



Study Guide

Committee on Regional Development

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1. Greetings of the Board

Distinguished Members of the European Parliament,

We take great pride in extending a heartfelt welcome to you, to EUropa.S. 2024, and particularly, introducing you to the European Parliament's Regional Development Committee (REGI). This year's topic, "***SMART Cities & Digital Transition: Opportunities for Regional Development for a Sustainable and Efficient Europe***" holds immense significance over our EU institutions and radiates the capacity to mould our very lives and futures for the better. As the board of the Regional Development Committee, we hope this document accompanies you through your preparations for the conference, and provides you with a strong and valuable frame of reference for further study and research, to deepen your knowledge and understanding of such a vibrant and exciting topic.

The European Parliament, constitutes one of the most vital instruments of the European Union, holding substantial legislative and budgetary powers that grant it important control of the European project's direction. In this year's edition of EUropa.S. you will be called to engage in dynamic debates and gain a deep understanding of European institutions. You'll assume roles as diplomats and legislators, honing vital skills for real-world politics, and working together to reach viable and productive conclusions.

In short, we hope that committee sessions will be exciting, full of insightful debates, and respectful diplomacy. Finally, please do not hesitate to contact us if you have any questions. We genuinely can't wait to meet you all in April at EUropa.S 14th edition. A fantastic experience is ahead of you!

Kind regards,

The Board of the Regional Development Committee

Adriani Nikolaou, President of REGI

Panagiotis Kakis, Vice- President of REGI

2. Introduction to the Committee

In order to promote balanced development throughout the European Union, policies and strategies are shaped in large part by the Regional Development Committee of the European Parliament. This group, which is made up of European Parliament (MEP) members committed to regional issues, works to improve the territorial, social, and economic cohesion of EU member states. The group addresses regional inequities and advances sustainable development by formulating recommendations and legislative proposals after lengthy debates.

Monitoring the application of the EU's regional strategy and making sure that money allotted for regional development initiatives is used efficiently is one of its main duties. In order to match policies with the various needs of various European areas, the committee works with other parliamentary committees, national governments, and regional authorities. In order to obtain information that guides its decision-making process, it also maintains an ongoing interaction with stakeholders, such as nearby businesses and communities.

To put it simply, the Regional Development Committee works to close the gap between established and developing regions of the European Union by acting as a catalyst for resilient and inclusive growth. Through promoting collaboration and unity, the committee aids in the development of a stronger and more integrated European Union.

3. Introduction to the Topic

The concept of SMART Cities and the digital transition has emerged as a transformative force, promising a paradigm shift in urban development across Europe. As nations grapple with the challenges of rapid urbanization, climate change, and resource constraints, the integration of smart technologies into urban infrastructure becomes imperative. This dynamic approach aims not only to enhance the efficiency of city living but also to foster regional development, laying the foundation for a sustainable and interconnected future.

Modern technologies are used in "smart cities" to maximize the number of urban living features, from public services and healthcare to energy management and transportation. Using programs like the CEF Digital 5G for Smart Communities (5GSC), the European Union has been actively encouraging the growth of smart cities. The goal of these initiatives is to use digital innovation to solve urban problems and promote economic development.¹("Smart Cities and Communities | Shaping Europe's Digital Future," 2023)

¹ Smart Cities and Communities | Shaping Europe's digital future [WWW Document], 2023. URL <https://digital-strategy.ec.europa.eu/en/policies/smart-cities-and-communities> (accessed 12.2.23)

In the strategic implementation plan for Smart Cities, the European Court of Auditors highlights the built environments, districts, and sustainable urban transportation as important areas for action. This strategy is in line with the overarching objective of developing technologically advanced, ecologically responsible, and socially inclusive cities.² (“Special report 24/2023,” n.d.)

Research outlines ideas that can enhance the entire shift to smart cities and proposes policy recommendations for the move toward sustainable smart cities ³(Choi and Song, 2023). These directions support a resilient and well-balanced urban ecology by integrating sustainability principles with technology breakthroughs in an all-encompassing vision. Initiatives such as DESTI-SMART promote a low-carbon economy in Smart Cities by addressing issues related to effective and sustainable tourism ⁴(“DESTI-SMART,” 2023). This demonstrates a thorough strategy that considers the larger economic and ecological effects of smart development in addition to urban infrastructure. Barcelona is a prime example of the revolutionary potential of Smart Cities. Its city council developed an IT strategy for a worldwide transformational plan in 2011 ⁵(Ferrer, 2017). This project emphasizes how crucial it is to integrate new technology with strategic planning to propel urban growth.

In conclusion, Europe has a rare chance for regional growth as a result of the pursuit of SMART Cities and the digital revolution, which offers a model for effective and sustainable urban life. Cities may prosper in an intelligent and linked environment while also adapting to future difficulties via the use of cutting-edge technology, sustainability, and teamwork.

4. Key Terms and Definitions

4.1 SMART Cities

A smart city uses information and communication technology (ICT) to improve operational efficiency, share information with the public, and provide a better quality of government service and citizen welfare⁶. Through data technology and analytics, SMART Cities are able to utilise their resources optimally and respond to urban challenges.

4.2 Digital Transition

Digital transition, or digitisation, has been an ongoing process of taking analogue information such as paper documents and converting them into digital formats such as

² Special report 24/2023: Smart cities [WWW Document], n.d. . Eur. Court Audit. URL <http://www.eca.europa.eu/en/publications/sr-2023-24> (accessed 12.2.23).

³ Choi, H.-S., Song, S.-K., 2023. Direction for a Transition toward Smart Sustainable Cities based on the Diagnosis of Smart City Plans. *Smart Cities* 6, 156–178. <https://doi.org/10.3390/smartcities6010009>

⁴ DESTI-SMART [WWW Document], 2023. . Interreg Eur. URL <https://projects2014-2020.interregeurope.eu/desti-smart/> (accessed 12.2.23).

⁵ Ferrer, J.-R., 2017. Barcelona’s Smart City vision: an opportunity for transformation. *Field Actions Sci. Rep. J. Field Actions* 70–75.

⁶ *What is a Smart City? – Definition and Examples* (no date). Available at: <https://www.twi-global.com/technical-knowledge/faqs/what-is-a-smart-city.aspx> (Accessed: 2 December 2023).

web pages, online catalogues, or electronic papers. Simply put, digitisation is converting anything into digits⁷.

4.3 Digital Transformation

Digital transformation (DX) is the use of digital technology and data analytics to make data-driven decisions, improve operational efficiency, streamline work and gain a competitive edge (in business)⁸.

4.4 Regional Development

Regional development is the label of the efforts to develop certain areas of a country, with development usually understood in the socioeconomic sense. Regional development is thus not only measured in incomes, the number of jobs, and demographic trends in a certain area, but it can also point to the more general dynamics such as innovation and creativity in the region in focus⁹.

4.5 Sustainability

Sustainability is 'the use of natural products and energy in a way that does not harm the environment¹⁰'. It can also be defined as 'meeting the needs of the present without compromising the ability of future generations to meet their own needs¹¹', according to the United Nations Brundtland Commission (1987).

4.6 Green Growth

Green growth is a concept in economic theory and policymaking used to describe paths of economic growth that are environmentally sustainable¹². According to the Organisation for Economic Co-Operation and Development (OECD), Green growth means fostering economic growth and development while ensuring that natural assets continue to provide the resources and environmental services on which our well-being relies¹³.

4.7 Artificial Intelligence

⁷ *The difference between digital transformation and digital transition* (no date) *Technology Record | The best of enterprise solutions from the Microsoft partner ecosystem*. Available at: <https://www.technologyrecord.com/article/the-difference-between-digital-transformation-and-digital-transition> (Accessed: 2 December 2023).

⁸ 'Digital Transformation' (2022) *Techopedia*, 6 October. Available at: <https://www.techopedia.com/definition/30119/digital-transformation> (Accessed: 2 December 2023).

⁹ *Regional Development - an overview | ScienceDirect Topics* (no date). Available at: <https://www.sciencedirect.com/topics/social-sciences/regional-development> (Accessed: 2 December 2023).

¹⁰ *sustainability noun - Definition, pictures, pronunciation and usage notes | Oxford Advanced Learner's Dictionary at OxfordLearnersDictionaries.com* (no date). Available at: <https://www.oxfordlearnersdictionaries.com/definition/english/sustainability?q=sustainability> (Accessed: 2 December 2023).

¹¹ Nations, U. (no date) *Sustainability, United Nations*. United Nations. Available at: <https://www.un.org/en/academic-impact/sustainability> (Accessed: 2 December 2023).

¹² Mandle, L. *et al.* (eds) (2019) *Green growth that works: natural capital policy and finance mechanisms around the world*. Washington, DC: Island Press.

¹³ *What is green growth and how can it help deliver sustainable development? - OECD* (no date). Available at: <https://www.oecd.org/greengrowth/whatisgreengrowthandhowcanithelpdeliversustainabledevelopment.htm> (Accessed: 2 December 2023).

Artificial intelligence (AI) is the ability of a digital computer or computer-controlled robot to perform tasks commonly associated with intelligent beings. The term is frequently applied to the project of developing systems endowed with the intellectual processes characteristic of humans, such as the ability to reason, discover meaning, generalize, or learn from past experience¹⁴.

5. Overview of SMART Cities and Digital Transition

5.1 Understanding Digital Development in Europe, Present Challenges and Significance in the European Context

In the context of the EU, regional development is a complex idea that is essential to determining the economic environment and guaranteeing fair growth among varied regions. Therefore, our capacity to comprehend in depth its importance and complexity demands a thorough examination of the main aspects of regional development, illuminating current issues and the external environment that shapes its course.

5.1.1 The significance of smart cities and climate neutrality

The European Green Deal's objective of becoming carbon neutral by 2050 depends heavily on cities. Despite making up only 4% of the EU's total land area, 75% of its population resides there. Moreover, cities are responsible for more than 70% of worldwide CO₂ emissions and more than 65% of global energy consumption. Urban action has a major role in mitigating climate change, therefore, a need arises to urge cities to accelerate their digital and green transformation. European towns in particular can make a significant contribution to the Green Deal's goal of decreasing emissions by 55% by 2030. More practically, though, these cities can help their inhabitants enjoy cleaner air, safer transportation, and less traffic and noise.¹⁵

The current state of the EU's efforts in digital transition and SMART city development result from H2020's successor, the Horizon Europe program and its European missions, which essentially constitute a new way to bring concrete solutions to some of our greatest challenges. They have ambitious goals which they are set to deliver concrete results for, by 2030. It actively involves smart cities and digital transition development through its dedicated mission titled "Climate-Neutral and Smart Cities".¹⁶ By 2030, this vision seeks to create 100 smart, climate-neutral communities that serve as centres of innovation and

¹⁴ *Artificial intelligence (AI) | Definition, Examples, Types, Applications, Companies, & Facts | Britannica* (2023). Available at: <https://www.britannica.com/technology/artificial-intelligence> (Accessed: 2 December 2023).

¹⁵ Climate-neutral and smart cities (2023). Available at: https://research-and-innovation.ec.europa.eu/funding/funding-opportunities/funding-programmes-and-open-calls/horizon-europe/eu-missions-horizon-europe/climate-neutral-and-smart-cities_en (Accessed: 6 December 2023).

¹⁶ Horizon Europe (2023). Available at: https://research-and-innovation.ec.europa.eu/funding/funding-opportunities/funding-programmes-and-open-calls/horizon-europe_en (Accessed: 7 December 2023).

experimentation. It emphasizes environmentally friendly urban growth, utilizing quick fixes and drastic strategies to become carbon neutral. As part of its commitment to advancing digital innovation in cities, the program supports projects and initiatives that address citizen-centred reforms and launches 100 tech pilots. Furthermore, in order to address climate change and support the UN's sustainable development objectives, Horizon Europe, the EU's principal financing program for research and innovation, places a strong emphasis on clever and sustainable urban solutions.¹⁷

Europe is leading the way in sustainable urban development with its smart cities, which use cutting-edge technologies to make their cities more livable and efficient. With an emphasis on enhancing human capital, transit, and general urban environments, these cities prioritize the integration of digital solutions to address a variety of difficulties.

5.1.2 Summary of the EU's Progress in Smart Cities

Under the support of developmental programmes like Horizon 2020 (H2020) and other initiatives, the European Union has advanced smart cities considerably. Horizon 2020 was the EU's research and innovation funding programme from 2014-2020 with a budget of nearly €80 billion. With an expenditure of €400 million and total investment to participating cities of around €1 billion, the "Lighthouse" research and innovation initiative is a prime example of the EU's dedication to smart urban development.¹⁸ Many European communities have benefited from this initiative's effective support as they adopt smart technology. It has accelerated the development of smart city technology and helped establish and validate key performance metrics that are essential for assessing smart city programs.¹⁹ ²⁰ Moreover, the European Union's commitment to evaluating optimal methodologies and promoting market demand-driven growth has been demonstrated by initiatives such as the European Smart City Initiative ²¹.

H2020-funded smart city lighthouse projects like RUGGEDISED have acted as launching pads for the creation of climate-neutral cities.²² These initiatives are in line with the EU's overarching goals of encouraging environmental awareness and sustainability in urban settings. Based on research assessing the development of smart cities and sustainability

¹⁷EU Missions in Horizon Europe (2023). Available at: https://research-and-innovation.ec.europa.eu/funding/funding-opportunities/funding-programmes-and-open-calls/horizon-europe/eu-missions-horizon-europe_en (Accessed: 7 December 2023).

¹⁸Wirsinna, A. (2021) 'Smart City EU - Lighthouse Projects – Investigation of Economic Benefits', *European Journal of Marketing and Economics*, 4(2), pp. 35–51. Available at: <https://doi.org/10.26417/409ktp52j>.

¹⁹Smart City performance measurement system | CITYKEYS Project | Fact Sheet | H2020 (no date) CORDIS | European Commission. Available at: <https://cordis.europa.eu/project/id/646440> (Accessed: 7 December 2023).

²⁰Bieliauskaite, J. (2016) 'Performance Indicators for Smart Cities', *European DIGITAL SME Alliance*, 10 December. Available at: <https://www.digitalsme.eu/performance-indicators-smart-cities/> (Accessed: 7 December 2023).

²¹Mandl, C. and Kirschner, T. (2014) 'European Smart City Initiative Assessment of Best Practices to Stimulate Market-/ Demand-Pull', in. Available at: <https://doi.org/10.13140/2.1.4559.7449>.

²²Rotterdam, Umea and Glasgow: Generating Exemplar Districts In Sustainable Energy Deployment | Ruggedised Project | Results | H2020 (no date) CORDIS | European Commission. Available at: <https://cordis.europa.eu/project/id/731198/results> (Accessed: 11 December 2023).

in urban settings, these activities are significant since they focus on new energy policy orientations.²³ The EU's strategic focus on promoting innovation and design in smart city efforts is demonstrated by the significant attention and importance given to the European Smart City Lighthouse Projects.

5.1.3 European Union's Challenges in Advancing Smart Cities: Failures, Inabilities, and Significance in the European Context

However, challenges and reserved success have been the main result of the Union's past efforts for the advancement of SMART Cities, as mentioned above. Regarding implementing its smart cities strategy, the European Union (EU) has faced multiple hurdles, including dispersed support and trouble with public involvement. One significant challenge is that 75% of the participants indicated citizen aversion or lack of engagement.²⁴ This raises questions about how well these programs will succeed in meeting the priorities and concerns of the target population.

Several sceptics raise viable concerns about the viability of participation in the digitization efforts of the EU. The main goal of these approaches is to achieve "smartness," a coveted urban term that, in the European context, typically entails significant funding from the Union's programmes. It demonstrates how this political economy gives rise to a discursive production logic, which explains why a large number of smart city initiatives that have been or are aspiring to be successful in European grant applications typically overlook the viewpoint and interests of the general public.²⁵ Meaning that instances could exist, in which the participation status and progression of advancement towards SMART cities are undertaken as the main objective themselves, in essence, as a means of external funding, rather than a proactive effort of evolution and digitalization, thus excluding the central aspects, reasons and actors that the programmes are meant to serve.

This calls into question how these projects may be integrated into a coherent, pan-European plan and how scalable they can be. The EU's state-of-the-art evaluation of smart cities emphasizes the need for factual data and a thorough grasp of current projects.²⁶ The European Union may find it difficult to implement smart urban development policies and plans in the absence of a coherent strategy and consistent empirical evidence.

²³Tantau, A. and Şanta, A.-M.I. (2021) 'New Energy Policy Directions in the European Union Developing the Concept of Smart Cities', *Smart Cities*, 4(1), pp. 241–252. Available at: <https://doi.org/10.3390/smartcities4010015>.

²⁴Special report 24/2023: Smart cities– Tangible solutions, but fragmentation challenges their wider adoption' (no date) European Court of Auditors. Available at: <http://www.eca.europa.eu/en/publications/sr-2023-24> (Accessed: 8 December 2023).

²⁵Engelbert, J., van Zoonen, L. and Hirzalla, F. (2019) 'Excluding citizens from the European smart city: The discourse practices of pursuing and granting smartness', *Technological Forecasting and Social Change*, 142, pp. 347–353. Available at: <https://doi.org/10.1016/j.techfore.2018.08.020>.

²⁶Alaverdyan, D., Kučera, F. and Horák, M. (2018) 'Implementation of the Smart City Concept in the EU: Importance of Cluster Initiatives and Best Practice Cases', *International Journal of Entrepreneurial Knowledge*, 6, pp. 30–51. Available at: <https://doi.org/10.2478/ijek-2018-0003>.

6. Legal Framework

6.1 The Legal Landscape of Smart Cities and Digital Transition in the European Union

The profound and rapid nature of digitalization undoubtedly comes with a cost, and general suspicion to the greater public. The unprecedented surge of new opportunities, capabilities and interactions raises significant questions and fears about the ethical and legal arguments that can be made in an entirely new world of immeasurable potential and limitless possibilities. To tackle the distrust, preserve civilian freedom and liberties, as well as to foster and promote inclusion and equal digitalization the EU constantly evolves and revises both its legislation and strategies. The legal framework governing these initiatives is intricate and multifaceted, drawing from various legislative measures and directives.

6.2 The 2030 Digital Compass

The EU's 2030 Digital Compass represents a comprehensive policy framework aimed at guiding digital transformation within the European Union. One of its primary impacts on pre-existing legislation is evident through the introduction of digital principles rooted in primary EU law, notably the Treaty on the European Union.²⁷ The 2030 Digital Compass impacts the Treaty on the European Union, specifically the foundational principles of the EU. The digital principles articulated in the Digital Compass draw from and are rooted in the Treaty of the European Union, emphasizing values such as fundamental rights, non-discrimination, and the rule of law. These principles empower individuals in the digital realm, emphasizing a rights-based approach to digital technologies. The Digital Compass also outlines a governance framework, ensuring a coordinated effort through an annual cooperation cycle to achieve common digital objectives and targets.²⁸

The impact of the 2030 Digital Compass on European digital development is profound. By setting clear targets and principles, it aims to create a conducive environment for innovation while upholding fundamental rights. It represents a forward-looking strategy that recognizes the centrality of digitalization in the EU's future, positioning the region as a leader in the global digital landscape.

However, the framework's weaknesses may include potential challenges in implementation and enforcement. While the Digital Compass provides a roadmap, translating these ambitions into tangible regulatory and legislative actions may

²⁷ COMMUNICATION FROM THE COMMISSION TO THE EUROPEAN PARLIAMENT, THE COUNCIL, THE EUROPEAN ECONOMIC AND SOCIAL COMMITTEE AND THE COMMITTEE OF THE REGIONS 2030 Digital Compass: the European way for the Digital Decade (2021). Available at: <https://eur-lex.europa.eu/legal-content/en/TXT/?uri=CELEX%3A52021DC0118> (Accessed: 9 December 2023).

²⁸ Europe's Digital Decade – Questions and Answers (no date) European Commission - Available at: https://ec.europa.eu/commission/presscorner/detail/en/qanda_21_984 (Accessed: 9 December 2023).

encounter obstacles. Striking a balance between fostering innovation and safeguarding digital rights is a complex task, requiring careful calibration of legal measures.

6.3 The European Interoperability Framework for Smart Cities and Communities (EIF4SCC)

The European Interoperability Framework for Smart Cities and Communities (EIF4SCC) is a strategic initiative aimed at providing local administration leaders within the European Union with a comprehensive framework for interoperability in smart cities and communities.²⁹ The EIF4SCC, introduced in July 2021, encompasses definitions, principles, recommendations, and practical use cases to guide EU local administrations in fostering interoperability within their smart city projects. The primary objective is to create a standardized approach that enhances the integration and interaction of diverse smart city solutions, ensuring seamless collaboration and efficient service delivery.

The framework emphasizes the importance of interoperability in the context of smart cities, acknowledging the diverse range of technologies, systems, and stakeholders involved.³⁰ By offering practical use cases and recommendations, EIF4SCC aims to facilitate the development of interoperable smart city solutions, contributing to the overall advancement of European cities and communities.

6.4 The General Data Protection Regulation (GDPR)

The General Data Protection Regulation (GDPR) has significantly impacted pre-existing legislation by introducing a unified and comprehensive framework for data protection across the European Union. Its main strength lies in harmonizing rules, fostering digital privacy, and enhancing individuals' control over their data. The GDPR's foundational principles, outlined in Article 5³¹, emphasize lawfulness, fairness, transparency, purpose limitation, data minimization, accuracy, storage limitation, integrity, and confidentiality. These principles ensure that personal data processing is conducted ethically and responsibly, setting a higher standard for data protection.

One of the GDPR's key strengths is its extraterritorial reach, as stated in Article 3.³² This provision extends its applicability to businesses outside the EU that process the data of EU residents, creating a global impact. Additionally, the right to erasure (Article 17)³³ empowers individuals to request the deletion of their data, enhancing their control and

²⁹ Proposal for a European Interoperability Framework for Smart Cities and Communities (EIF4SCC) | Shaping Europe's digital future (2021). Available at: <https://digital-strategy.ec.europa.eu/en/news/proposal-european-interoperability-framework-smart-cities-and-communities-eif4scc> (Accessed: 9 December 2023).

³⁰ NetZeroCities (no date). Available at: <https://netzerocities.app/> (Accessed: 9 December 2023).

³¹ EUR-Lex - 32016R0679 - EN - EUR-Lex (no date). Available at: <https://eur-lex.europa.eu/eli/reg/2016/679/oj> (Accessed: 10 December 2023).

³² EUR-Lex - 32016R0679 - EN - EUR-Lex (no date). Available at: <https://eur-lex.europa.eu/eli/reg/2016/679/oj> (Accessed: 10 December 2023).

³³ EUR-Lex - 32016R0679 - EN - EUR-Lex (no date). Available at: <https://eur-lex.europa.eu/eli/reg/2016/679/oj> (Accessed: 10 December 2023).

privacy. The GDPR's emphasis on data breach notification (Article 33)³⁴ ensures timely disclosure, fostering transparency and accountability.

However, the legislation also exhibits weaknesses. Compliance can be burdensome, especially for small businesses, as seen in the ongoing assessment of national legislation mentioned in the European Commission report.³⁵ Striking a balance between robust data protection and the practicality of implementation remains a challenge. The one-size-fits-all approach may not accommodate diverse industries, potentially impeding innovation. In conclusion, the GDPR has reshaped the landscape of data protection, providing a robust framework with both strengths and weaknesses. Its strengths lie in harmonization, individual empowerment, and global applicability, while its weaknesses include compliance challenges and potential hindrances to innovation. The impact on European digital development is evident in increased data protection measures and a push for digital sovereignty. Striking a balance between privacy and innovation will be crucial for future amendments and the evolution of the GDPR.³⁶

6.5 NIS2 Directive and the Cyber Resilience Act

The NIS2 Directive and the Cyber Resilience Act (CRA) represent crucial developments in the European Union's cybersecurity landscape. NIS2, which will replace the existing NIS Directive, introduces cybersecurity requirements aimed at enhancing the resilience of essential and digital service providers. These measures encompass supply chain security and incident reporting obligations, contributing to a high common level of cybersecurity across the EU.³⁷ Simultaneously, the CRA, a part of these efforts, focuses on bolstering cyber resilience. It aligns with NIS2 to address emerging cybersecurity challenges and mandates organizations in various sectors to ensure cyber resilience, creating a comprehensive framework for cybersecurity in the EU.

The NIS2 Directive emphasizes supply chain security and incident reporting, reflecting a commitment to strengthening cybersecurity measures across essential and digital service providers. Meanwhile, the CRA complements NIS2 by fostering cyber resilience, ensuring organizations are prepared to withstand and recover from cyber threats.³⁸ This coordinated approach reflects the EU's dedication to creating a robust cybersecurity framework.

³⁴ EUR-Lex - 32016R0679 - EN - EUR-Lex (no date). Available at: <https://eur-lex.europa.eu/eli/reg/2016/679/oj> (Accessed: 10 December 2023).

³⁵ Coos, A. (2018) 'GDPR: The Pros and The Cons', Endpoint Protector Blog, 1 February. Available at: <https://www.endpointprotector.com/blog/gdpr-the-pros-and-the-cons> (Accessed: 10 December 2023).

³⁶ Data protection in the EU (2023). Available at: https://commission.europa.eu/law/law-topic/data-protection/data-protection-eu_en (Accessed: 10 December 2023).

³⁷ Cyber Resilience Act - Questions and Answers (no date) European Commission - European Commission. Available at: https://ec.europa.eu/commission/presscorner/detail/en/QANDA_22_5375 (Accessed: 10 December 2023).

³⁸ NIS 2 Directive (no date). Available at: <https://www.nis-2-directive.com/> (Accessed: 10 December 2023).

6.6 The Digital Markets Act (DMA) and the Digital Services Act (DSA)

The Digital Markets Act (DMA) and the Digital Services Act (DSA) are significant legislative initiatives within the European Union aimed at regulating the digital landscape. While both acts share the overarching goal of creating a safer and more user-centric digital environment, they differ in their primary focus and objectives.

The DMA concentrates on addressing competition concerns in digital markets. It seeks to ensure fair competition by imposing specific obligations on digital gatekeepers, such as large online platforms. These platforms are subject to rules regarding market dominance, interoperability, and data access. The DMA empowers regulators to intervene and address anti-competitive practices to foster a level playing field.³⁹

In contrast, the DSA primarily focuses on user protection, transparency, and accountability. It addresses issues related to harmful and illegal content online. The DSA introduces obligations for digital service providers to take proactive measures to detect and remove illegal content. It also emphasizes user empowerment by providing mechanisms to contest platform decisions that impact their digital experience.⁴⁰

While the DMA and DSA share the broader goal of enhancing the digital space, the DMA tackles competition concerns among digital gatekeepers, whereas the DSA aims to safeguard users and establish a framework for responsible digital services.

7. Main Discussion

7.1 Digital Transition

7.1.1 Global and European Trends

In recent years, the transition to the digital era has become a goal for developed economies and societies. Spreading across various aspects of public governance, finance, and society, moving onto a more digitalized tomorrow has become more crucial than ever. In the **global scene**, the digital transition is mostly apparent through the dominance of the ***Internet of Things (IoT), 5G Technologies, Artificial Intelligence (AI), and cybersecurity-related issues.***

More specifically, through the implementation and wide usage of the ***Internet of Things***, a vast majority of digital products, services, and systems are utilized through 'computing power, electronics miniaturization, and network interconnections to offer new capabilities not previously possible'.⁴¹ Through the IoT, citizens and consumers will see

³⁹Digital Markets Act - European Commission (2023). Available at: https://digital-markets-act.ec.europa.eu/index_en (Accessed: 10 December 2023).

⁴⁰The Digital Services Act package | Shaping Europe's digital future (2023). Available at: <https://digital-strategy.ec.europa.eu/en/policies/digital-services-act-package> (Accessed: 10 December 2023).

⁴¹ Rose, K., Eldridge, S. and Chapin, L. (no date) 'The Internet of Things: An Overview'.

their lives change for the better since the offered levels of connection and automation are expected to transform the economy, healthcare, energy management, and society, among others. Interconnected with the IoT are **5G Technologies**, which represent the newest and most advanced level of connectivity yet. 5th Generation Cellular technologies offer high-speed internet connectivity and access to multiple services for billions of users worldwide, whose digital needs could not be met via the previous cellular connection generation (4G Technology). 5G Technologies can enable machine-to-machine (M2M), device-to-device (D2D), and device-to-everything (D2E) communications, with low cost and high speed, allowing for the development of digital communications and all-time-high levels of interconnectivity and economic growth⁴².

Artificial Intelligence (AI) is one of the newest and most breakthrough tools of modern society in the fields of research and development⁴³. Using different methods, such as machine learning and learning by trial and error, and by analyzing immense amounts of data, AI models are enabled to proceed to reasoning, problem-solving, perceiving reality, diagnosing situations⁴⁴ and even solving complex mathematical problems, and discovering new stable materials⁴⁵, an incredible scientific breakthrough. Such levels of intelligence and development can be used to roadmap and fast-track societies' path to growth and sustainability.

However, the higher the level of digitalization, the more advanced the security concerns. The digital transition has faced intense scrutiny, due to a major escalation in **cybersecurity** threats and attacks, not only toward governments, institutions, and organizations but also against citizens⁴⁶. Data theft, malicious server attacks, and viruses are almost an everyday phenomenon affecting millions of people, and creating losses of millions of dollars⁴⁷. According to the Cyber Workforce Study 2023, conducted by the International Information System Security Certification Consortium (ISC2) research, 'the global cybersecurity workforce needs to grow by 73% to effectively defend organizations and critical assets, and roughly 4 million more skilled cybersecurity professionals are needed worldwide'⁴⁸.

In the **European Union**, the focus is set on achieving a just and sustainable digital transition through a new policy called **Europe's Digital Decade**. The Policy encompasses European values alongside new targets, objectives, programmes, and projects, and is set

⁴² Chettri, L. and Bera, R. (2020) 'A Comprehensive Survey on Internet of Things (IoT) Toward 5G Wireless Systems', *IEEE Internet of Things Journal*, 7(1), pp. 16–32. Available at: <https://doi.org/10.1109/IIOT.2019.2948888>.

⁴³ Hagendorff, T. and Wezel, K. (2020) '15 challenges for AI: or what AI (currently) can't do', *AI & SOCIETY*, 35(2), pp. 355–365. Available at: <https://doi.org/10.1007/s00146-019-00886-y>.

⁴⁴ *Artificial intelligence - Machine Learning, Robotics, Algorithms* | Britannica (2023). Available at: <https://www.britannica.com/technology/artificial-intelligence> (Accessed: 3 December 2023).

⁴⁵ *The Economist* (no date) 'A Google AI has discovered 2.2m materials unknown to science'. Available at: <https://www.economist.com/science-and-technology/2023/11/29/a-google-ai-has-discovered-22m-materials-unknown-to-science> (Accessed: 3 December 2023).

⁴⁶ *Cybersecurity | Digital Development* (2023) U.S. Agency for International Development. Available at: <https://www.usaid.gov/digital-development/cybersecurity> (Accessed: 3 December 2023).

⁴⁷ *The Latest Cyber Crime Statistics (updated December 2023) | AAG IT Support* (no date). Available at: <https://aag-it.com/the-latest-cyber-crime-statistics/> (Accessed: 3 December 2023).

⁴⁸ *Cybersecurity Workforce Study* (no date). Available at: <https://www.isc2.org/research> (Accessed: 3 December 2023).

to guide all actions related to digital matters⁴⁹. Also, in recent years, European states have implemented and developed *e-governance strategies* and platforms, aiming to maximize the benefits of accessible administration. The goal is to have all public services fully online by 2030⁵⁰. Additionally, to tackle privacy data issues, the European Union adopted in 2016 the General Data Protection Regulation (GDPR), which is ‘the strongest privacy and security law in the world⁵¹’. The Regulation safeguards the data protection rights of European citizens in the digital era, with clear limitations and the need for consent from a website to access private data, while also including sanctions for possible breaches. Last but not least, the Union has introduced the ‘Digital Europe Programme (DIGITAL)’, which aims to offer digital technology solutions to businesses, citizens, and public administration, through funding initiatives⁵². The DIGITAL programme accommodates both the goals of the green transition and the digital transition, which are often interlinked and referred to as the Twin Transition⁵³.

7.1.2 Addressing the Digital Divide

The digital divide is scientifically defined as ‘the gap between those who have and do not have access to computers and the Internet⁵⁴’. However, the issue is multifactorial and does not just concern access to computers and the internet. Instead, the digital divide is also affected by:

- Availability
- Affordability
- Quality of Provided Service
- Relevance⁵⁵

Such differences in access are not only found when comparing different countries or regions but also in the same city or even neighbourhood. According to the 2020 State of Broadband report by the UN’s Broadband Commission for Sustainable Development⁵⁶, 3.6 billion people in the world remain offline, while in the European Union in 2017 14% of households did not have internet access and by 2022, the percentage was halved to

⁴⁹ *Europe’s Digital Decade | Shaping Europe’s digital future* (2023). Available at: <https://digital-strategy.ec.europa.eu/en/policies/europes-digital-decade> (Accessed: 3 December 2023).

⁵⁰ *Eurostat: Take a guess!* (no date). Available at: <https://ec.europa.eu/eurostat/cache/interactive-publications/digitalisation/2023/01/> (Accessed: 3 December 2023).

⁵¹ *The general data protection regulation* (2022). Available at: <https://www.consilium.europa.eu/en/policies/data-protection/data-protection-regulation/> (Accessed: 3 December 2023).

⁵² *The Digital Europe Programme | Shaping Europe’s digital future* (2023). Available at: <https://digital-strategy.ec.europa.eu/en/activities/digital-programme> (Accessed: 3 December 2023).

⁵³ Diodato, D. *et al.* (2023) ‘Introduction to the special issue on “the twin (digital and green) transition: handling the economic and social challenges”’, *Industry and Innovation*, 30(7), pp. 755–765. Available at: <https://doi.org/10.1080/13662716.2023.2254272>.

⁵⁴ Van Dijk, J.A.G.M. (2006) ‘Digital divide research, achievements and shortcomings’, *Poetics*, 34(4–5), pp. 221–235. Available at: <https://doi.org/10.1016/j.poetic.2006.05.004>.

⁵⁵ Aguiar, C.M., João Paulo de Vasconcelos (2022) ‘What Is the Digital Divide?’, *Internet Society*, 3 March. Available at: <https://www.internetsociety.org/blog/2022/03/what-is-the-digital-divide/> (Accessed: 7 December 2023).

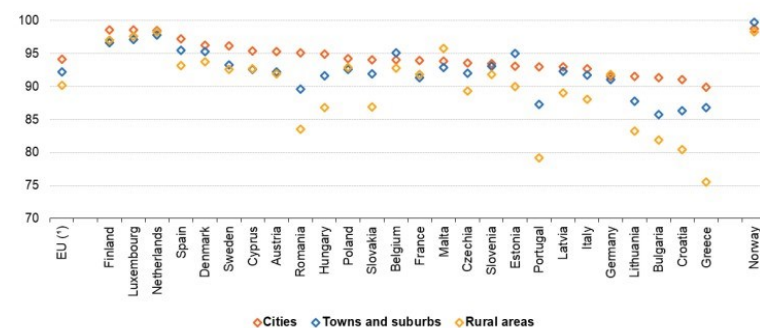
⁵⁶ ‘The State of Broadband 2020: Tackling Digital Inequalities’ (no date) *Broadband Commission*. Available at: <https://www.broadbandcommission.org/publication/the-state-of-broadband-2020/> (Accessed: 7 December 2023).

only 7%⁵⁷. The percentages of *access* are speculated to have risen by 7% in 5 years (2017-2022, access percentage increased from 85.81% to 92.44%) as a result of the public health crisis caused by the COVID-19 Pandemic.

However, even inside EU borders, the digital divide is apparent. According to 2022 data, the average European city household showcased an internet access percentage of 94%, whereas smaller towns and suburbs came close, with 92% of internet access. Lastly, the European rural areas had on average 90% internet coverage. It is also interesting to examine the disparities between European countries. In some countries, such as Finland and the Netherlands, the difference between cities, suburban regions and rural areas was as low as 1%. However, contrary to the European North, southern European countries, showed larger gaps, such as Greece and Portugal, with the gap between urban and rural households with access to the Internet reaching up to 14%⁵⁸.

The Nordic countries and Germany, two of the EU's northernmost members, have greater rates of technology adoption and the development of digital infrastructure.⁵⁹ There is a significant digital divide since southern nations like Greece, Bulgaria, and

Internet access in households by degree of urbanisation, 2022
(% of all households)



Note: ranked on overall internet access.
(*) Estimate
Source: Eurostat (online data code: isoc_ci_in_h)



Romania find it difficult to stay up with their northern counterparts. This difference makes it more challenging for the southern countries to take full advantage of technology breakthroughs, access educational resources, and engage fully in the digital economy.⁶⁰ The differences highlight the necessity of focused efforts and cooperative projects to close

⁵⁷ *Statistics / Eurostat* (no date). Available at: https://ec.europa.eu/eurostat/databrowser/view/isoc_ci_in_h/default/table?lang=en (Accessed: 7 December 2023).

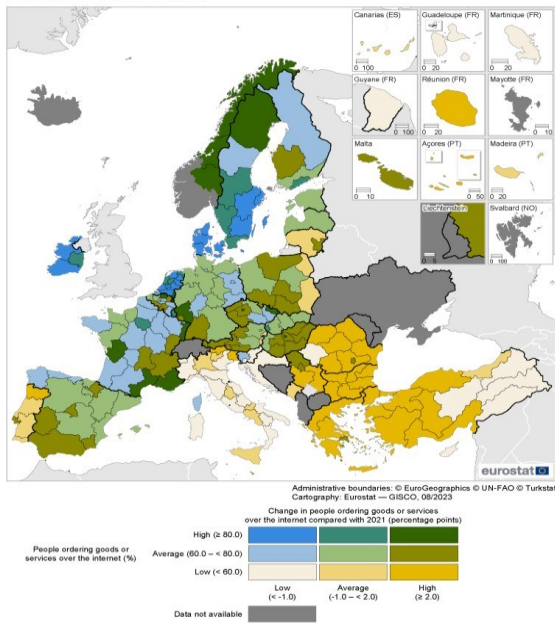
⁵⁸ *Digital economy and society statistics - households and individuals* (no date). Available at: https://ec.europa.eu/eurostat/statistics-explained/index.php?title=Digital_economy_and_society_statistics_-_households_and_individuals (Accessed: 7 December 2023).

⁵⁹ Demoussis, M. and Giannakopoulos, N. (2006) 'Facets of the digital divide in Europe: Determination and extent of internet use', *Economics of Innovation and New Technology*, 15(3), pp. 235–246. Available at: <https://doi.org/10.1080/10438590500216016>.

⁶⁰ Cruz-Jesus, F., Oliveira, T. and Bacao, F. (2012) 'Digital divide across the European Union', *Information & Management*, 49(6), pp. 278–291. Available at: <https://doi.org/10.1016/j.im.2012.09.003>.

the North-South digital divide and ensure a more equitable distribution of digital opportunities across the European Union.

People ordering goods or services over the internet for private use during the 12 months preceding the survey, 2022 (people aged 16–74, by NUTS 2 regions)



Note: Germany, Greece, Poland and Türkiye, NUTS level 1. Croatia: national data. Corse (FRM0): low reliability. Source: Eurostat (online data codes: isoc_3812_1 and isoc_9c_820)

In addition, the digital divide encompasses socioeconomic variables in addition to geographic divides. Higher earners and educated people are more likely to have access to cutting-edge technology and digital abilities, which creates a split between those who are proficient in these areas and those who find it difficult to traverse the digital world.⁶¹ Digitally literate people, for example, might actively engage in smart city projects and profit from creative urban solutions, while others may be excluded because they lack the necessary resources or skills.

The digital gap can be mitigated or exacerbated by government policies and efforts. Even though the EU has acknowledged how critical it is to address this problem, difficulties still exist. Coordinated efforts from the public and commercial sectors, NGOs, and other stakeholders are needed to close the gap.⁶² Nonetheless, the continuation of the difference is partly due to the fragmented character of support and the differing degrees of commitment among member states. The capacity to use digital technologies for growth in one's personal, professional, and social spheres is also included in the concept of the "digital divide," which goes beyond a simple lack of access to technology. Initiatives like Horizon 2020 seek to support smart cities in the context of regional development, but their effects on closing the digital gap are yet unclear. The Scalable Cities project, which involves 120 cities in smart city and community initiatives, demonstrates advancements as well as difficulties.⁶³ It is crucial to make sure that programs aimed at creating smart cities don't unintentionally deepen divisions by leaving out particular groups of people.

⁶¹ Recvlohe, C. (2021) 'How Smart Cities Succeed or Fail', *Dialogue & Discourse*, 25 January. Available at: <https://medium.com/discourse/how-smart-cities-succeed-or-fail-23b26cc58437> (Accessed: 8 December 2023).

⁶² *Bridging the digital divide in the European Union* (no date). Available at: <https://etradeforall.org/news/bridging-the-digital-divide-in-the-european-union/> (Accessed: 8 December 2023).

⁶³ *Scalable Cities | Smart Cities Marketplace* (no date). Available at: <https://smart-cities-marketplace.ec.europa.eu/scalable-cities> (Accessed: 11 December 2023).

7.2 Technology and Regional Development

7.2.1. Artificial Intelligence (AI) in SMART Cities

Artificial Intelligence (AI) plays a pivotal role in shaping the future of SMART Cities. In the future, AI can optimize transportation systems, reduce energy consumption, and enhance public safety. By analyzing vast datasets, AI enables predictive maintenance, ensuring the longevity of critical infrastructure. The gradual integration of AI into present-day urban life involves the implementation of smart grids, autonomous transportation, and intelligent public services. This phased approach allows for seamless adoption, minimizing disruptions while maximizing the benefits.⁶⁴

Two pivotal challenges AI adoption in urban living poses are **Privacy Concerns** and **Overreliance on Technology**. AI systems collect and analyze vast amounts of personal data to optimize services. Ensuring robust cybersecurity measures becomes paramount to protect sensitive information from potential breaches and misuse. Additionally, the ethical implications of AI decision-making raise questions about accountability and transparency. Moreover, the digital divide poses a challenge, as not all communities may have equal access to AI-driven services, exacerbating existing societal disparities. In the case of technology overreliance, while automation enhances efficiency, excessive dependence on AI may lead to job displacement and the erosion of traditional skills. Striking a balance between human expertise and AI capabilities is essential to prevent unintended social consequences.⁶⁵ Gradual integration, guided by ethical considerations and a focus on inclusivity, is key to ensuring a smooth transition into this AI-driven future. Addressing challenges such as privacy, cybersecurity, and the digital divide requires proactive measures, emphasizing the need for a holistic approach to harnessing the benefits of AI in SMART Cities.

7.2.2. Advancements in the Internet of Things (IoT): Shaping the Future of Urban Living

The Internet of Things (IoT) represents a revolutionary paradigm that promises to redefine urban living, creating smarter, more interconnected cities. As IoT technology advances, its potential to improve urban living in the future becomes increasingly evident. One key aspect is the optimization of city infrastructure, where IoT sensors and devices facilitate real-time monitoring of various parameters, such as traffic flow, energy consumption, and waste management. These insights enable city planners to make data-

⁶⁴ Herath, H.M.K.K.M.B. and Mittal, M. (2022) 'Adoption of artificial intelligence in smart cities: A comprehensive review', *International Journal of Information Management Data Insights*, 2(1), p. 100076. Available at: <https://doi.org/10.1016/j.ijime.2022.100076>.

⁶⁵ 'From IoT to AI: Discovering the Highlights of Smart Cities and Their Impact on Urban Living' (no date). Available at: <https://inclusioncloud.com/insights/blog/smart-cities-impact/> (Accessed: 13 December 2023).

driven decisions, leading to more efficient resource allocation and enhanced sustainability⁶⁶.

The gradual and viable introduction of IoT into our present lives involves the integration of smart devices into everyday objects and processes. For instance, smart home devices that utilize IoT technology enable residents to remotely control and monitor aspects like lighting, security systems, and energy consumption. This incremental approach allows individuals to experience the benefits of IoT in familiar settings, fostering acceptance and understanding. Similarly, in urban planning, the implementation of smart parking solutions and intelligent public transportation systems showcases how IoT can integrate into current infrastructure, making urban life more convenient and efficient.

However, amidst these promising advancements, challenges and traps emerge. Security and privacy concerns are paramount as the proliferation of interconnected devices creates an expansive attack surface for potential cyber threats. Safeguarding sensitive data and ensuring the resilience of IoT networks against malicious activities become imperative to prevent breaches and protect user privacy.⁶⁷ Additionally, the standardization of IoT protocols and interoperability issues pose hurdles to seamless integration, requiring collaborative efforts among industry stakeholders to establish unified frameworks.

7.2.3. Notable Case Studies

The synergy between the Internet of Things (IoT) and Artificial Intelligence (AI) is transforming SMART Cities, ushering in a new era of urban living. Notable case studies exemplify the potential and challenges of this integration. In **Barcelona**, the city leverages IoT sensors and AI algorithms to optimize traffic management, reducing congestion and enhancing overall mobility. This technological intervention has not only streamlined transportation but also significantly contributed to a more sustainable and livable urban environment.⁶⁸ Additionally, **Amsterdam's** innovative use of AI in waste management showcases the practical benefits of these advancements. By employing predictive analytics, the city optimizes garbage collection routes, reducing costs and environmental impact while improving overall operational efficiency.⁶⁹

The gradual and viable introduction of IoT and AI into present-day urban life is illustrated by **Singapore's** smart city initiatives. Through a phased approach, Singapore has integrated AI-driven solutions for energy management, water conservation, and

⁶⁶ Ullah, A. et al. (2023) 'Smart cities: the role of Internet of Things and machine learning in realizing a data-centric smart environment', *Complex & Intelligent Systems* [Preprint]. Available at: <https://doi.org/10.1007/s40747-023-01175-4>.

⁶⁷ Syed, A.S. et al. (2021) 'IoT in Smart Cities: A Survey of Technologies, Practices and Challenges', *Smart Cities*, 4(2), pp. 429–475. Available at: <https://doi.org/10.3390/smartcities4020024>.

⁶⁸ Ferrer, J.-R. (2017) 'Barcelona's Smart City vision: an opportunity for transformation', *Field Actions Science Reports*. The journal of field actions, (Special Issue 16), pp. 70–75

⁶⁹ Mancebo, F. (2020) 'Smart city strategies: time to involve people. Comparing Amsterdam, Barcelona and Paris', *Journal of Urbanism: International Research on Placemaking and Urban Sustainability*, 13(2), pp. 133–152. Available at: <https://doi.org/10.1080/17549175.2019.1649711>.

intelligent transportation systems. This step-by-step implementation not only minimizes disruption but also allows residents to experience the benefits firsthand, fostering acceptance and engagement.⁷⁰ However, challenges persist. In **London**, the use of AI in predictive policing has raised ethical concerns about privacy and biases in law enforcement algorithms. Striking a balance between leveraging AI for public safety and safeguarding individual rights remains a critical challenge in the advancement of SMART Cities.⁷¹

Furthermore, the interconnected nature of IoT devices poses cybersecurity risks, as seen in the case of **Vienna's** smart energy management. While optimizing energy consumption through AI, the city must navigate potential vulnerabilities and ensure robust cybersecurity measures to protect critical infrastructure.⁷² The integration of these technologies demands a comprehensive approach that addresses challenges related to privacy, ethics, and security, emphasizing the need for collaborative efforts between technology developers, policymakers, and the community.

7.2.4. Exploring Future Trends and Technologies

The future trajectory of smart cities is intricately tied to the evolution of **data analytics** and **machine learning (ML)** artificial intelligence (AI) technologies, paving the way for innovative possibilities in urban development. One notable trend is the widespread application of **big data analytics**, where vast datasets generated by urban environments are leveraged to derive actionable insights. Machine learning algorithms play a pivotal role in this context, enabling predictive analytics and pattern recognition. For example, predictive maintenance powered by machine learning can optimize city infrastructure, enhancing efficiency and reducing downtime. Self-learning algorithms, empowered by unsupervised machine learning, are gaining prominence. These algorithms adapt and evolve without explicit programming, fostering dynamic and responsive urban systems. An exemplary application is the use of AI in energy management, where machine learning algorithms optimize energy consumption based on historical data and real-time demand. This not only enhances resource efficiency but also contributes to the overall sustainability of the city.

Machine learning (ML) looks promising in revolutionizing various facets of our future, with profound impacts across industries and societal domains. As we delve into the potential of ML, it becomes evident that its influence extends far beyond current

⁷⁰ Cavada, M., Tight, M.R. and Rogers, C.D.F. (2019) '14 - A smart city case study of Singapore—Is Singapore truly smart?', in L. Anthopoulos (ed.) *Smart City Emergence*. Elsevier, pp. 295–314. Available at: <https://doi.org/10.1016/B978-0-12-816169-2.00014-6>.

⁷¹ Anthopoulos, L. (2017) 'Smart utopia VS smart reality: Learning by experience from 10 smart city cases', *Cities*, 63, pp. 128–148. Available at: <https://doi.org/10.1016/j.cities.2016.10.005>.

⁷² Roblek, V. (2019) '5 - The smart city of Vienna', in L. Anthopoulos (ed.) *Smart City Emergence*. Elsevier, pp. 105–127. Available at: <https://doi.org/10.1016/B978-0-12-816169-2.00005-5>.

applications. The integration of ML in urban planning, as highlighted in recent studies⁷³, showcases its capacity to optimize land use, predict population trends, and inform sustainable development. Beyond urban planning, machine learning is anticipated to play a pivotal role in the evolution of healthcare. Innovations such as predictive analytics for disease diagnosis and personalized treatment plans are at the forefront of ML's transformative potential. Moreover, the field of intelligent urbanism underscores the interconnectedness of technological progress and urban development, emphasizing how a concentrated effort to cultivate AI can shape the cities of the future.⁷⁴

Additionally, the intersection of ML with emerging technologies like quantum computing opens new frontiers, offering unprecedented computational power for complex problem-solving. In the financial sector, the future of ML involves enhancing fraud detection, risk management, and personalized financial services. The ability of ML models to analyze intricate patterns in financial data contributes to more accurate decision-making and tailored customer experiences.

A particular type of machine learning called "**deep learning**" uses multi-layered neural networks, or "deep neural networks," to find and extract complex patterns from massive datasets. The future will be greatly impacted by this advanced approach to artificial intelligence. According to an in-depth examination, deep learning has the potential to completely transform a number of industries, including eLearning, by offering more economical and effective solutions for higher education.⁷⁵ The integration of deep learning with the Internet of Things (IoT) is being studied in the context of smart cities.

Deep learning is expected to see significant advancements as the discipline continues to expand and be researched, with trends and new applications defining its future.⁷⁶

Notably, issues are being addressed and methods are changing to keep deep learning at the forefront of technological innovation. In the context of machine learning applications, the potential of deep learning to influence future urban development is highlighted. Machine learning-powered urban planning tools have the potential to offer historical context, which will be crucial for making sensible choices as smart cities develop.⁷⁷ Future applications of deep learning may include improved natural language processing, climate

⁷³ Herath, H.M.K.K.M.B. and Mittal, M. (2022) 'Adoption of artificial intelligence in smart cities: A comprehensive review', *International Journal of Information Management Data Insights*, 2(1), p. 100076. Available at: <https://doi.org/10.1016/j.ijime.2022.100076>.

⁷⁴ Yan, Z. et al. (2023) 'Intelligent urbanism with artificial intelligence in shaping tomorrow's smart cities: current developments, trends, and future directions', *Journal of Cloud Computing*, 12(1), p. 179. Available at: <https://doi.org/10.1186/s13677-023-00569-6>.

⁷⁵ Muniasamy, A. and Alasiry, A. (2020) 'Deep Learning: The Impact on Future eLearning', *International Journal of Emerging Technologies in Learning (IJET)*, 15, p. 188. Available at: <https://doi.org/10.3991/ijet.v15i01.11435>.

⁷⁶ Understanding the Future of Deep Learning (no date). Available at: <https://www.turing.com/kb/understanding-the-future-of-deep-learning> (Accessed: 15 December 2023).

⁷⁷ Koutra, S. and Ioakimidis, C.S. (2023) 'Unveiling the Potential of Machine Learning Applications in Urban Planning Challenges', *Land*, 12(1), p. 83. Available at: <https://doi.org/10.3390/land12010083>.

modelling, and tailored healthcare, demonstrating the adaptability and wide-ranging effects of this cutting-edge AI paradigm.

7.2.5. Role of Public-Private Partnerships

The EU's commitment to promoting innovation and sustainability is in line with the use of public-private partnerships in the creation of smart cities. PPPs may speed up the adoption of cutting-edge technologies like artificial intelligence and promote digital transformation by facilitating the inflow of resources and private sector experience. Smart city projects might alleviate the budgetary restrictions sometimes encountered by governmental bodies by utilizing private contributions. PPPs' collaborative character fosters information sharing, which helps the EU fully use automation and artificial intelligence (AI) for resource management, urban efficiency, and enhanced citizen services.⁷⁸

7.2.5.1 Positives and Negatives:

7.2.5.1.1 Advantages:

- **Innovation and Experience:** Promising PPPs frequently make use of the experience and creativity of private organizations, delivering state-of-the-art responses to urban problems.
- **Efficiency in Implementation:** Decision-making procedures are streamlined through collaborations, which makes project implementation more effective.
- **Financial viability:** The implementation of significant smart city projects is made possible by private investments, which lessen the strain on the state's budget.

7.2.5.1.2 Problems:

- **Absence of Public Involvement:** Inadequate public consultation is a common cause of failures, since it can give rise to resistance and ultimately project failure.
- **Financial hazards:** Reliance excessively on private funding may lead to conflicts of interest and financial hazards that compromise the long-term viability of the enterprise.
- **Data Privacy Issues:** Unresolved privacy issues have been shown to breed public mistrust, as seen by initiatives where citizen data usage was not sufficiently protected.

PPPs offer a structure that enables public and private organizations to work together to navigate the complicated world of emerging technologies as smart cities move toward increased automation and digitization. The European Union's focus on sustainability and inclusion corresponds with PPPs' collaborative nature, promising that the advantages of

⁷⁸ Jayasena, N.S., Chan, D.W.M. and Kumaraswamy, M.M. (2022) 'Is Public-Private Partnership (PPP) a Preferred Strategy for Procuring Smart Infrastructure in Developed Countries: An Empirical Study of the Perceived Benefits, Barriers and Recommended Strategies', *Sustainability*, 14(11), p. 6421. Available at: <https://doi.org/10.3390/su14116421>.

automation and artificial intelligence are shared fairly among a range of urban populations.⁷⁹ Nevertheless, managing the convoluted issues of data privacy, governance, and public-private partnerships transparency are challenges that must be carefully managed to guarantee the ethical and responsible integration of technology into the European Union's urban fabric.

7.3. Social and Environmental Impact

7.3.1 Citizen Engagement: Fostering Innovation Ecosystems

The concept of SMART cities has gained considerable attention due to its unique characteristics and its ability to perform tasks autonomously, independently and quickly, while calculating the best type of service for its citizens. According to an analysis conducted by Business School students of the Qingdao University of Technology and the Chengdu University of Technology in China, 'these smart characteristics include smart governance (related to participation), smart people (related to social and human capital), smart environments (related to natural resources), smart mobility (related to transport and ICT), smart economy (related to competitiveness) and smart living (related to quality of life)⁸⁰'. Yet, since SMART cities were created mainly with the goal of being people-oriented, one of the best ways to provide citizens with high-quality amenities and services is by promoting citizen engagement in policy- and decision-making.

In Europe, more and more cities are taking a turn towards implementing SMART tactics and strategies, in order to elevate living standards. Amsterdam, London, and Paris are three European cities that have since 2015 been ranking continuously in the Top 20 Global Innovation Cities™ Index⁸¹, since they have implemented smart digital strategies and tools in the workspace, transportation, industry and business sectors⁸².

In the process of optimising the services provided in and by SMART cities and boosting citizen engagement, a main stakeholder is digital innovation hubs (DIHs), backed up by the idea that 'whatever the problem community is the answer'. DIHs are according to the European Commission 'orchestrators that connect stakeholders of regional ecosystems to support the digital transformation⁸³'. Citizen engagement can be promoted through cooperation with the DIHs, by creating 'living lab services'. Those services simulate real-

⁷⁹ Voorwinden, A. (2021) 'The privatised city: technology and public-private partnerships in the smart city', *Law, Innovation and Technology*, 13(2), pp. 439–463. Available at: <https://doi.org/10.1080/17579961.2021.1977213>.

⁸⁰ Zhu, W., Yan, R. and Song, Y. (2022) 'Analysing the impact of smart city service quality on citizen engagement in a public emergency', *Cities*, 120, p. 103439. Available at: <https://doi.org/10.1016/j.cities.2021.103439>.

⁸¹ billr (2023) *Innovation Cities™ Index 2022-2023: Global 500 World's Most Innovative Cities, Innovation Cities™ Index / World 500 City Rankings*. Available at: <https://innovation-cities.com/worlds-most-innovative-cities-2022-2023-city-rankings/26453/> (Accessed: 8 December 2023).

⁸² Vallicelli, M. (2018) 'Smart cities and digital workplace culture in the global European context: Amsterdam, London and Paris', *City, Culture and Society*, 12, pp. 25–34. Available at: <https://doi.org/10.1016/j.ccs.2017.10.001>.

⁸³ *Digital Innovation Hubs: helping companies across the economy make the most of digital opportunities — Brochure / Shaping Europe's digital future* (2019). Available at: <https://digital-strategy.ec.europa.eu/en/library/digital-innovation-hubs-helping-companies-across-economy-make-most-digital-opportunities-brochure> (Accessed: 8 December 2023).

life scenarios and allow the creation of innovative new approaches, policies and start-ups through cooperation and innovation. Such cases have already been observed in Romania, the Netherlands and Israel⁸⁴. Such services could also allow citizens to report problems in their regions or provide them with a preview of planned changes and the ability to comment on those possible changes (concept of a Digital Twin SMART City)⁸⁵.

7.3.2 A just and inclusive transition

‘Whether technology becomes an empowering force for good or a sower of more division and exclusion will depend on the choices we make now’. These were the words of Achim Steiner, UNDP Administrator at the First Regular Session of the UNDP Executive Board 2023. As the years go by, and achieving the goals of sustainable development (SDGs) becomes more and more crucial, the digital transition is considered one of the most powerful tools in the toolbox of policymakers and the general public, which could further aid the progress towards the SDGs, yet at the same time, not everyone is able to benefit from the transitions. Not only do millions of people lack access to digital tools and the Internet of Things, but they are also at a much higher risk of falling behind on digital transformation and becoming even more vulnerable due to the lack of their digital skills⁸⁶. To fully benefit from the digital transition, we need to steer clear of discrimination and include all members of society, disregarding their socioeconomic status.

A just and equal sustainable transition includes equal opportunities through policy-making and legislative procedure, funding and investing, especially in defavored regions and taking into consideration the marginalised and opportunity-lacked persons. The European Union has launched quite a few activities to improve digital inclusion within its borders, such as the Digital Education Action Plan, which provides students and education personnel with ‘Technologies for Learning and Skills⁸⁷’, yet neither is there any significant change nor are the elderly or the disadvantaged mentioned in any project. Another point of the EU’s Digital Inclusion strategy would be to promote social inclusion projects to boost the participation of disadvantaged and marginalised members of the public socially and economically⁸⁸, yet no specific action has been taken yet. The issue is

⁸⁴Lepore, D., Testi, N. and Pasher, E. (2023) ‘Building Inclusive Smart Cities through Innovation Intermediaries’, *Sustainability*, 15(5), p. 4024. Available at: <https://doi.org/10.3390/su15054024>.

⁸⁵White, G. et al. (2021) ‘A digital twin smart city for citizen feedback’, *Cities*, 110, p. 103064. Available at: <https://doi.org/10.1016/j.cities.2020.103064>.

⁸⁶*Three ways digital transformation accelerates sustainable and inclusive development* (no date) UNDP. Available at: <https://www.undp.org/blog/three-ways-digital-transformation-accelerates-sustainable-and-inclusive-development> (Accessed: 11 December 2023).

⁸⁷*Funding & tenders* (no date). Available at: <https://ec.europa.eu/info/funding-tenders/opportunities/portal/screen/opportunities/topic-details/ict-22-2016> (Accessed: 11 December 2023).

⁸⁸*Digital inclusion | Shaping Europe’s digital future* (2023). Available at: <https://digital-strategy.ec.europa.eu/en/policies/digital-inclusion> (Accessed: 11 December 2023).

prominent; while some people move along with the digital transition, others lack the necessary means to follow up.

7.3.3 SMART Cities and Sustainability

The concepts of SMART cities and sustainability are closely correlated since one of the main goals of SMART cities is to promote sustainability and reach sustainable development goals. Simultaneously, digital tools and advanced technology allow for better implementation of sustainable practices and a higher level of citizen happiness, since ‘the analyses show that the smart environment associated with green spaces, air pollution control, and recycling services could influence happiness’⁸⁹. With only 6 years left to achieve the UN Sustainable Development Goals (2030), the European Union has so far, according to the ‘Sustainable Development in the European Union — monitoring report on progress towards the SDGs in an EU Context, 2023 edition’⁹⁰, published by Eurostat, has made moderately favourable progress towards the goal of sustainable cities and communities (SDG11), and more progress is expected. More specifically, the 11th Sustainable Development Goal, ‘Make cities and human settlements inclusive, safe, resilient and sustainable’, has targets promoting sustainability in urbanisation, transportation, housing and settlement planning, reducing the environmental impact and waste of cities, among others⁹¹. The European Commission, through Eurostat, has created a digital platform (SDGs & me⁹²), to allow for visualisation of the realisation and the progress of each goal in each Member State and the Union. Through the platform, citizens can be informed about the progress in sustainable development and what can they do to further pursue and implement sustainable practices, with help from yearly EU reports.

But first, we need to realise what a sustainable smart city truly is. According to a 2022 paper⁹³, after careful consideration of many studies, there are at least 6 dimensions taken into consideration to turn a city into a smart sustainable one. These dimensions are:

- smart living
- smart environment
- smart mobility
- smart economy
- smart people

⁸⁹ Chen, C.-W. (2023) ‘Can smart cities bring happiness to promote sustainable development? Contexts and clues of subjective well-being and urban livability’, *Developments in the Built Environment*, 13, p. 100108. Available at: <https://doi.org/10.1016/j.dibe.2022.100108>.

⁹⁰ 2023 report on Sustainable Development Goals (no date) European Commission - European Commission. Available at: https://ec.europa.eu/commission/presscorner/detail/en/ip_23_2887 (Accessed: 18 December 2023).

⁹¹ Goal 11 | Department of Economic and Social Affairs (no date). Available at: <https://sdgs.un.org/goals/goal11> (Accessed: 18 December 2023).

⁹² EUROSTAT (no date) *Sustainable Development Goals (SDGs) and me - 2023 edition, Sustainable Development Goals (SDGs) and me - 2023 edition*. Available at: <https://ec.europa.eu/eurostat/cache/visualisations/sdgs/> (Accessed: 18 December 2023).

⁹³ Ibid. 86

- smart governance

In the European Union, SMART city actors are brought together in a digital platform, called 'Smart Cities Marketplace', a 'major market-changing undertaking that aims to bring cities, industries, SMEs, investors, banks, researchers and many other smart city actors together.⁹⁴ The platform allows for stakeholders to find innovative offers and sustainable solutions regarding smart development, sustainable transportation, policy creation and management, and sharing of knowledge and best practices, and facilitates innovation, sustainability and transition. The Marketplace also provides focus and discussion groups, which work on specific issues and 'allow for the exchange of views and opinions between participants and experts' as well as the 'Green Cities Wiki', which provides access to various dimensions of sustainable growth and SMART cities.

7.3.4 Addressing Workforce Development and Skills

As we have entered the digital era, more and more cities are making efforts to implement smart strategies and policies, to transform the everyday lives of the citizens and promote technology, innovation and sustainability. The digitalisation of cities also creates new employment opportunities and circumstances in the labour market, for which the employees may not be ready or adequately skilled. In SMART cities, due to the high rate of automation and digital technologies, workers are able to focus more on challenging problems and complex tasks, yet due to the same factors, many other workers are expected to lose their jobs and their job positions-many of which were the base of the 20th-century middle class⁹⁵- are expected to be eliminated completely.

The main issue is that SMART cities require skilled workers in fields that are quite specialised, such as AI data analysis, programming, digital policy creation, digital ethics management and circular economy officers, to name a few⁹⁶. And as more and more cities are turning SMART, the need for specialised workforce is increasing and the existing personnel does not possess the necessary skills. This issue is quite complex and requires both reskilling of already existing labourers and inviting new professionals to join the new and advanced skills. Especially since the trend of SMART cities is becoming the new norm and since 68% of the world population is expected to live in urban areas by 2050⁹⁷, it is crucial to find ways to equip the cities with the needed professionals and experts.

The first step is ensuring that all members of a SMART city's workforce have digital literacy skills, so as to be able to follow up with the digital transition, understand the innovative technology and get efficiently re-integrated into an ever-so-evolving labour

⁹⁴ *Smart cities - European Commission* (no date). Available at: https://commission.europa.eu/eu-regional-and-urban-development/topics/cities-and-urban-development/city-initiatives/smart-cities_en (Accessed: 18 December 2023).

⁹⁵ *Cities' Role in the Future of the Workforce* (no date) GovTech. Available at: <https://www.govtech.com/workforce/Cities-Role-in-the-Future-of-the-Workforce.html> (Accessed: 19 December 2023).

⁹⁶ *Smart Cities: 5 New Jobs they are Creating* | .cult by Honeypot (no date). Available at: <https://cult.honeypot.io/reads/smart-cities-5-new-jobs-they-are-creating> (Accessed: 19 December 2023).

⁹⁷ Ritchie, H. and Roser, M. (2023) 'Urbanization', *Our World in Data* [Preprint]. Available at: <https://ourworldindata.org/urbanization> (Accessed: 19 December 2023).

market. Digital education needs to be accessible to all, through education in the national education institutes for students, but also accessible to the general public through public projects, information days and informatics classes available online or in public spaces. Additionally, providing vocational education and training and allowing for the collaboration of educational institutes, regional administrators and the general public, could allow for better preparation of the workforce to withstand the new changes and digital challenges, while also keeping in mind the 'social and environmental responsibilities of the green transition'⁹⁸. Of course, technology companies have a major role in digitalisation and the transformation of cities as we know them. Therefore, alongside educational institutions, they can also offer reskilling and re-educational programmes⁹⁹, in order to speed up the process of training employees and informing the general public regarding the rapid changes in communities, the new possibilities and the new tools of SMART cities.

Last but not least, the European Union could be a major stakeholder in providing the European workforce with the necessary skills for the rapidly changing and evolving SMART Europe. Through education, re- and upskilling programmes, the EU can act as a catalyst in providing adults with new knowledge and competencies, employability and continuous education. The EU introduced the concept of lifelong learning, which offers possibilities for both formal and informal education, to promote education that is not restricted to the years of mandated education. Digital literacy and cyber skills could also be incorporated into lifelong learning in order to improve participation and access in the new SMART city systems and the contemporary digital job market. Additionally, the member states can support education, the development of digital skills, and vocational learning through national initiatives and decentralised EU organisations.

7.3.5 Economic Opportunities

In addition to the evolution of SMART cities, a wave of economic prospects has emerged, transforming them into financial hubs with boundless potential. The swift digitization of urban areas has opened up fresh market avenues, particularly for targeted investments in smart and cyber technologies. SMART cities offer an expansive canvas for deploying digital technology across all facets of life, spanning autonomous recycling systems and solar-powered traffic signs to real-time data analysis and issue reporting. This necessitates investments in infrastructure construction and updates for city projects. Furthermore, SMART cities present an opportunity to address local unemployment rates by creating employment prospects in technology, analytics, and information management. Collaboration with local businesses and enterprises, along with a focus on sustainability, becomes essential in this endeavor. Although this approach mandates a

⁹⁸Fitsilis, P. *et al.* (2023) 'Skilling Up for Tomorrow's Cities: The Workforce of Smart Cities', *Qeios* [Preprint]. Available at: <https://doi.org/10.32388/I2L0CB.2>.

⁹⁹Ercan, T. and Kutay, M. (2022) 'Chapter 13 - Training professional smart city workforces through a partnership with technology firms', in J. R.Vacca (ed.) *Smart Cities Policies and Financing*. Elsevier, pp. 181–196. Available at: <https://doi.org/10.1016/B978-0-12-819130-9.00005-X>.

robust education system promoting digital skills and inclusivity, the true SMART cities are those effectively leveraging technological and informational advantages to stimulate inclusive economic growth. Public-Private Partnerships emerge as another avenue for economic opportunities in SMART cities. By establishing entrepreneurial hubs and implementing precise development plans, one can anticipate an upswing in the GDP of SMART cities, fostering more resilient and tightly-knit communities. Of course, through sustainable and smart practices in the sectors of communications (5G networks with high capacity and low latency), transportation (green vehicles, solar-powered traffic signs, traffic and accident sensors) and energy (smart grids, smart lighting, solar and wind-powered buildings), cities can reduce their operation costs by millions per year, freeing up money and resources¹⁰⁰, which can be then utilised for further investment and creation of employment opportunities.

7.4 Risks and Challenges

7.4.1 Anticipating Challenges and Risks

The utilisation of advanced technologies and the Internet of Things (IoT) have allowed SMART cities to emerge and blossom into a solution for the challenges correlated to the rapid growth of urban populations¹⁰¹. Yet, because the concept of SMART cities is still maturing and evolving, the interlinked risks are still being examined and weighed against the benefits of this new digital urban project.

Given the fact that SMART cities call for intricate, detailed and sustainably designed SMART infrastructure, policymakers and administrators need to take into account the costs; and not only the cost of construction but also the costs of operation and maintenance. SMART cities rely on digital systems, power grids, networks and sensors, which require quite a delicate installation, operation and maintenance, in order for the financial and social benefits to actually emerge. And given the fact that even the minimal

¹⁰⁰ 'Smart Cities Technologies: Driving Economic Growth and Community Resilience' (no date) *Federation of American Scientists*. Available at: <https://fas.org/publication/smart-cities-technologies-driving-economic-growth-and-community-resilience/> (Accessed: 20 December 2023).

¹⁰¹ Silva, B.N., Khan, M. and Han, K. (2018) 'Towards sustainable smart cities: A review of trends, architectures, components, and open challenges in smart cities', *Sustainable Cities and Society*, 38, pp. 697–713. Available at: <https://doi.org/10.1016/j.scs.2018.01.053>.

operation costs are high and demanding, 'cost optimization throughout the lifetime of a smart city is still a quite challenging task'¹⁰².

Although SMART cities preach sustainable practices, it is crucial to examine the issue of waste management. Such an issue is of utmost importance, especially if we consider that, according to Eurostat, in 1995 the EU waste generated by municipalities would be

467 kilograms per capita, while in 2021 this figure has been raised to 527 kilograms, an increase of 12.9%¹⁰³. However, it is important to note that although the generated waste per capita has increased, the waste that is being discarded to landfills has decreased by 55% (285 kilograms per capita in 1995 to 121 kilograms)¹⁰⁴, which means that European municipalities implemented different tactics of waste management, such as recycling and composting. SMART, via the usage of digital technologies, are charged with the responsibility of sustainable waste management and further lowering the amount of waste they produce.

Last but not least, SMART cities make extensive use of AI and automation, which will lead people to adopt new practices and look for new career options, since because of digitization, AI and automation, 1.7 million manufacturing jobs have been lost since 2000¹⁰⁵ and it is estimated that between 400 and 800 million people could be fired by 2030. Out of them, between 75 and 375 million will need to adjust to new careers¹⁰⁶. Therefore, policymakers and administrators of these new urban structures need to be ready to face high percentages of unemployment, digital illiteracy and lack of skills necessary for employment.

Municipal waste generated, in selected years, 1995-2021
(kg per capita)

	1995	2000	2005	2010	2015	2020	2021	Change 2021/1995 (%)
EU	467	513	506	503	480	521	527	12.9
Belgium	455	471	482	456	412	729	755	66.0
Bulgaria	094	612	588	554	419	408	445	-36.0
Czechia	302	335	289	318	316	543	570	88.8
Denmark	521	664	736	758	822	814	769	47.6
Germany	623	642	565	602	632	641	620	-0.5
Estonia	371	453	433	305	359	383	395	6.4
Ireland (*)	512	599	731	624	557	644	644	25.7
Greece (*)	303	412	442	532	488	524	524	72.8
Spain	505	653	588	510	456	464	472	-6.6
France	475	514	529	534	516	538	565	18.8
Croatia	220	262	336	379	393	418	447	103.6
Italy	454	509	546	547	486	487	495	9.1
Cyprus	595	628	688	695	620	609	633	6.5
Latvia	264	271	320	324	404	478	461	74.5
Lithuania	426	365	387	404	448	483	480	12.7
Luxembourg	587	654	672	679	607	790	793	35.0
Hungary	460	446	461	403	377	403	416	-9.5
Malta	387	533	625	623	641	643	611	57.6
Netherlands	539	598	599	571	523	533	515	-4.6
Austria	437	580	575	562	560	834	835	90.9
Poland	285	320	319	316	286	346	362	27.3
Portugal	352	457	452	516	460	513	513	45.6
Romania	342	355	383	313	247	290	302	-11.8
Slovenia	596	513	494	490	449	487	511	-14.3
Slovakia	295	254	273	319	329	478	497	68.5
Finland	413	502	478	470	500	611	630	52.6
Sweden	386	425	479	441	451	431	418	8.3
Iceland	426	462	516	484	588	614	659	55
Norway	624	613	426	469	422	604	799	27.9
Switzerland	602	659	664	711	728	706	704	16.9
United Kingdom (*)	498	577	581	599	463	463	463	0
Bosnia and Herzegovina	..	..	..	340	352	..	..	..
Montenegro (*)	..	..	..	494	530	486	515	..
North Macedonia	..	..	..	381	441	441	459	..
Albania	..	..	..	491	369	311	311	..
Serbia	..	..	..	363	259	427	442	..
Türkiye	441	465	458	410	424	415	416	-6
Kosovo (*)	..	..	..	..	252	255	270	..

(*) 2020 data instead of 2021.
 (*) 2019 data instead of 2020 and 2021.
 (*) 2018 data instead of 2020.
 (*) 2012 data instead of 2010.
 Note: data presented in italic are estimated.
 (*) This designation is without prejudice to positions on status, and is in line with UNSCR 1244/1999 and the ICJ Opinion on the Kosovo Declaration of Independence
 Source: Eurostat (online data code: env_wasmun)



¹⁰² Ibid 109

¹⁰³ *Municipal waste statistics* (no date). Available at: https://ec.europa.eu/eurostat/statistics-explained/index.php?title=Municipal_waste_statistics (Accessed: 21 December 2023).

¹⁰⁴ Ibid 111

¹⁰⁵ Correspondent, C.K.P. (2019) 'Robots to wipe out 20 million jobs around the world by 2030: Study', *The Straits Times*, 26 June. Available at: <https://www.straitstimes.com/tech/robots-to-wipe-out-20-million-jobs-around-the-world-by-2030-study> (Accessed: 3 December 2023).

¹⁰⁶ *What the future of work will mean for jobs, skills, and wages: Jobs lost, jobs gained* | McKinsey (no date). Available at: <https://www.mckinsey.com/featured-insights/future-of-work/jobs-lost-jobs-gained-what-the-future-of-work-will-mean-for-jobs-skills-and-wages> (Accessed: 3 December 2023).

7.4.2 Privacy and Security Concerns

SMART cities are mainly driven by cameras, sensors, and data analysis, which allow for a better citizen experience and optimal and autonomous decision-making; yet, all of these digital systems call for the utilisation of citizen information and constant surveillance. How do smart cities address the privacy and security concerns their digital systems generate?

First of all, SMART cities run on data. From security camera footage to traffic sensors, most forms of SMART technology require processing data. This processing is often done by third parties, who are considered as 'trusted agents'. However, can be 'highly sensitive citizen data' and vulnerable to security threats, such as data leaks, which can be difficult to prevent, detect and control¹⁰⁷. Another privacy issue is that, since citizens use personal devices, such as mobile phones and personal computers, to access SMART city services, their private devices are also at risk of surveillance and data theft, in case of a malicious cyberattack¹⁰⁸.

Another concerning issue is data storage. Even if citizens provide their data and personal information, it is not always possible to specify how this data will be used or if it will be used for its original cause. The lack of transparency is not just centred around if and where the data will be stored, but also if the information will be provided to third parties without the citizens' consent¹⁰⁹. And although the European Union has one of the strongest data protection regulations in the world, it is still uncertain if the GDPR Regulation is adequate, to minimise the use and processing of private information collected in SMART cities.

However, the issue has more aspects. Especially in SMART cities, public sector actors often share data between them, since the need for collaboration is even higher, data transmission across public stakeholders is common and often involves techniques such as data integration and data mashup. Although these techniques are designed to allow data sharing, without fully compromising data privacy, they often face scrutiny for failing to protect sensitive information and allowing for re-identification of some citizens¹¹⁰. Data transmission, integration and mashup are procedures that citizens are not always fully informed of, due to the lack of transparency and they can lead to misuse of personal information, such as health records and financial statements.

Lastly, the cases of cyber attacks in recent years have multiplied and at the end of 2020, the yearly cost of cybercrime reached €5.5 trillion, twice the figure of 2015. Cyber threats can emerge in various ways such as Distributed denial-of-service (DDoS) threats, malware, IoT threats, and attacks on the supply chains. In the European Union, Russian

¹⁰⁷ Papadimitriou, P. and Garcia-Molina, H. (2011) 'Data Leakage Detection', *IEEE Transactions on Knowledge and Data Engineering*, 23(1), pp. 51–63. Available at: <https://doi.org/10.1109/TKDE.2010.100>.

¹⁰⁸ Ibid 109

¹⁰⁹ van Zoonen, L. (2016) 'Privacy concerns in smart cities', *Government Information Quarterly*, 33(3), pp. 472–480. Available at: <https://doi.org/10.1016/j.giq.2016.06.004>.

¹¹⁰ Braun, T. *et al.* (2018) 'Security and privacy challenges in smart cities', *Sustainable Cities and Society*, 39, pp. 499–507. Available at: <https://doi.org/10.1016/j.scs.2018.02.039>.

attacks have also become more frequent since the Russian invasion of Ukraine in 2022¹¹¹. Because SMART cities and their systems are continuously connected to the IoT, they are also more vulnerable to cyber-attacks and threats and need to be protected adequately, so as to allow for all of the procedures to run smoothly and undisturbed and to not set citizens in danger.

8. Party Positions

8.1 Group of the European People's Party (Christian Democrats)

The European People's Party, founded in 1976, is the oldest and largest European Parliament group with 177 members in the European Parliament. The EPP follows centre-right policies and aims towards the creation of a self-assured, competitive, democratic and strong Europe, at the service of the European people¹¹².

The EPP views SMART cities as a means to achieve greener communities and lower emissions while moving towards a low-carbon Europe. Alongside more efficient urban planning and innovative projects regarding zero-emission mobility, EPP supports the development of greener cities, a circular economy and digital systems¹¹³. Taking into account that the urban population has increased by 3.154 billion people from 1950 to 2014, and the numbers are expected to grow by another 70% by 20250, the European People's Party acknowledges the impact that urban development has on the environment and has shifted its focus towards the creation of digital platforms that aid in the operation and welfare of cities, while also strengthening efforts for efficient and green energy. SMART cities are according to the EPP green cities too and the European administration should support young Europe and its representatives to develop SMART city strategies¹¹⁴.

8.2 Group of the Progressive Alliance of Socialists and Democrats

The Progressive Alliance of Socialists and Democrats is the leading centre-left and the second largest party in the European Parliament, with 141 MEPs. The S&D Group supports inclusivity in European societies and structures its work around values such as equality, freedom, diversity fairness and solidarity, with commitments to social justice, protection of consumer rights and human rights in general, employment growth and financial market reform. The Alliance aims at creating a more democratic and stronger Europe with more opportunities and a better future for all¹¹⁵.

¹¹¹ *Top cyber threats in the EU* (2023). Available at: <https://www.consilium.europa.eu/en/infographics/cyber-threats-eu/> (Accessed: 21 December 2023).

¹¹² *EPP Group in the European Parliament* (no date). Available at: <https://www.eppgroup.eu/> (Accessed: 21 December 2023).

¹¹³ Party, E.-E.P. (no date) *EPP - A sustainable Europe - European People's Party*. Available at: <https://www.epp.eu/papers/a-sustainable-europe/> (Accessed: 22 December 2023).

¹¹⁴ Party, E.-E.P. (no date) *EPP - Smart and green cities - European People's Party*. Available at: <https://www.epp.eu/papers/smart-and-green-cities/> (Accessed: 22 December 2023).

¹¹⁵ *Who we are | Socialists & Democrats* (no date). Available at: <https://socialistsanddemocrats.eu/who-we-are> (Accessed: 22 December 2023).

When it comes to SMART cities, the S&D views sustainable and smart mobility as a priority. The Group wishes to bridge the regional gaps with better and greener infrastructure in the transportation sector and by integrating smart and green solutions in energy and infrastructure¹¹⁶. The Party also prioritises inclusivity in the digital sector, while ensuring that every individual follows along with the digital transformation of Europe and the SMART-ification of cities and regions. The S&D believes that Europe should support workers through the SMART transition and protect all new forms of employment, especially those in the digital sector, while also embracing artificial intelligence. The EU should stay vigilant of AI and ensure that the integration of AI in cities should not be correlated with the sacrifice of fundamental rights, but only with sustainable development and innovation. Last but not least, the S&D highlights the importance of digital literacy and equal access to digital services, while simultaneously protecting SMART citizens from digital dangers and threats connected to digital development¹¹⁷.

8.3 Renew Europe Group

The Renew Europe is the centrist and pro-European political party of the European Parliament. The Group promotes European values, an economy with steady growth and opportunities for all, sustainability and most importantly a stronger Europe in a changing world. Renew Europe fights for the civil rights of European citizens and is willing to lead the digital transformation, to ensure equal access for all¹¹⁸.

The Renew Group supports the creation and development of SMART cities as they promote sustainability, safety and mobility. SMART cities can allow for lower gas and CO2 emissions and can contribute to achieving the goals of the European Green Deal. It is also important to highlight that, because smart cities use smart transportation systems, they can also contribute to developing better trans-European transportation networks, which would also be decarbonised¹¹⁹. Additionally, the Renew Europe group supports the EP's call to develop more sustainable and digital cities, a need that was further intensified after the COVID-19 pandemic, with more and better involvement of local stakeholders.

8.4 Group of the Greens/European Free Alliance

The Greens/EFA party in the European Parliament is characterized by a set of key ideological pillars. Their mission is centred upon environmental sustainability, with a particular focus on measures aimed at combating climate change, safeguarding

¹¹⁶ *S&Ds want to bridge the gap between Europe's regions with sustainable and smart mobility* | Socialists & Democrats (2021). Available at: <https://socialistsanddemocrats.eu/newsroom/sds-want-bridge-gap-between-europes-regions-sustainable-and-smart-mobility> (Accessed: 22 December 2023).

¹¹⁷ *Our Inclusive Digital Europe* | Socialists & Democrats (2023). Available at: <https://www.socialistsanddemocrats.eu/content/our-inclusive-digital-europe> (Accessed: 22 December 2023).

¹¹⁸ *Your voice in the European Parliament* (2023) *Renew Europe*. Available at: <https://www.reneweuropengroup.eu/> (Accessed: 22 December 2023).

¹¹⁹ *For Renew Europe, safety and connectivity must be the...* (2023) *Renew Europe*. Available at: <https://www.reneweuropengroup.eu/news/2023-03-21/for-renew-europe-safety-and-connectivity-must-be-the-foundations-of-european-urban-mobility> (Accessed: 22 December 2023).

biodiversity, and advancing renewable energy sources.¹²⁰ Another pillar is democracy and human rights, which are dedicated to promoting open government and defending individual freedoms. In addition, the party supports social justice, working to reduce economic inequalities and advance inclusion. The Greens/EFA party supports SMART Cities and the Digital Transition, imagining an urban landscape that is both technologically sophisticated and ecologically aware.

As seen by their dedication to ensuring that technological breakthroughs benefit society as a whole and the environment, they place a strong emphasis on the application of digital technology to build open and economically viable societies.¹²¹ This aligns with their overarching objective of advocating for climate justice and maintaining equilibrium between advancements in technology and environmental stewardship. SMART Cities are seen by the Greens/EFA party as a way to improve regional development sustainably. They back programs that use technology to optimize urban planning, boost energy efficiency, and develop transportation networks. The party sees SMART Cities as centers of efficiency and innovation that work together in European innovation partnerships to improve the general well-being of residents, companies, and organizations.

8.5 European Conservatives and Reformists Group

The European Conservatives and Reformists (ECR) party in the European Parliament is guided by several core ideological pillars, including a commitment to individual freedom, free-market principles, and a Europe of sovereign nations. In order to guarantee responsiveness to various national circumstances, the ECR, which advocates for a flexible and practical approach to governance, highlights the significance of subsidiarity and the idea that choices should be made as locally as possible.¹²² The ECR party highlights a cautious approach to prevent centralized control while acknowledging prospects for technology-driven regional development in the framework of SMART Cities and the Digital Transition.

They place a high priority on giving local governments the authority to decide what digital infrastructure to build so that SMART Cities are customized to the particular requirements and objectives of each area. The party maintains national identity and opposes excessive EU participation in local problems, even as it supports digital improvements, in order to protect member states' sovereignty.¹²³ ECR party members' statements highlight their dedication to a well-rounded strategy for digital transition and smart cities. They emphasize how technology may improve productivity, economic expansion, and environmental sustainability locally, emphasizing solutions that respect member state authority and advance regional development.

¹²⁰EFA (no date) Greens/EFA. Available at: <https://www.greens-efa.eu/en/efa> (Accessed: 21 December 2023).

¹²¹ Digital future (no date) Greens/EFA. Available at: <https://www.greens-efa.eu/en/article/infosheet/digital-future> (Accessed: 21 December 2023).

¹²² Who we are? // ECR Group (no date) ECR Group. Available at: <https://ecrgroup.eu/ecr> (Accessed: 21 December 2023).

¹²³ ECR Group in the European Parliament (no date) ECR Group. Available at: <https://ecrgroup.eu/> (Accessed: 21 December 2023).

8.6 The Left group in the European Parliament - GUE/NGL

The Left in the European Parliament, represented by the GUE/NGL (European United Left/Nordic Green Left) party, is characterized by a commitment to social justice, workers' rights, environmental sustainability, and peace. The party, which has its roots in socialist principles, is committed to pursuing gender equality, protecting underprivileged groups, and opposing neoliberal economic practices. The GUE/NGL places a strong emphasis on an inclusive, cooperative Europe that respects variety and strives for the welfare of its people.¹²⁴ The GUE/NGL party approaches SMART Cities and Digital Transition with an emphasis on making sure that technical improvements emphasize social equality, ecological sustainability, and the well-being of inhabitants. They advocate for SMART Cities that address the needs of the working class, promote affordable housing, and foster community engagement. Party members have expressed in statements their commitment to using digital technology for the benefit of society as a whole and harnessing innovation to solve societal issues and close economic gaps.¹²⁵ The goal of the GUE/NGL party is to establish efficient and sustainable urban environments that do not reinforce social inequality. They see SMART Cities as catalysts for regional growth that put the needs of the people first. Their strategy fits with their ultimate objective of creating a Europe that is both ecologically conscious and socially just.

9. Questions to be raised

1. How can digitization initiatives be citizen-driven and promote active participation and inclusion?
2. How can the North-South digital divide be effectively addressed, taking into consideration the disparities in quality and affordability of services?
3. How can we achieve equal digital access and connectivity in the rural areas of the Union?
4. How can interoperability projects promote sustainable regional development and effectively include cooperation in all social spheres?
5. How can we address privacy concerns and technology overreliance while successfully incorporating AI in SMART Cities?
6. How can we fully utilize the uncapped potential of the IoT, taking into account the expansive attack surface and the European cybersecurity workforce deficit?
7. How can successful SMART City Cases be scaled to a Common European archetype?
8. How can Public-Private Partnerships (PPPs) be successfully implemented in a common European Smart City Strategy?
9. How can the concept of a Digital Twin SMART City widely integrate civic participation and cooperation in digitalisation and SMART-ification efforts?

¹²⁴ About the group (no date) GUE/NGL. Available at: <https://left.eu/about-the-group/> (Accessed: 21 December 2023).

¹²⁵ What we stand for (no date) GUE/NGL. Available at: <https://left.eu/what-we-stand-for/> (Accessed: 21 December 2023).

10. How Europe's digitalisation progress can ensure an equitable digital transition?
11. How can the European Union intensify efforts regarding achieving Sustainable Development Goal 11, while ensuring that all elements of the goal (inclusivity, safety, resiliency and sustainability) are fulfilled?
12. In which ways can SMART cities counter the privacy and security concerns generated by the extensive use of information and personal data?

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11. Further Reading

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