regions.

3. In light of the foregoing, the Congress invites the local and regional authorities of Council of Europe member States to:

a. promote a strategic vision and pro-active policies at local and regional levels to use smart technologies for more human centred and sustainable cities and regions, responding to communities' needs and expectations;

2 Debated and adopted by the Congress on 25 October 2022, 1st Sitting (see Document CG(2022)43-13, explanatory memorandum), co-rapporteurs: Anthony BUCHANAN, United-Kingdom (L, NR) and Jan MARKINK, Netherlands (R, ILDG).

b. foster inclusive initiatives to reinforce local and regional democracy and to promote digital equity and access to affordable Internet and technology, providing sufficient digital literacy training, support and advice to both employees and citizens;

c. introduce systematic assessments of compliance of new technologies with human rights, democracy and sustainable development goals before they are deployed, including risk identification and suitable mitigation measures;

d. ensure continuous evaluation and oversight of the use of new technologies, paying special attention to artificial intelligence tools;

e. take measures to protect individuals in the processing of personal data and to improve cybersecurity in line with international standards and best practices; ensure that users maintain control over their data; consider a distributed data architecture to secure sensitive databases;

f. pay particular attention to the behaviours of end-users, keeping in mind potential difficulties they may face, in particular for first-time users, people with disabilities and impairments and vulnerable groups, establish clear mitigation strategies and maintain in-person support and procedures;

g. integrate sustainability and climate neutral targets in designing and implementing smart solutions in particular concerning energy, water, waste, building and mobility;

h. foster innovation and investment in new sustainable technology at local and regional levels to support the completion of the SDGs;

i. develop peer-to-peer cooperation and exchange of best practices on digitalisation and artificial intelligence between cities and regions in Europe.

4. The Congress calls on the local and regional authorities and their national associations to take account of this resolution and the accompanying explanatory memorandum (Document CG(2022)43-13) on this issue.

5. The Congress asks its statutory bodies, such as its committees, to take into account the present resolution in the framework of their respective activities.

RECOMMENDATION 480 (2022)[3]

1. The Congress of Local and Regional Authorities of the Council of Europe refers to:

a. the Priorities of the Congress 2021-2026, in particular Priority 6.e. Digitalisation and artificial intelligence, Priority 6.d. Environmental issues and climate action; Priority 6.c. Reducing inequalities in the field;

b. the Additional Protocol to the European Charter of Local Self-Government on the right to participate in the affairs of a local authority (2012);

c. Congress Recommendation 448(2020) on Developing urban-rural interplay (2020);

d. Congress Recommendation 424(2018) on Transparency and open government;

e. Congress Recommendation 398(2017) on Open data for better public services;

f. Congress Recommendation 274(2009) on E-democracy: opportunities and risks for local authorities;

g. Congress Recommendation 263(2009) on Digital divide and e-inclusion in the regions;

h. the Council of Europe Human Rights Commissioner's Recommendation "Unboxing Artificial Intelligence: 10 steps to protect Human Rights (2019);

i. the OECD Council Recommendation on Artificial Intelligence (2019);

j. the Sustainable Development Goals (SDG) of the United Nations 2030 Agenda for Sustainable Development, in particular SDG 3: Ensure healthy lives and promote well-being for all ages; SDG 9: Build resilient infrastructure, promote sustainable industrialization, and foster innovation; SDG 10: Reduce inequality within and among countries; SDG 11: Makes cities and human settlements inclusive, safe, resilient, and sustainable; SDG 12: Ensure sustainable consumption and production patterns; SDG 13: Take urgent action to combat climate change and its impacts; and SDG 16: Promote just, peaceful and inclusive societies for sustainable development, provide access to justice for all and build effective, accountable and inclusive institutions at all levels.

2. The Congress points out that:

a. Cities and regions across Europe and beyond are gradually introducing smart technologies to improve human well-being and public services. The ever-increasing amounts and types of data available represent an opportunity for local and regional authorities, but also for national authorities to better implement, adapt and monitor policies.

b. Smart technologies, especially those equipped with artificial intelligence, can present risks and challenges in terms of human rights, democracy, governance and citizen participation. Issues concerning data protection, and control, transparency and accountability are at the forefront of concerns. International and national legal obligations are being adopted or discussed to ensure the respect of fundamental freedoms in the design and use of information and communication technologies (ICTs).

c. In addition to a robust legal framework, national investments in infrastructures, training and awareness raising campaigns are necessary to ensure a fair deployment of solutions without creating two-speed territories and people. Uneven distribution of smart solutions can contribute to deepen the digital divide among urban and rural areas and for vulnerable groups of population and can further reinforce social and economic inequality and discrimination.

d. Smart technologies should be used as a tool to serve human rights, democracy and sustainable development, mitigating potential risks and maximising their benefits for all. Unregulated use of smart technologies may have an adverse effect on human rights and democracy. By resorting to digital technologies, local and regional authorities are key actors to achieve national sustainable development goals. These tools can be used to improve the quality of local and regional democracy, public services,

3 Debated and adopted by the Congress on 25 October 2022, 1st Sitting (see Document CG(2022)43-13, explanatory memorandum), co-rapporteurs: Anthony BUCHANAN, United-Kingdom (L, NR) and Jan MARKINK, Netherlands (R, ILDG).

pollution control, energy efficiency and mobility for more human-centred and sustainable cities and regions.

3. In light of the foregoing, the Congress requests that the Committee of Ministers invite the national authorities of member States of the Council of Europe to:

a. empower local and regional authorities to develop and implement strategies for human centred and sustainable cities and regions, responding to communities' needs and expectations, developing multistakeholder and interagency cooperation, systematically providing the necessary funds, training and human resources;

b. support legally and with capacity building systematic assessment of compliance of new technologies and Artificial Intelligence tools with human rights, democracy and sustainable development goals at local and regional levels;

c. develop and implement measures to bridge the digital divide, by providing sufficient funds, training and support to both employees of public administration and citizens, including first-time young users, elders, inhabitants of remote areas, people with disabilities and other marginalised groups;

d. develop and implement measures for human centred and challenge-based innovation with active involvement of communities and through public-private partnerships, supporting investments in new sustainable technology at local and regional levels;

e. enhance protection of individuals in the processing of personal data and strengthen cybersecurity in line with international standards and best practices by adopting a robust legal framework; and ratifying the Protocol amending the Convention for the Protection of Individuals with Regard to Automatic Processing of Personal Data as well as the Convention on Cybercrime and its additional protocols;

f. adopt open government and open data standards and support their implementation at local and regional levels; support the development and use of open-source software;

g. embed human rights and sustainability into procurement standards and systems focusing on economic, social and environmental outcomes and promoting e-procurement, transparency and integrity;

h. invest in broadband, mobile and Wi-Fi infrastructures to support fair and affordable access to smart solutions in urban, rural and remote areas;

i. establish support mechanisms for local and regional authorities confronted with cyberattacks and ransomwares permanently or temporarily disrupting delivery of public services, including training and a helpline;

j. promote and foster exchange of experiences on successful digital initiatives to reinforce local and regional democracy and sustainable development.

4. The Congress calls on the Committee of Ministers and the Parliamentary Assembly of the Council of Europe to take account of this recommendation and the accompanying explanatory memorandum (Document CG(2022)43-13) in their activities relating to Council of Europe member States.

EXPLANATORY MEMORANDUM

Table of contents:

1. Introduction 7

2. Smart cities and smart regions in context 7

2.1 Relevant concepts 7
2.2 Population dynamics: urbanisation versus rural shrinkage 8
2.3 Risks and challenges for smart cities and smart regions 9

3. International legal standards for smart cities and smart regions 11

4. Comprehensive vision and policies 13

5. Human rights at the heart of digitalisation 14

5.1 Privacy and data security safeguards 14
5.2 Promoting digital equity 15

6. Better democracy and public services 16

6.1 Smart local/regional democracy 16
6.2 Smart public service delivery and administration 17

7. Sustainability and smart environment 18

7.1 General considerations 18
7.2 Smart energy, water and waste 19
7.3 Smart mobility 21

8. Innovation at the service of communities 22

8.1 Challenge-based innovation 22
8.2 Urban data platform 22
8.3 Data interoperability and federation: the case of Estonia 23

9. Growing stronger in times of crises 24

9.1 Lessons learnt 24
9.2 Post-crisis recovery and post-war reconstruction 25

10. Conclusions 26

1. Introduction[4]

1. Cities and regions across Europe are gradually introducing new technologies including artificial intelligence tools, for the purpose of improving human well-being and public services. The ever-increasing amounts and types of data available represent a huge opportunity for territorial authorities to better address the needs of their citizens notably related to security, mobility and communication, in order to achieve better connected and more sustainable, participatory and resilient cities and regions.

2. However, it is important not to race to action, but rather to ensure that the activities are carried out in a democratically responsible and purposeful manner. There are not only benefits for local and regional democracy, in terms of human rights, good governance and citizen participation but also risks associated with smart cities and smart regions such as the gender, generational and digital divides, privacy and data security challenges. Some of these challenges have been further amplified by the Covid-19 pandemic. Moreover, still too many smart cities / regions initiatives are led by big business and not driven by the needs of the citizens. Not all technological change is necessary, and not all smart solutions offered for cities and regions contribute to the public good.

3. Against this general background, the aim of this report is to offer a balanced approach towards understanding smart technologies applied in cities and regions across Europe and to reassert the importance of democratic values and fundamental freedoms as well as of sustainable development goals in their design and implementation. The report clarifies the core concepts of smart cities and regions, explores the current socio-economic transformations that are impacting European cities and regions and clarified risks and challenges for territorial authorities.

4. Furthermore, the report provides guidelines for local and regional as well as national authorities of Council of Europe member States to ensure that innovations are inclusive, sustainable and implemented in a responsible manner in the light of relevant international standards and best practices. It highlights the ways in which new technologies can be used as a tool to enhance human rights, democracy and sustainable development. This report argues that technologies alone do not make cities and regions smarter and that it is necessary to put people at the centre of digital transformation. The digitalisation should be driven by the needs and expectations of communities. The report contains examples from municipalities and regions in Council of Europe member States which are using smart technologies to improve the lives of their citizens, and by so doing, enhance the quality of local and regional democracy with a special focus on participatory democracy through increased citizen participation and inclusion. Finally, the report sheds light on examples of innovation in the service of communities.

2. Smart cities and smart regions in context

2.1 Relevant concepts

5. There are no globally accepted definitions for the concepts of “smart city “and “smart region”. This is partly due to the quick emergence of very diverse initiatives, implemented in different contexts but all covered by the umbrella of smartness, i.e. use of advanced technologies. Smart city and smart regions are multifaceted phenomena for which the use of information and communication technology (ICT) and data remain of central importance. They cover a wide range of initiatives and solutions, developed on purpose for solving one issue or as off-the-shelf products, applicable in different contexts. Those include applications, sensors, software, algorithms, platforms and cameras deployed in cities and regions in order to optimise public administration and management.

6. Throughout Europe, the smart city movement has gained momentum since the 1980s, through a phase of progressive development by research institutes and private companies and seems to have gained pace recently. While the Smart city movement started as a social science research concept, it quickly became a marketing tool for ICT companies. There can be a self-congratulatory tendency since many cities and regions have labelled themselves as “smart”, independently from the actual level of digitalisation, or even the actual human-centred use of ICTs.

4 Report prepared with the contribution of Ralf-Martin SOE, Founding Director and Senior Research Fellow, FinEst Centre for Smart Cities, Tallinn University of Technology (Estonia) and the contribution of Eunomia Research & Consulting Ltd, Bristol (United Kingdom).

7. In fact, smartness initiatives are often led by businesses for the sake of profit or efficiency including a myriad of one-off projects, without a guiding thread.

8. However, a new positive trend is developing as many smart cities and regions are now leading proactively comprehensive digitalisation strategies to effectively address social, economic and environmental issues.

9. In the European Union, the concept of smart cities has been coupled with climate neutral goals of urban environments. and the European Commission (EC) has introduced a new mission on Climate Neutral and Smart Cities.[5] As part of this process, the EC deployed an ambitious plan to support 100 Smart Cities by 2030 and many more replicas by 2050. A large-scale Research and Innovation project NetZero Cities will operate the first part of the mission[6] and will serve as a platform to support Mission-cities on becoming climate neutral. It will also conduct 30 large-scale pilots in 30 European Cities and involve 60-90 replication cities.

10. This report argues that “Smartness” is not only about the use of technologies, but increasingly about inclusive democracy, social cohesion, respect for human rights, social and civic innovation as well as environmental sustainability. It is about building a city optimised and sustainable for all citizens. Practice shows that high quality public services, achievement of outcomes and trust in public institutions as well as smart mobility and smart environment projects are among the key indicators for a smart city or a smart region.

11. In addition to cities, there is an increasing focus on smart regions, covering areas outside the main urban centres, namely rural, suburban and low-density areas. In the European Union, small or rural communities constitute approximately a quarter of the population. Such communities may suffer from outstanding issues concerning mobility (with high car dependence), and have limited access to education, health and other services.[7] Indeed, as many other socio-economical processes, smart solution implementations are characterised by two different speeds, arisen across the urban-rural divide. This may be due to different reasons, ranging from traditional demand-driven approaches to the prevalence of smart city, to the detriment of rural areas, as the centre of interest in the last decades. This report wants to highlight that while smart city solutions are mainly designed for big urban areas they are generally transferable to rural areas.

12. The report promotes public value approach which has at its core the action creating value for the communities and the common good in the light of requirements of human rights, democracy and sustainable development. In this framework, the success of public service delivery in cities and regions is assessed under the angles of inclusivity, equity, efficiency and accountability.

13. In recent years, support has been growing for a new policy approach designed to enhance Europe's strategic autonomy in the digital field, actively promoting European standards on data protection and cybersecurity and building an innovation capacity. In particular, there is a need to develop digital public spaces, open, democratic and sustainable, in Europe.

2.2 Population dynamics: urbanisation versus rural shrinkage

14. Urbanisation is the biggest driver for smart technology adaption in cities and regions. Europe’s level of urbanisation is estimated at 75% and could increase up to 85% in 2050. As a trend, capital cities tend to grow with a faster pace and metropolisation tends to continue even if, in some countries, natural population growth is negative. However, the pace of population growth is not equal across municipalities and regions in Europe. Many small and mid-size towns and low-density regions face stagnation with population being stable but ageing. Furthermore, in several smaller municipalities population shrinks. For example, in the case of Estonia, the area around the capital city of Tallinn (Harjumaa) is going through metropolisation whereas the remaining 14 regions are all shrinking in population.[8] Besides, according to the 2019 World Population Prospects, prepared by the World Health Organisation, by 2050, one in six people in the world will be over the age of 65, while in 2019, this ratio was only one in eleven. Although there has been limited research on this, the ageing trend seems to

5 http://ec.europa.eu/mission-cities
6 https://netzerocities.eu
7 https://ruralsharedmobility.eu
8 According to the 2019/2020 Estonian Human Development Report, between 2000 and 2018 the population of the capital region increased by 10%, while Tartumaa county lost 4% of its population and the rest of the counties shrank by 10 to 25%.

have a bigger impact on rural areas rather than bigger cities. For example, Oslo, the capital city of Norway, is becoming younger in population whereas rural areas in Norway are ageing.

15. These trends have clear consequences on urban environments – more people living in dense cities will contribute to increased demand for mobility, energy, social and educational services, waste management, housing, parking spaces, and so on. On the other hand, this organic growth will make cities less liveable environments as increasing consumption in more and more populated areas tends to lead to more pollution, negatively affecting the quality of life.

16. The fundamental issue with population dynamics in urban and regional areas is that infrastructure is not automatically adjusted to the population. For example, in London, while the city is of similar size than two centuries ago, hundreds of thousands of cars are now coming in everyday, which leads to challenges regarding traffic optimisation but also more and more emissions. As a result, cities and suburban areas are gradually developing policies and technologies to become climate-friendly. In the field of European mobility, this includes a shift towards non-motorised traffic, multi-modal transportation and electric vehicles with novel platform-based business models (e.g., Mobility as a Service). The same also applies to energy, construction and circular economy related developments.

17. Towns and regions are confronted with very different challenges. Currently, more data is collected in urban environments via cameras, sensors and smartphones. Cyber risks are therefore higher in urban areas. In other words, unsupervised technological dependency in cities can also lead to several negative externalities ranging from small issues, such as the lack of parking without smartphone, to circumstantial extremes, such as, for instance, secure internet failure influencing local government e-elections or smart electricity grid failure leading to shortage of water supply. In more rural communities these risks tend to be more limited.

18. Uneven population growth of bigger cities and shrinkage of smaller regions have also contributed to the geographical digital divide. In the perspective of smart technologies, the use of ICT in solving European local government challenges has primarily been adopted in cities. Even if rural areas also benefit from smart technologies to improve public services, most technology providers are mainly interested in high-density urban settings, notably due to economics of scale effect. This tends to lead to the situation where densely populated cities with rather good provision of public services are most attractive test grounds for smart technologies, which further increases the gap between urban and rural areas.

19. Importantly, the digital divide is also affecting the infrastructure side. From the market update perspective, high-speed Internet connection is offered mainly in high-density areas like bigger cities. In the case of rural areas, and more extreme cases of remote mountains, islands, and forest-villages with limited inhabitants, the access to reliable Internet is a bigger challenge and maintenance becomes more expensive. In this context, the access to the high-speed Internet is seen as an utmost priority.

2.3 Risks and challenges for smart cities and smart regions

20. Across the globe, there are extreme examples of smart technology applications which support authoritarian regimes to the detriment of people's fundamental rights and freedoms. Those include mass camera surveillance, "social scoring system" rating trustworthiness and behaviours of citizens and determining access to essential services, analyses of medical records etc. Citizens in Europe can also be subjected to infringement of their rights and freedoms. One key area of concern is the massive development of Artificial Intelligence (AI) systems which can entail several potential risks, such as opaque decision-making, gender-based or other kinds of discrimination or intrusion of privacy. Local and regional authorities may be at the forefront to the application of some of these tools and must be aware of potential risks and consequences of digitalising parts of public service delivery.

21. The digital transformation raises several questions related to its pervasive impact on human rights especially the right to private life and human dignity. Increased amounts of personal data are collected, analysed and stored, sometimes without appropriate or informed consent from the users. Importantly, this does not cover only visible data collection such as video cameras on the streets but involves all possible data sources including, for example, population registries, medical records, phone call logs, web browsing history, sensors, energy consumption data and so on. If this data is too easily combined into one database without proper protection, citizens' privacy can be easily breached. Security concerns regarding information management and exchange, including the use of non-encrypted software or clouds based in third countries, have recently emerged. In fact, medical records databases,

which are often handled by regional and local authorities, are a particular source of concern. Informed consent is not always guaranteed in smart solutions, especially in GPS-located solutions. In 2020, the Tartu City government of Estonia notified the data protection agency of a breach in which a database with the information of about 20,000 users of the bike-sharing system was publicly accessible on the Internet. The database revealed information about the users, including their names, email addresses, phone numbers, user IDs and the routes and time taken by the users. In the Netherlands, a government tool to alert the Dutch public administration about fraud risk, SyRi, by processing and linking large amounts of data, including personal data, was banned because of the opacity of the algorithm and the impossibility for citizens to protect themselves against it and appeal its decisions.

22. The use of algorithms for local police purposes and crime prevention is becoming a more common way to analyse the likelihood of someone committing a crime, by local and regional police forces. There are, however, major concerns concerning predictive tools such as inter alia reinforcing biases within policing regarding the targeting of minorities. Facial recognition technologies can be alarmingly error-prone when applied to anyone who is not a white man. Each attempt to use predictive tools (for example in Roermond and Amsterdam in the Netherlands, in Denmark or in North-Rhine Westphalia in Germany) attracted criticisms for discriminatory bias, lack of ethical standards and violations of privacy. Risks identified in use of such tools are being assessed at European level. The European Commission is currently considering a 5-year ban on the use of such technology while regulators assess how to safeguard its potential misuse.

23. One of the main challenges is potential lack of human control and oversight over the software, algorithm or even decisions taken, the absence of redress mechanisms and by extent the lack of democratic accountability of such solutions. Moreover, local and regional governments can be tempted to delegate part of public service delivery to private actors. Consequently, such private companies may have more power on decision making than elected representatives, which creates a real challenge to local and regional democracy. As a result, citizens can feel discriminated by artificial intelligence algorithms and their bias in taking decision. It is particularly true in the case of groups that are already discriminated against.

24. Smart cities and smart regions run the risk of further deepening social and generational divides by marginalising people who are not comfortable with new technologies or have little access to broadband connection. This is particularly alarming in the case of Roma or rural populations, including rural youth, who may be excluded from local and regional public services due to poor connection and lack of awareness and skills. In rural areas, the Internet penetration rate across the European Union is substantially lower than in urban areas.[9] For instance, by 2021, the share of European Union households with Internet access had risen to 92 %, but access is still not evenly provided in certain rural areas and households over 74 years old are often not well-connected. Another line of divide is within cities themselves.as certain urban areas have been empowered compared to the others. Central neighbourhoods with infrastructures and skilled citizens are often selected to ensure success of the deployment of a strategy, at the detriment of sub-urban areas. In the nutshell, relying on smart solutions can lead to a process of self-selection by citizens, i.e., the most affluent, urban, technology savvy, well-informed and educated segments of the population tend to accept new technologies more easily, when others may be confronted with accessibility issues, commit errors and decide not to use the solutions available.

25. The Defender of Rights of France[10] warned in 2022 about potential major breaches of three main legal principles which dictate public administration in France (e.g., continuity, equality and adaptability) in relation to the implementation of the national strategy to digitalise all public services including local and regional services. Hasten implementation led to a degraded situation in terms of public service delivery, and in particular, for people who do not master either the technology or the administrative jargon, such as citizens with lower income, young and elderly, foreigners and people with disabilities, etc. Interestingly, this report highlighted that a quarter of young respondents (18-25 years old) to the 2020 survey had faced difficulties to carry out at least one procedure online, which is ten points higher than for the rest of the population.

26. Increased automation with robots and artificial intelligence replacing humans can lead to the loss of certain jobs. The workforce disruptions created by digitalisation and artificial intelligence require efforts aimed at re-employing and retraining many employees. Certain categories of the population are more at risk than others. In particular, women can face greater risks due to their higher representation in administrative jobs.

9 See Bridging the digital divide in the EU, European Parliament, 2015.
10 « Dématérialisation des services publics : trois ans après où en est-on ? » (2022).

27. Weak or fraudulent cybersecurity can lead to negative consequences including unexpected costs. Local and regional governments are being increasingly confronted to ransomwares and other cyberthreats leading to permanent or temporary denial of service. Building up human resources and capabilities to ensure data security and continuous delivery of public services can be costly. For instance, a 2020 study estimated the number of security breaches in UK local councils to amount to over 700. 50% of local councils surveyed staff had received cybersecurity training in 2020, even though many services were transferred online, and 45% of councils did not employ any professionals with recognised security qualifications. In Czechia, the National Cyber and Information Agency noticed a strong increase in cyberattacks and their severity in 2020. For instance, the University Hospital of Brno fell victim to a ransomware in March 2020, which significantly limited its operations and caused financial damage. Another important extorsion attack took place at the Prague 3 town hall and temporarily stopped the Czech Point system (one-stop shop) and caused its website and several other systems to fail.[11] Multiple cyberattacks on Ukrainian critical infrastructure and public authorities' websites have been conducted by Russia as part of its illegal and unjustified invasion of Ukraine.[12] A cyberattack on the Lviv city council website on 13 May 2022 resulted in stolen data.[13]

28. Another key challenge for smart cities and smart regions is the sustainability and impact of such solutions. Smart solutions can lead to unexpected costs, security and maintenance updates that may not have been fully forecasted. Local and regional authorities may not always be aware of these hidden costs. Besides, some smart solutions can remain underutilised for various reasons: not adapted, not user-friendly, etc. The real challenge for local and regional authorities is to understand the behaviour, needs and difficulties faced by different groups, differentiated by gender, age or geography. A 2016 report of the European Commission on analysis of failures in the implementation of smart cities projects noted that that technology was hardly ever the problem and that the main risk of failure was the lack of attention to the needs of users who eventually will have to interact with the system the most. Solutions are often based on a simplified user behaviour and ready-made products, which can lead to a lack of interest and uptake by the citizens. Assessing people's attitudes towards technology and their degree of acceptance is often forgotten when solutions are implemented in a top-down way. Finally, new technologies are becoming increasingly energy costly, from local servers, data centres, Wi-Fi and network antennas, etc. Sobriety and sustainability requirements help to evaluate the balance between the cost of developing such solutions and its value for the end-users.

29. According to research, data interoperability and integration are among the most common smart city/region technical challenges. Often local and regional authorities are 'locked in' to specific corporate products and interests and lack openness and more global vision and strategy.

3. International legal standards for smart cities and smart regions

30. As mentioned, new technologies (including Artificial Intelligence) applied in municipalities and regions can both serve and threaten democracy and human rights. Interactions between new urban technologies and human rights are complex and there has been rather limited systematic research on the interconnections. Potential human rights infringements come down to the design and implementation of digital urban services.

31. Among civil and political rights more particularly the right to respect for private and family life, freedom of expression, freedom of assembly and association, the right to an effective remedy, the right to non-discrimination and the right to participate in the affairs of a local authority are of particular relevance in the context of smart cities and smart regions. Among social, economic and cultural rights the most relevant include the right to education, the right to an adequate standard of living, the right to the protection of health and the right to protection against poverty and social exclusion.

32. The responsibility to safeguard human rights and fundamental freedoms, both online and offline, lies with the Council of Europe member States. However, municipalities and regions have *de facto* a significant share of the countries' responsibility for implementing human rights principles and standards set out in international treaties in practice. This must be done in compliance with the European Convention on Human Rights as interpreted by the European Court of Human Rights. Other relevant legally binding instruments of the Council of Europe include the European Charter on Local Self-

11 2020 Report on cyber security in the Czech Republic, NUKIB, 2021.
12 https://www.consilium.europa.eu/en/press/press-releases/2022/05/10/russian-cyber-operations-against-ukraine-declaration-by-the-high-representative-on-behalf-of-the-european-union/
13 https://news.yahoo.com/cyberattack-lviv-russians-stole-published-184959700.html

Government and its additional protocol on the right to participate in the affairs of a local authority, the Convention for the Protection of Individuals with Regard to Automatic Processing of Personal Data and its amending Protocol, Convention on Access to Official Documents, the Convention on Cybercrime and its additional protocols as well as the (Revised) European Social Charter.

33. In the European Union the relevant legal documents include Digital Services Act and Digital Markets Act, General Data Protection Regulation (GDPR) and Artificial Intelligence Act.

34. A risk-based approach is the core focus of the Council of Europe Committee on Artificial Intelligence (CAI) elaborating a legally binding instrument on the development, design and application of AI systems. Its predecessor, Ad Hoc Committee on Artificial Intelligence (CAHAI), pointed to the need for the future Council of Europe legal framework to contain provisions on risk classification, prevention of unlawful harm, evidence-based *public deliberations* and inclusive engagement with this topic, equal treatment and non-discrimination, gender equality and protection of vulnerable groups, data governance, robustness, safety and cybersecurity, transparency, "explainability", auditability, accountability, sustainability and protection of whistle-blowers as well as human oversight.

35. CAHAI specifically underlined that the use and design, procurement, development and deployment of AI systems in the public sector should be "subject to adequate *oversight* mechanisms in order to safeguard compliance with human rights, democratic principles and the rule of law, and foster public trust by rendering the use of AI systems trustworthy, i.e., intelligible, traceable and auditable." The Council of Europe Commissioner for Human Rights recommended not to use AI systems that are complex to a degree that they cannot be subjected to human review and scrutiny.

36. On the non-binding side, Sustainable Development Goals are increasingly used to steer local and regional governance. National governments alone cannot achieve the ambitious goals of the 2030 agenda; therefore, cities and regions are expected to contribute to achieving the SDGs. In many countries, local or regional authorities have competency over core SDG areas such as water, housing, transport, infrastructure, land use and climate change.

37. The following United Nations Goals for Sustainable Development (SDGs) are relevant in the context of smart cities and regions:

- SDG 3: Ensure healthy lives and promote well-being for all ages;
- SDG 9: Build resilient infrastructure, promote sustainable industrialisation, and foster innovation;
- SDG 10: Reduce inequality within and among countries;
- SDG 11: Make cities and human settlements inclusive, safe, resilient, and sustainable;
- SDG 12: Ensure sustainable consumption and production patterns;
- SDG 13: Take urgent action to combat climate change and its impacts;
- SDG 16: Promote just, peaceful and inclusive societies for sustainable development, provide access to justice for all and build effective, accountable and inclusive institutions at all levels.

38. Although technology adaption in cities and regions interacts with all the above-mentioned SDGs, smart communities should focus more particularly on SDG 11: Sustainable cities and communities, which calls for human settlements to be inclusive, safe, resilient, and sustainable, and to enhance capacity for participatory integrated and sustainable human settlement planning and management in all countries by 2030. The indicators for SDG 11 include in particular the following two:

- By 2030, enhance inclusive and sustainable urbanisation and capacity for participatory, integrated and sustainable human settlement planning and management in all countries;
- By 2030, substantially increase the number of cities and human settlements adopting and implementing integrated policies and plans towards inclusion, resource efficiency, mitigation and adaptation to climate change, resilience to disasters, and develop and implement [..] holistic disaster risk management at all levels.

39. The OECD has adopted Principles on Artificial Intelligence which promote artificial intelligence (AI) that is innovative and trustworthy and that respects human rights, democratic values and sustainable development.

4. Comprehensive vision and policies

40. Population dynamics leading to increased population density in cities and shrinkage in the countryside have an impact on environment, mobility and the provision of services. This report follows the public value approach driven by community needs and demands in a commitment to human rights, democracy and the sustainable development. Cities and regions should proactively shape the conditions for the development and use of smart technologies instead of being reactive to disruptive digital tools.

41. In order to do so, cities and regions increasingly develop holistic approaches which specifically address all components of digitalisation, including a thorough analysis of needs, finances, risks and expected outcomes of these initiatives. Such comprehensive strategies developed with the support of citizens and local stakeholders can be key to success and acceptance. Siloed solutions without data operability considerations or scalability plans may lead to limited outcomes. Many cities and regions have developed their own digital strategies, including the cities of Barcelona in Spain and Tallinn in Estonia or the regions of Bourgogne-Franche-Comté in France and Emilia-Romagna in Italy.

42. The voices of cities and regions are important for shaping and updating the national policies, legislation and regulations regarding the design and use of artificial intelligence. Holistic and needs-based digitalisation frameworks should promote inclusivity and human rights for all as well as sustainability. Inclusive and resilient smart cities and smart regions take duly into account the need to secure data management systems as well as to protect privacy and promote open standards, to ensure shared data ownership and interoperability of solutions, to prevent vendor lock in and to enforce procurement standards. The interoperability allows providing public services in an integrated way across cities and regions.

43. Cities and regions need an innovation strategy providing for innovation goals; managerial leadership and adequate and specialised staff; focus on greater access to and better use of public data; sources of funding to support innovation capacity; proper update, evaluation and monitoring mechanisms to strengthen accountability and efficiency.

44. The focus of the digital transformation policy of the capital city of Warsaw is people and their needs, with high attention to privacy and security as well as sustainable development. The city of Barcelona has developed a policy on technological sovereignty as part of Digital Barcelona Plan adopted by the city council that sets open standards for technology development and use for the common good[14]. The policy is centred around promoting the development of skills and capabilities in agile and user-centred methodologies; free and open-source software (prioritising non-discrimination); interoperability of services and systems and the use of open standards and open architecture.

45. Cities and regions need both leadership commitment at top levels and the sufficient capacities of their staff with relevant skills required for digital transformation. Literacy training and capacity building efforts for their staff require working with competent external expert resources. In Arad, Romania, 80 staff members were trained to use the portal for local e-services and are providing guidance and demonstrations to citizens who preferred in-person interactions. National government can also support communities in appointing and training technology officers. For instance, in Ukraine, the national digital transformation strategy was complemented with the appointment of regional deputy-governors in charge of digitalisation, 38 chief digital transformation officers in key cities and 1,400 digital leaders in municipalities.

46. The people centred smart city or region approach requires coordinating with multiple stakeholders including multiple levels of government, industry, academia and civil society (sometimes referred to as “quadruple-helix” collaboration model). Community engagement is increasingly seen as essential for the success of smart city/region initiatives. The Scottish Cities Alliance (UK) is a remarkable example of how Scotland’s seven cities (Aberdeen, Dundee, Edinburgh, Glasgow, Inverness, Perth and Stirling) have jointly developed an ambitious programme of data and digital technology projects (“Scotland’s 8th City – the Smart City” Programme) involving key stakeholders from both the public and private sectors.

47. In view of the risks and challenges mentioned above the impact of new technologies on human rights and democracy should be systematically assessed during the design phase and before they are deployed, including risk identification, identification of suitable mitigation measures. Moreover, there

14 https://www.barcelona.cat/digitalstandards/en/data-management/0.1/summary

should be continuous evaluation of the use of new technologies. In this respect the outcomes of the work of CAI/CAHAI of the Council of Europe provide a precious guidance. Data protection impact assessment (DPIA) is performed in accordance with requirements of Regulation 2016/679 (GDPR) in the EU member States. Guidelines on DPIA determining whether processing is "likely to result in a high risk" have been adopted and applied since 2017 [15]. National authorities can also provide very useful guidance. For instance, the Ministry of the Interior and Kingdom Relations of the Netherlands has elaborated the fundamental rights and algorithm impact assessment ('FRAIA)[16], which is an overarching tool complementing the DPIA.

48. Modern digital governance requires public oversight and control of smart technologies including at local and regional levels. The EU Artificial Intelligence Act requires human oversight of high-risk AI systems. Barcelona adopted seven governing principles for an ethical use of AI, which include human supervision. It means that "any technological application launched by Barcelona City Council that affects people must be under human control, even in circumstances where automated learning or similar techniques allow algorithms to take automated decisions". Such human supervision should be proportional to the risk to people posed by the emerging technology. In Antibes, France, the municipality was pioneer in publishing a register of algorithms used at local level on local associations subsidies, tourism tax and kindergarten and after school activities enrolment. Since 2020, the French government has now made this a legal obligation for all municipalities above 3500 inhabitants.

49. Finally, digital technology is a significant vector of energy use and greenhouse gas emissions. A more sober and responsible digital use shows that environmental and digital transition go hand-in-hand. Digital sobriety should guide digital solutions for cities and regions in particular with respect to energy, housing and mobility. For instance, the agglomeration of La Rochelle, France, is elaborating a strategy of "responsible digitalisation" since 2019 to rethink its digital waste. It led to the deletion of 2600 Go of data stored on servers which will avoid the emission of 73 tons of carbon dioxide. Sobriety and data minimisation should also be considered in strategic planning, as too much data stored for too long, may not always be necessary.

5. Human rights at the heart of digitalisation

5.1 Privacy and data security safeguards

50. The issue of the right to privacy remains at the forefront of concerns. An adequate legislation at the national level compliant with the standards set in the Council of Europe (modernised) Convention for the Protection of Individuals with Regard to the Processing of Personal Data is a prerequisite for adequate policies on privacy at the regional and local levels. Municipalities and regions need sufficient awareness on privacy and on how data is used and generated by new technologies. They need to regulate how to collect and process data generated by new technologies. Data collected indiscriminately and without public consent presents human rights risks. Privacy risks need to be assessed before any collection of information, and the information should be collected proportionally and only for a limited period of time, the subjects should be notified how their information is used and should give their consent.

51. Addressing privacy is critical to an inclusive participatory process. Participants, in particular in digital format, should be allowed to act anonymously. They should also be in control of their data and data should not be traced to a citizen, when possible. One way is to follow My Data declaration when designing smart services with the following goal: "to empower individuals with their personal data, thus helping them and their communities develop knowledge, make informed decisions, and interact more consciously and efficiently with each other as well as with organisations".[17] From the technological and legal perspective, the My Data declaration gives the consent to share personal data to a citizen. For example, in several European e-health portals, it is possible to decide for a user who has access to which medical personal data.

52. In order to respect the privacy of citizens, it is advised to define who and how has access to personal data, and how this is stored and processed. Research on these issues is conducted in the Netherlands at I-Hub, Radboud University's interdisciplinary research hub on digitalisation and society.

15 https://ec.europa.eu/newsroom/article29/items/611236
16 https://www.government.nl/documents/reports/2021/07/31/impact-assessment-fundamental-rights-and-algorithms#:~:text=The%20Fundamental%20Rights%20and%20Algorithm,deployment%20of%20an%20algorithmic%20system
17 https://mydata.org/declaration

iHub brings together a diverse range of scholars from across the humanities, social sciences, engineering and natural sciences to tackle urgent questions raised by the increased digitalisation and use of data in science and society.

53. It is important to grant access only to people with specific rights to access delicate databases (e.g., medical professionals, police officers, civil servants) and also keep log files of every request. Distributed databases are important in the case of cyber risks – illegal access to one database does not mean access to all data. In the case of distributed architecture, no single organisation has full control of all data – which alleviates several internal and external risks of large-scale data privacy breach. Initiatives to store data locally to avoid breaches have also emerged.

54. National governments can support local and regional authorities in handling cyber-attacks by providing emergency guidance, support through national agency, helplines or dedicated police force, training and funding of staff in charge of data protection. For instance, the Dutch Centre for Security and Digitalisation (CVD) in the city of Apeldoorn has acquired considerable expertise in the area of cybersecurity.

55. Data security is also important in the case of analogue data – for example, medical files in hospitals must be stored safe both in offline (on paper) and online (on computer) environments. Furthermore, in well-designed trust-based systems, online data can be as safe or even safer than offline data (for example, when a doctor checks his neighbours' personal health data stored in hospital library, there might not be that effective authentication and logging systems in place).

56. Building up human resources and capabilities to ensure data security and continuous delivery of public services can be costly. Information exchange can be crucial for avoiding such security issues. For instance, the UK Local Government Association published several case studies of how local government handled cyber-attacks. In the London Borough of Islington, one of the key lessons learned was that local councils needed to have tried and tested business continuity and communication plans to ensure delivery of public services.

5.2 Promoting digital equity

57. One of the main issues for smart city and region strategies is to support access to technologies to all, promoting digital equity. It is necessary to ensure inclusiveness of technology-based services in order to mitigate the risks of digital divide. Meaningful participation in today's digital age requires a high-speed broadband connection to the Internet. Affordable Internet connectivity has become a requisite for full participation in society, including access to education, affordable housing, and critical government services. The Covid-19 pandemic introduced even greater urgency for local and regional authorities to bridge the digital divide, especially for marginalised groups of population - elderly, women and girls, children and youth, low-income residents, persons with disabilities, indigenous people, those living in informal settlements, rural communities, refugees and immigrants. For instance, in Brest, France, the municipality set up over a 100 free and accessible-for-all Internet access points, known as PAPI, in ordinary buildings and places visited by elderly citizens, people with disabilities and marginalised, in libraries, public offices, sports and cultural centres. The town of Szozytno in Poland also established 10 kiosks, 96 free Wi-Fi hotspots and optic fibre. Even though 15 users can be connected at the same time and for a determined period only, this system has allowed for thousands of users to connect free of charge.

58. Smart solutions must understand the behaviours of elderly users and integrate contingency plans to maintain in-person service. On the other hand, smart solutions could also be implemented to facilitate social interactions or to support people with visual, mobility and/or hearing impairments. For example, a mobile application called "Madrid Te Acompaña (Madrid is with You) " was developed by Madrid City Council to promote intergenerational solidarity. It helps elderly people on request to be accompanied by volunteers to any appointment (doctor, administrative etc.), to go for a walk or to a social and recreational activity.

59. Lack of skills for digital transformation can be an issue for local and regional authorities as well as for the public they serve. Therefore, the digital literacy is of key importance. Certain disadvantaged groups such as elderly people require special attention. Typically, basic skills on how to use a computer can be successfully taught, followed by skills on how to use e-services, offered by municipalities and regions and then skills on how to use smartphones (or smart devices in general). These trainings have proven to be helpful on increasing the digital literacy among the elderly population if they are run for free and in easy-access public spaces, such as libraries. For example, in Estonia a large-scale training

project called “Came Along” involved every 13th person in society in 2009-2011 in order to train people for using Internet and e-services. In Slovenia Simbioza Genesis social enterprise works on promoting lifelong learning through intergenerational cooperation and in particular helping the elderly to acquire basic computer skills and improving digital skills and competencies among other target population (youth, students, unemployed etc).

60. As the world moves more towards a cashless society, there is an increased risk that vulnerable communities are excluded. It puts up barriers to accessing simple services, such as purchasing food, for those without bank accounts. The homeless, refugees, and immigrants find themselves further ostracised from society, unable even to readily receive donations from members of the public.

61. *Tap for Bristol* is an initiative that directly supports the services that seek to prevent homelessness and support those needing emergency care in Bristol (UK). Recognising that fewer people are carrying coins, it allows donations to be given through contactless touch points that are situated throughout the city - in shop windows, offices and cafes.

62. Equity means also ensuring accessibility and usage of technology to facilitate inclusion of all citizens. The Disability Inclusion Evaluation Tool (DIETool) has been developed in Slovenia to facilitate inclusion of disabled people. It identifies factors that influence disabled citizens’ quality of life (e.g., employment, education, transport, public spaces, social and health system, tourism, legislation etc.). For each factor indicators are observed, measured and evaluated. This information helps cities to understand the meaning of a disability-inclusive city, evaluate their own inclusiveness, identify weaknesses and obtain input on how they can be addressed. The initiative has been tested in several cities, including Maribor and Ljubljana.

63. A research and innovation project in Duved (Sweden) was launched to bridge growing disparity in living conditions between rural and urban areas and to generate innovative local solutions in rural areas for housing, work, food supply, social services, cultural activities, circular economy, energy system and direct democracy. The “Duved model” of governance through collaboration promotes active participation and influence of the local community in municipal building and development processes. It covers several areas including affordable and sustainable housing; circular food production and sustainable energy; attractive public spaces and local cultural heritage; customised digital solutions and improved flows.

6. Better democracy and public services

6.1 Smart local/regional democracy

64. New technologies can help connect people both to each other and to the local/regional authorities. Residents’ lived experiences are a form of expertise that should be leveraged for the success of any project at local or regional levels. The e-participation – digital public participation – includes:

- e-information - access to information;
- e-consultation - engaging individuals in contributions / deliberations on public policies;
- e-decision-making - empowering people in co-design of policies and co-production of solutions that meet their needs, offering opportunities to directly set the agenda for local and regional public initiatives.

65. Individuals can be drivers of decision-making processes, be included in them as participants, act as co-creators or be ICT users and providers.

66. Through digitalisation, citizen/government interaction can be facilitated in many ways. E-democracy, in the form of e-engagement tools, can increase the legitimacy of local and regional authorities by involving citizens in democratic governance in varying ways. Citizens have more platforms to express their opinions, without being constrained by the need to attend a meeting, no matter their geographical position, and governments are open to receive feedback around the clock. This constant access also changes people’s expectations of democratic decision-making.

67. Smart individuals are people who are able to make appropriate use of open, democratised data. They are engaged and empowered to positively contribute to the city and the community. In that sense, new and innovative collaboration methods are important. Greater transparency enables citizens, via open data portals or mobile apps, to engage with the data and understand what it is used for.

68. The use of open data can help strengthen local democracy. Some projects build on public data to create or improve channels of dialogue between citizens and municipalities/regions and facilitate more inclusive decision-making processes between citizens and municipal/regional authorities. They can also offer greater transparency and accountability. Open Data platforms were developed in the framework of the Scottish Cities Alliance enabling Scottish cities to work collaboratively and to publish data sets opened for innovation. For example, Dundee City open data platform allowed to survey cultural opportunities across Dundee and how people engaged with these opportunities.[18] In Belgium, the "Smart Flanders" programme supports 13 cities in the Flanders region in their development into smart cities, including the port city of Antwerp. Smart Flanders does this by focusing on real-time open data and shared reference models and aims to stimulate cooperation between cities and actors from the quadruple helix (including multiple levels of government, industry, academia and civil society). Leveraging its "learning by doing" approach, Smart Flanders focuses on making data as accessible as possible, with a view to maximum reuse as a basis for smarter services and applications.

69. The BizİzmirBizİzmir project in Türkiye aims at improving democratic governance in the municipality of İzmir, based on transparency and citizen participation and at facilitating digital transformation. It provides citizens with a single point of access to a wide range of information regarding Izmir such as regarding municipality's budget, public tenders and discussions in assembly and committee meetings.

70. Many cities across Europe have started to implement participatory budgeting involving residents directly to the budgeting decision-making process. Cities such as Paris, London, Bologna, Lisbon have resorted to digital platforms to deploy participatory budgeting projects. One key lesson for success was that in-presence meetings and activities must complement digital platforms.

71. Online evaluation, questionnaires and surveys can also be useful for local and regional authorities to monitor deployment of policies and activities but also to interact in real-time with users. Citizens can get directly involved into the daily-life of the community through, for instance, fix-my-street smartphone-based applications where residents can provide feedback with location and picture(s) to local administration if something needs attention – e.g., road is too slippery, or street-lightning is not working. Fix my Street Brussels Capitale, developed in partnership between the region, the 19 municipalities composing the region and the Brussels Mobility agency, used open-source code to record thousand issues raised by citizens and to inform them in real-time of the processing by local or regional authorities. Approximately 5-10 years ago, these applications started developing but most cities had not effectively adjusted their internal back-end process accordingly. In most cases, an email sent to the formal city address (e.g., info@city) can be more effective as local/regional authorities often have responsibility to reply to each letter/request whereas this is not the case with messages received via applications. In some applications, the residents can be anonymous so there is nobody to reply to or ask additional information. There are also several indirect methods of participation – e.g., feedback surveys and public transport passenger's counters.

72. Finally, as in any participatory democracy initiative, special care must go into opening these initiatives to a large and representative audience, to ensure varied and useful inputs. Inclusivity remains essential for the success of all such initiatives.

6.2 Smart public service delivery and administration

73. Local and regional governments have a lot to gain by increasing the use of smart technologies in their everyday activities, such as strengthening productivity in public administration, and reducing energy intensive technologies and infrastructure. However, improving the quality of life for citizens requires many issues to be resolved, in respect to the implementation of smart governance. Therefore, there is the need for government services to be user-centred and inclusive.

74. At the local and regional level, governance can benefit from the implementation of smart tools and technologies, such as applications which streamline and automate service delivery – parking payments, tax payments, tele-health, self-monitoring energy consumption etc. Chatbots are increasingly deployed to provide simple information to citizens, on opening hours, addresses and other openly available information. Applications can also extend to monitoring safety and service efficiency. National governments can also support the roll-out of digital solutions through the coordination of technologies and advice on procurement. Digitalisation of public services can be used by local and regional governments to facilitate access to benefits or to pay online more conveniently for some services.

18 https://creativedundee.com/2018/04/culture-connects-what-we-learned/

75. The digitalisation process represents an opportunity to reimagine local and regional governance and public services. By placing people at the centre of the digitalisation process and prioritising privacy and security the local and regional authorities can improve the accessibility and utility of public services.

76. In addition to direct involvement of citizens, several tools also aim at bolstering decision-making of local and regional officials and optimising public service delivery. One example is a concept of digital twin, a virtual replica of a city, which becomes more and more implemented in Europe. Such a virtual model is designed to accurately reflect a physical object of a city. In the case of well-implemented and dynamic digital twins, various stakeholders and even residents can visually understand how the city is developing. For example, if there is a tall new building to be built, how this affects the sunshine of other buildings close-by. In addition, also greener targets can be incorporated into the digital twins. This, at least theoretically, allows to make real-time calculations and explore various scenarios on how to balance transport and energy emissions within that area. The digital twin in the city of Pilsen (Czechia) focuses on the interrelation between transport and noise pollution tackling the types of vehicles and speed limits. The Flanders region (Belgium) Digital twin concentrates on smoother mobility through actions that are kinder to the environment and reduce the impact on human health. These tools can also be used to strengthen participatory governance by explaining to citizens the impact of a measure or by integrating citizens' inputs into the design of the various scenarios.

77. Open data can be used to improve public service delivery, providing citizens with analysis, insight and tailored information to enhance their use of public facilities. From recycling points to public toilets, parks to kindergartens or schools to restaurants: an application can help find the service that meets specific needs. Online route maps can be updated to reflect temporary road closures when a route is closed for repairs if data is shared and integrated. By making datasets available, public institutions become more transparent and accountable. Encouraging the use, reuse and free distribution of data promotes innovative and people-centred services. In Mariupol, Ukraine, Nazar City Bot had operated to create open data-based services for local government agencies. It enabled local residents to receive automatic notices about scheduled or emergency service disruptions at a specific address and keep track of the progress of repairs. Such queries accounted for close to 80% of all calls to the Mariupol municipal call centre. Mariupol was the first city of Ukraine where a portal of open data was launched.[19]

78. The project "Digital villages", coordinated by the Fraunhofer Institute of Experimental Software Engineering (IESE) in several pilot villages in Germany, supports digital solutions for people living in rural areas, focusing primarily on sparsely populated areas. A common digital platform has been created for the supply of local goods (through local online marketplace), communication (local news and events), mobility solutions and e-government services. The "living lab approach" was used for this project. The key lesson from the project is the importance of asking for resident feedback on early prototypes, so that the design of the technology is user-friendly and can best address residents' needs.

79. People-centred healthcare allows everyone to make decisions and participate in their own care. It is organised around the health needs and expectations of people. Digital health tools help to improve the speed and the quality of medical services, notably to vulnerable categories of population. Digital health tools have considerably expanded since the outbreak of Covid-19 pandemic (see IX.1).

7. Sustainability and smart environment

7.1 General considerations

80. Digital transformation plays now a key role in meeting the demands of sustainable development. Informed long-term investments in sustainable hardware, infrastructure and industrial technologies are critically important for the cities and regions.

81. Indeed, sustainability focused initiatives can tackle multiple challenges simultaneously, as digital solutions are often cross-cutting. They can improve the health and well-being of people, in particular by tackling inequality and they can help to combat the climate crisis by smoothing traffic flows and reducing carbon emissions. Smart strategies can also create more resilient local infrastructures by identifying source of fragility and by using digital twins to create and test various scenarios.

19 https://mariupolrada.gov.ua/en/news/mariupol-%E2%80%93-pershe-misto-ukraini-de-zapuschenij-portal-vidkritih-danih-na-bazi-rishennja-vid-mincifri

82. Investing in low-carbon climate-resilient urban infrastructure has low incremental costs and provides additional benefits. Goals of net zero emissions and decarbonisation of cities and regions can be best achieved when combining alternative energy generation with preservation and promotion of trees and plans in cities and regions.

83. Local and regional authorities are key actors in the transformation towards a more sustainable society. Many local and regional decisions can directly affect the environment such as related to transportation, building construction, spatial planning and other economic matters. Being closer to citizens and local businesses they are often in better position to influence consumer and producer behaviours by implementing emission-reduction policies.

84. But generally national or supranational policies determine what cities and regions can do, therefore national and supranational enabling policies and legislation are necessary to advance climate action at the city or a region level. Supporting policies and incentives ensure that city/region level initiatives have sufficient resources and potential to effect meaningful change.

85. The *Bristol Approach* (UK) is an overarching model for the development of community-led smart interventions, with a more holistic view on issues like transport, energy, housing, and the potential use of new technologies and better data. The model allowed inter alia to measure damp in houses, to understand the reasons for it and to design solutions. It was also used to measure the biodiversity of parks and green spaces, to evaluate the health of the local ecosystem and protect it in the future.

86. As smart cities and regions evolve, services and infrastructure become more integrated. Information can be collected in real time with the use of sensors, cameras, wearable gadgets and smart devices. *Smart Citizen* project in Barcelona (Spain)[20] empowers ordinary citizens and communities to capture information about their local environment and share it with a wider audience. At the core of this approach is the Smart Citizen Kit, a low-cost environmental sensor that non-technical users can easily deploy to take a reading of levels of air pollution, noise pollution and humidity. Based on this information citizens promote changes in the municipal development.

87. Smart initiatives can also be used to prevent natural disasters such as drought, wildfires and flash floods, and mitigate their effects. For instance, in Denmark, early warning for flood systems have been co-created in the city of Vejle by citizens of three most at risk neighbourhoods. These combine weather forecasts from a local university, a smart system designed by a private architecture firm and automatised access to deviating upstream managed by the municipality.

7.2 Smart energy, waste and water management

88. Energy diversification, promotion of renewable energy and the energy security have been important priorities for cities and regions in Europe, but the war of the Russian Federation against Ukraine has shed a new light on energy circuits and over dependency on non-renewable resources. Smart projects can accelerate energy transition to a net-zero future supporting the mitigation of energy market fluctuations and facilitating access to affordable, local and reliable energy. Cities, regions and the national authorities need to work together to ensure a rapid decarbonisation and clean energy transition and to promote increasing investments in related technologies to reach climate neutrality.

89. Smart energy systems in particular can enable local/regional renewable energy, energy storage, and smart appliances to be integrated and scheduled to ensure a balance of supply and demand. Automatically storing energy for when demand is high, releasing that stored energy when it is most needed, and informing users when supplies are cheaper helps to create a more resilient and sustainable energy systems.

90. The city of Slavutych in Ukraine is an example of an innovative community that overcame Chornobyl nuclear trauma, reinventing the city of nuclear engineers in a spirit of self-reliance. The city has built Solar Town, including several solar power plants, demonstrating how energy innovations can provide benefits to the community. The project relied on a robust financial plan, a legal model, support from the mayor and the community. Transparency and public consultation were central to its success.

20 This project is the brainchild of Fab Lab Barcelona at the Institute for Advanced Architecture of Catalonia, but since first being created in 2012 it has been developed collaboratively, with organisations including Hangar, Goteo and La Fosca. The project received funding, collaboration and support from MID and several EU-funded research projects such as Making Sense, iSCAPE, Organicity, Grow Observatory and DECODE.

91. The Gate 21 project in Denmark provides a common platform for municipalities, regions, companies and knowledge institutions for green solutions, in particular in energy conversion/storing, circular economy and green mobility in Greater Copenhagen.

92. Often, cooperating with other actors is key to ensure achieving relevant climate-related outcomes. The Province of Brescia (Lombardy region, Italy) has managed to group 28 small municipalities in a single initiative aimed at driving energy efficiencies, resulting in a 'smart light' transition on 23,000 light poles, carrying an economic value of around 45 million euros. The savings generated are being reinvested in an expansion of the light transition to encompass full coverage in the 28 territories, with the public IoT digital infrastructure given in concession to a private operator.

93. Digital technologies serve also to improve waste management: the collection routes get optimised, vehicles and human resources are used more efficiently to collect and transport waste (ex. with notifications of road restrictions, traffic congestions or other unexpected incidents), energy efficient sensors are used for waste containers even in remote locations, being connected to the waste management network 24/7. Having introduced a smart waste collection, with waste bin sensors providing real time data and fill-level forecasting, Dublin airport makes 90% cost savings. As part of a Smart Waste project, route optimisation software has been used by the Highland Council in Scotland to support an intelligent, data-driven approach to waste collection. It allows for more efficient routing of waste collection vehicles In Chania, Greece, sensor-connected bins were deployed to adapt collection times and routes. Also in Greece, the Attica region is developing a digital platform to communicate about recycling rules and to reward citizens for their efforts.

94. Digital technologies are used around Europe to tackle food waste. New apps and projects are created for this purpose. Mirafiori Quartiere a Spreco Zero is a project in the neighbourhood of Turin (Piedmont region, Italy) offering the excess food to those in need. A digital map with points of collection and an app facilitate the work of volunteers moving across the neighbourhood to match the request and the offer.

95. The notions of *intelligent buildings – IB* – is becoming increasingly popular, due to its potential for deploying emerging technologies to develop more comfortable and effective space usage and reduce energy consumption. This is achieved by connecting data on building energy consumption - integrating heating, ventilating, and air conditioning, lighting and air quality. Advanced building energy management systems, smart lighting and customised technology facilities improve energy efficiency and management. The lifetime costs of this investment in sustainable design for energy and water conservation, effective waste disposal and reducing pollution prove the efficiency of such investments. The Edge office building in Amsterdam is known as "the smartest building in the world" according to British rating agency BREEAM. It produces more energy than it consumes. It uses 70% less electricity compared to the average office building. The roof and a wall are covered with very efficient LED panels which are packed with a multitude of sensors (to measure temperature, humidity, light etc.). The panels are powered by the same cables that are used to carry Internet data.

96. There is a counterargument however, that Intelligent Buildings can be 'smart' without relying on the overuse of data and technology. By utilising intelligence found within the natural world, such as copying termite mound construction to create natural cooling within a building, a 'dumb' city[21] can provide natural efficiencies that have already proven the test of time. In the Edge building an aquifer thermal energy storage system provides all the energy required for heating and cooling. The energy generated in the gym is sent back to the grid and used to power the building. Rainwater is used to flush the building's toilets and water the gardens.

97. Population increase, overuse and pollution aggravate pressures on water resources. Moreover, the climate change brings more floods and droughts to European cities and regions. Smart technology and innovation convert traditional water framework into documented and interrelated water management. Digital technology improves access to clean, running water bettering people's well-being. This includes appropriate water treatment, eco-filtering and water quality control. Digital tools help in particular to reduce wasting water, detect leakages and spillage, forecast repairs and improve water quality. Those include a range of hardware and software instruments such as sensors, meters, data processing and visualisation tools. For instance, smart water meters collect and share real-time data on consumption of water. Sensors measure the quality of water, pressure on pipes, the wear of the equipment and machinery etc. Territorial reforms such as decentralisation help to improve water

21 Fleming, A. (2020). The case for making low tech 'dumb' cities instead of 'smart' ones [Article]. *The Guardian*, available at: https://www.theguardian.com/cities/2020/jan/15/the-case-for-making-low-tech-dumb-cities-instead-of-smart-ones [accessed 11 April 2020].

governance, empowering territories. Urban-rural interplay is important for water management highlighting interdependencies of cities with broader regional water ecosystem (ex. river basin within which cities are located). The “Smart Canal” drainage system in Glasgow uses historic canals and new innovation technologies to solve the problem of flooding. Advanced warning of heavy rainfall automatically triggers a lowering of the canal water. In Malta impressive efforts have been undertaken to desalinate sea water using increasingly digital energy efficient technologies.

7.3 Smart mobility

98. It is critical to address growing global transport emissions that concentrate mainly in urban and suburban areas. This can be done in particular by ensuring more efficient and sustainable mobility in cities and regions. Developing sustainable and connected urban and regional transport systems offer flexibility and efficiency for the benefit of citizens and their well-being. More efficient public transportation reduces travel times, improves air quality and lowers CO2 emissions. More integrated transport and land-use planning promote public transport, car sharing, smart parking, walking and cycling as well as improvements in energy intensity and fuel type.

99. There is also a growing trend to change the business model of transport either making it more demand-based or promoting no-car-ownership financial models. In the first case, public transport is scheduled according to the demand and location of residents, making it a hybrid version of a taxi and a bus. When combining a demand and location of interested passengers, a trip can be optimised on a specific route with on-demand stops. For example, the city of Helsinki piloted a Kutsuplus application-based shuttle-bus service between 2012-2015 that was rather popular among urban residents. In the case of financial models, a Mobility-as-a-Service (MaaS) has been piloted also in a few European cities. The concept is rather simple – it is a combined mobility subscription (e.g., a monthly fee provides access to public transport, bicycles, scooters with a limited number of taxi and rental car trips).

100. The EU-funded project *Smarter Together* supported smart city solutions in Munich, Lyon and Vienna. The project *Smarter Together* supported in particular urban mobility and reduced reliance on private motor vehicles in Munich. It encouraged car-owning residents who live some distance from a convenient public transport not to use their private cars for certain journeys in the city, or even to realise that they do not need a car at all. At the same time, the project increased mobility options for citizens that do not own a car, making the public transport network more accessible for them and thereby promoting inclusion. As a result of the project, eight multimodal e-mobility stations were built, providing access to several different transport options, including rental bikes, car sharing and electric vehicle charging stations. The e-mobility stations include a digital information pillar, which displays all available mobility options in the area. This includes details of public transport, maps to support active travel, and free Wi-Fi. The goal is to make the experience of changing from one means of transport to another as seamless as possible for the user. The use of smart mobility stations, similar to those provided through *Smarter Together*, forms an integral part of Luxembourg’s new tram line and the West of England’s Future Mobility Zone proposals.

101. The Dundee ShareMORE project in Scotland uses digital technology and data to create new Mobility-as-a-Service (MaaS) business models. MaaS encourages the sharing of mobility assets, such as cars, bikes and public transport operations in both a community and corporate fleet setting.

102. The city of Mariupol in Ukraine, before its destruction by Russian Federation forces, was awarded “The Best Transport Model of the City” prize at the 2019 Kyiv Smart City Forum for the implementation of a number of innovative projects such as the “Pikas” automated dispatch control system, a mobile application for city residents, an electronic travel card, fare payment through the QR code and the establishment of electronic displays at stops.

103. In the field of smart cities and regions, automated mobility is one of most complex and emerging phenomena combining sensors, video feed, mobility data, 5G, automation technologies and electric vehicles with a goal of reducing non-necessary traffic and improving road safety. The effect comes from the assumption that cars would have more than a single passenger on average and automated cars drive non-stop instead of being parked most of the time. However fully AI-driven mobility remains conceptual as the technology is not ready yet to replace human drivers in an open traffic. Automated vehicles on public roads require a significant upgrade of infrastructure with substantial costs and serious rebuilding involved in already regulated urban environment. Moreover, legal issues related to criminal and civil liability will have to be solved as well as the regulation for manufacturers and insurers and the future road traffic. There have been some pilot projects. In the Netherlands, robot buses offered a public transport solution between the busy Brandevoort railway station and the Automotive

Campus. The route in Helmond was 3 km long with four bus stops and included several challenges, such as two roundabouts and a great number of cyclists.

8. Innovation at the service of communities

8.1 Challenge-based innovation

104. In recent years, digital innovations like civic technology, geographic information systems, the sharing economy, open data, and digital platforms have changed how people understand, manage and participate in cities and regions.

105. Operationally, implementing public value as a concept, is also dependent on how technology is procured and implemented by cities and regions. The public sector is playing a crucial role in technology development by being the biggest procurer of smart solutions. However, in uncertain and dynamic environments, cities and regions do not have a full knowledge of what to procure, especially in the case of "wicked problems" – one can understand what the problem is but there is no clear roadmap how to solve it. In this light, several cities in Europe (e.g., Amsterdam and Helsinki) have started to procure smart solutions in a more agile and experimental way, that allows to test out some of them as small pilots, and scale them up, if successful. This also labelled as "Innovation Challenge," can be taken as an alternative to traditional procurement where the main specifications of procured solutions are known beforehand.

106. Thus, complex solutions can be procured following the 'Innovation Challenge' type of principle, where the needs of the procurer and expected outcomes of the procurement are described, but the exact technical solution and their functionalities are supposed to be left open for the companies to plan and propose. The aim of the challenge-based procurement is to help the procuring authorities to find best solutions that are in the market, and on the other hand to drive the companies to propose solutions that are better targeted towards the real need of the local governments and end-users. Local and regional authorities must ensure that these solutions are in line with fundamental rights and democratic values and can pass a thorough human rights assessment.

107. As an example, what is meant by innovation challenge, the proposed solution, and/or parts of the proposed solution can be software, hardware, infrastructure, service or an innovative business model. However, it should be underlined that the solution can also consist solely of software and hardware if the proposing company envisions that this would be the optimal way to reach the expected outcomes. In any case of procurement, a very important part is having safeguards and internal capabilities within local governments; people that understand technologies.

108. Proposals submitted to innovation challenge can be evaluated from two perspectives. First, what is the subjective value of the proposed solution for the user. The subjective value reflects how the proposed solution would deliver the change of the behaviour in real life. The expected needs of the users are described in the user profiles and specific user personas are selected for each of the pilots. Second, what is the objective value of the proposed solution for the municipal system – for example, what is the exact reduction of the congestion, what are the potential cost savings, how the transport system would function better as a whole. This combination of subjective and objective value in the evaluation is sometimes defined as "value-based procurement" framework.

8.2 Urban data platform

109. One concept to bring together technologies, data and strategic goals, is an Urban Data Platform, adjustable both for cities and regions. An urban platform is a key software infrastructure for urban planning and maintenance, designed to handle and analyse large data sets from different domains. The wider goal is to enable transitions of cities and regions to more sustainable systems (less CO2, more energy efficient, more environmentally friendly, etc. - all better for the citizen).

110. The core concept of such platform is quite simple: deploying a network of sensors that can capture real-time data from a myriad of things occurring in the municipality and connect such sensors to an urban information system helping to analyse better and transform such data into knowledge (see figure below) and well-adapted products and services. Local and regional authorities use a permanent platform for interaction that provides a unique mix of services to each user. Furthermore, by giving users the capabilities of developing their solutions and services we create a more inclusive and bottom-up model of both social and economic local development.

111. The central question is to what extent big data platforms attract participation of citizens in provision of better services. It appears that e-participation positively impacts the clearance rate of urban service requests, more so for complex problems compared to simple routine services. Moreover, the focus on “smartness” in the context of service provision and the use of Urban Data Platforms make the public sector more agile and resilient.

8.3 Data interoperability and federation: the case of Estonia

112. Modern local governments are expected to be participatory, horizontal and collaborative with the help of digital technologies. Organisational structures are constructed for the convenience of administration and can make service provision vertical (e.g., departments of mobility and environment and their databases are fully disconnected).

113. Estonia is an interesting example of horizontal exchange of data, as there is close to full interoperability between public-sector databases via the data-exchange layer called X-road, both within departments in one local government and across all national and regional databases. For example, the national population registry (which stems from the population registry of Tallinn) is integrated with cities, regions and other government actors in Estonia. Therefore, municipalities do not need to keep their own population registries, as there is one live database of all residents in Estonia, and every municipality integrates their services based on this central registry (e.g., registration of new or departing residents). It is important to note that the X-road is not extraordinary because of its technological features (there are plenty of similar-logic enterprise-service bus platforms available) but mainly because it is a case of successful implementation, both organisationally and legally. Essentially, it is a rule-based approach, and all these rules has been pre-defined (e.g., who can make inquiries to the population and other thousand databases and how. Over 3,000 government-sector (including all cities and regions) databases are interlinked via the Internet using the transport layer. Thanks to the distributed architecture (no super-database but a network of linked Information systems) coupled with secure identification (with ID-card, smart-ID or mobile-ID), there have been no large-scale or system-wide failures over the past two decades.

114. Inspired by the X-road, Finland has been also implementing its data-exchange layer, and both countries have agreed to develop a federated solution. In 2017, this has resulted in a joint organisation, the Nordic Institute for Interoperability Solutions, which has the mission to develop federated e-governance solutions connecting Estonian X-Road technology with its Finnish counterpart (Palveluväylä) and with any other country interested in this (e.g., Iceland). First pilots based on these federated data-exchange layers focused on the exchange of tax, medical and/or population data. Furthermore, if the federation of data-exchange layers (see figure below) was fully implemented in Europe, this would offer an experimental setting for joint cross-border e-services between local governments and regions across Europe. Currently, most European countries still operate as “digital islands”, but the federation of data-exchange platforms could effectively lead to joint digital services based on real-time data requests from local, regional and governmental databases, hence also benefiting the commuters and macro-regions.

115. The next step for smart cities and regions could also be the integration of various sensor data by implementing an open and interoperable platform for connected sensors or things. That is, in addition to “citizen-based” databases, there can be interconnected registries, both public and private, for “things” like unity meters (gas, electricity, water), vehicles (cars, buses, trains etc.), home appliances, heating, lighting and waste-management systems, weather-forecast data etc. In Estonia, there is a first step towards this, namely the Estfeed platform, which connects close to 600,000 electricity users, and most end-users can trace their energy consumption via connected meters over the Internet. This platform, running on the X-road, links data sources and applications and provides a user interface for customers to see and manage their energy-consumption data and rights. For completely federated smart cities and regions, such federation could be the next step, after having integrated the public registries, but this may not be politically desirable.

9. Growing stronger in times of crises

9.1 Lessons learnt

116. The outbreak of Covid-19 had far-reaching, complex and multifaceted social and economic impact. It is now possible to see that this impact would have been even bigger without digital means, structures and skills. Development of smart applications has been amplified by the Covid-19 pandemic. In particular many applications and various platforms have been launched to help contain the virus, notably contact tracing ones. They have also been used to communicate and tackle disinformation, for remote consultations (to reduce burden on hospitals) and the rollout and monitoring of vaccination programmes. Several applications also supported the continuous delivery of public services during lockdowns.

117. Now the online environment plays a significantly bigger role – for example, the digitalisation of local and regional government services has increased with a logic to digitalise processes in order to offer alternatives to human contacts though which the virus spreads. Several conservative services like registering for marriage or divorce, or buying a real estate via notary have been digitalised in many European cities and regions during the crisis. In addition, important sections of the European population went through a crash-course on remote working and studying and it is probable that future working and studying remains hybrid in its format to certain extent.

118. The 15-minute city model, developed by urban planner Carlos Moreno, gained in popularity since 2020. Paris's mayor Anne Hidalgo included it into her re-election plan. 15-minute plans have been implemented in Milan, Copenhagen, Madrid and Edinburgh after the Covid-19 outbreak. A 15-minute city is a residential urban concept in which most daily necessities can be accomplished by either walking or cycling from residents' homes. It also relies on part of the public services being digitalised, local solidarity initiatives being leveraged or a one-stop desk being installed in the neighbourhood. In Paris for instance, the municipality supported the deployment of application Covisan, which allowed to track Covid-19 cases through a network of local general practitioners.

119. Stockholm has introduced a 1-minute city concept, an experimental model that gives residents more choice on how to use their neighbourhood or even a street. This has been proposed by Dan Hill, a designer at Vinnova with a focus on "a space outside your front floor – and that of your neighbours adjacent and opposite." During the pandemic, the concept of home has definitely changed a lot as people have started to spend significantly more time at home, e.g., working, studying, exercising, dining, socialising etc.

120. Some digital services have been used during the Covid-19 crisis to perpetuate social interactions or even develop new ones. In several instances, digital tools have enabled the development of online education, solidarity initiatives, circular economy efforts, live-streamed council meetings, providing for much needed social interactions. For instance, some studies have shown that older citizens who had Internet connection, proper devices, and were technologically literate prior to the Covid-19 pandemic, coped better with the reality of a lockdown and having to be away from loved ones for a long period.

121. However, the quick implementation of digital solutions, and mostly as a reaction to the situation rather than part of a comprehensive strategy, at local and regional levels sometimes missed the element of inclusivity and sustainability. For instance, impact on populations that were already marginalised from new technologies must be addressed. Forced home-schooling may have contributed to increasing education inequalities, as families without equipment or broadband connection were negatively impacted by the use of online tools. In short, citizens who were already marginalised, because of their age, gender, economic background or place of residence, may have been further excluded due to the lack of infrastructure, skills and equipment available. Understanding various user behaviours and tackling the digital divide has progressively emerged as a key concern that will need to be better addressed in the future.

122. Moreover, value for money concerns have been raised with expedited procurement, especially for digitalisation services, and less citizen oversight on public expenditures and provider selection. Also, a tendency to recentralise key responsibilities of local and regional authorities may have contributed to less inclusive decision-making making the deployment of e-solutions initiated by central governments even more tricky for local and regional authorities that did not always have the capacities and resources to make sure services were provided in an efficient and equal manner. On that matter, a key lesson learned from the pandemic is that it is crucial for all levels of government to set up

substantial measurement frameworks and evaluation mechanisms to track the deployment (and development) of technologies underpinning public action.

123. While local and regional authorities still struggle with consequences of the Covid-19 crisis, the war of the Russian Federation against Ukraine has substantial effects on local and regional governance. For instance, the quick and sharp increase in energy prices, especially in countries dependent on Russian fossil fuels, has resulted in increased financial burden for territorial authorities and a direct impact on local economies. The war has also caused pressure of food supplies and has had a significant impact on the mobility of people. European cities and regions demonstrated a high level of solidarity offering refuge to millions of Ukrainians fleeing the war and providing support to Ukrainian cities and regions. The Cities4Cities platform was launched at the initiative of Bernd Vöhringer (Germany, EPP/CCE), President of the Chamber of Local Authorities and Mayor of the city of Sindelfingen, with the support of the Congress, helping to match the needs of the Ukrainian cities and regions with offers of assistance from cities and regions in other European countries.

124. In Ukraine the successfully implemented digitalisation reform constitutes an efficient tool for the country's resilience against the Russian aggression. Despite the ongoing difficult situation, the IT sector has proved most resilient and adaptive. Many IT companies and specialists found refuge in western Ukraine or in other European countries. Some IT specialists choose to continue working remotely in dangerous areas close to the front line. The local and regional authorities continue to communicate with citizens using digital means despite all odds including occupation and repressions. Ukraine's ability to prevail in the future predicts a global movement towards a more empowered and freer digital world.

9.2 Post-crisis recovery and post-war reconstruction

125. Digitalisation and AI are essential for Covid recovery and post-war reconstruction efforts. The latest technologies are creating opportunities to shape better built environments and better urban experiences. Local and regional authorities play a vital role in leveraging digital initiatives for the safety and well-being of citizens. Three key areas can be identified as future game-changers for local and regional governance: the use of AI, data interoperability and digital economy.

126. It is certain that over the next decade AI will change the way local and regional governments handle local and regional development plans. While digital twins remain expensive and therefore accessible to only a handful of cities and still rely on many data inputs from connected sensors, it is possible to imagine a near future where scalable products emerge at a lower price to evaluate and trial policies. In that regard, the future transversal legal instrument on the use of AI, as prepared by the CAI, will be crucial to set the standards and protect against risks associated with AI algorithms and products.

127. In Barcelona, the recent installation of the Mare nostrum supercomputer hosting the city's digital twin is expected to bring the city closer to the 15-minute city model by reducing human error and basing urban planning decision on data and evidence. It will trial measures to curb air pollution, track gentrification trends and map delivery of public services to under-researched areas of the city.

128. Data interoperability will also become a key concern for local and regional authorities as they will progressively become the owners and producers of large amounts of crowd-sourced data which will only be useful if interoperable with other data repositories.

129. Besides, local and regional authorities must also acknowledge the importance digitalisation has now in terms of SMEs and economic development. It may become part of their responsibilities to ensure that they create an optimal environment for new businesses and more traditional SMEs. At the same time, the Covid-19 pandemic highlighted not only overreliance on technology, but also the important to remain involved in the development of technologies.

130. For these reasons, an inclusive and efficient digital transformation in Europe's cities and regions should be supported. People and their needs should be at the centre of the recovery efforts. More efforts will be needed to mitigate the digital divide and improve digital equity. It is key to ensure that recovery is paired with strengthened governance at local and regional levels and improved public trust. Accountability measures should also be put in place to prevent corruption and encourage transparency, integrity and open competition. In that regard, digital tools and open government can

facilitate the promotion, awareness and effective implementation of anti-corruption standards both among officials and the general public.[22]

131. Despite these challenges in the cutting-edge innovation sector, the current crises have shown that most of what we consider simple and basic, such as going to work, attending school, meeting with friends and family, can quickly change. For most rural and small communities, innovation may still take some time to dramatically change the way they do local governance but other ways can be explored to improve citizens' well-being and local democracy. As we live in more and more connected societies, it is necessary to draw inspiration from operational models that have in practice improved the life of all citizens. In that regard, the One City Approach in Bristol,[23] where digital technology had played a vital role in involving volunteers and young people in tackling the crisis, can be an interesting example.

132. In the European Union, 20% of the funds allocated to the recovery plan (more than € 800bn) will be allocated to push for more advanced digitalisation and € 7.5bn will be dedicated to the Digital Programme only, which will foster innovation specifically on in supercomputing, artificial intelligence, cybersecurity, advanced digital skills, and ensuring a wide use of digital technologies across the economy and society, including through Digital Innovation Hubs. Cities may become first recipients of grants and infrastructure plans but rural areas will also benefit from funds and innovative programmes.

133. Smart technologies should be used to support post war reconstruction and development in Ukrainian cities and regions, bridging the divide between big cities like the capital Kyiv and other urban and rural areas. Extensive reconstruction and revitalisation plans providing for infrastructure projects will have to be designed to structurally further modernise and rebuild Ukrainian cities and regions.

134. Reconstruction strategies facilitated by digital services should take into account the identities of cities and villages. AI can help in mapping post-war cities to re-create spaces based on people's memories, stories, and experiences. Reconstruction projects should be designed based on local conditions, in respect of local heritage, considering best sustainability solutions, while involving the local population. Emergency services can also benefit from more integrated/interoperable digital solutions to monitor the needs of the local population, including displaced persons. In that regard, any digitalisation initiative, for emergency purposes or long-term reconstruction, must place adequate attention to the specific needs of women and young people, in particular concerning political participation, employment and freedom from violence.

10. Conclusions

135. Over the last 20 years, major transformations have impacted the way European citizens live in cities and regions. Digitalisation has been one of the most transformative and cross-cutting phenomena and will continue to durably impact local and regional governance. While smart cities and smart regions have often been in the past instigated by private providers, digital initiatives choose more and more to reposition the citizen at the core of their vision. Indeed, no city nor region can be smart without being human-centred. Initiatives led without taking into accounts the needs of citizens showed that there is more to a smart city or region than a combination of highly innovative product. Human-centred smart cities and regions must encompass effective local democracy, sustainability, citizen participation, openness, transparency and accountability.

136. This report emphasises that smart cities and smart regions can present both opportunities and challenges for local and regional authorities. The concepts of smart city and smart region are driven by population dynamics and climate change, which pose various challenges related to energy, waste, mobility and more generally to the environment. For tackling these challenges, digital solutions and artificial intelligence have increasingly been used. These tools can also be used as enablers to promote a livelier local democracy by intertwining key elements of participative democracy in the design of smart cities and regions, such as open data. Rather uniquely, this report also puts more emphasis on inclusive initiatives in less advantaged regions and smaller towns, as smart solutions very often do not reach out from capital cities but some of the most creative and participatory solutions have emerged from these areas. This report invites local and regional authorities to systematically adopt robust needs, risk and impact assessments, enriched by local stakeholders and citizenry's inputs

22 The Congress thematic reports on the topics of conflict of interest, transparency and open government, transparent public procurement, administrative resources and fair elections, combating nepotism and protecting whistle-blowers offer precious guidance to the decision-makers at local and regional levels.
23 www.bristolonecity.com

and feedback, and to consider mitigation strategies to ensure citizens accept and benefit from these changes. Lack of clear and widely accepted strategies may well cause the failure of such initiatives.

137. The report offers guidelines for the use of smart technologies to serve human rights, democracy and sustainable development, mitigating potential risks and maximising their benefits for all. It highlights that technology should remain central as a tool in order to make cities and regions more inclusive and sustainable, but it should not be a driver itself.

138. Pace of progress and innovation in digital products often move faster than legislation. In the future, local and regional authorities must remain particularly vigilant to always be guided by standards of human rights and democracy as well as sustainable development goals. In particular, the emergence of artificial intelligence is particularly challenging for territorial authorities, if no legal framework oversees their application. The work of the CAI in this regard will provide much needed guidance for all member States.

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