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Civil Liability in the Age of Smart Cities: New Legal Challenges

MARIE ZAFFAGNINI

Associate Professor

CERDP

Université Côte d'Azur

Résumé : The emergence of smart cities, driven by AI and the IoT, challenges traditional civil liability frameworks. The complexity of multi-stakeholder environments, the autonomy of intelligent systems, and mass data collection necessitate new legal approaches. Recent European initiatives seek to modernize liability regimes, ensuring a balance between technological innovation, accountability, and the protection of fundamental rights.

Mots-clés : Smart cities ; Civil liability ; Artificial intelligence ; Data protection ; Legal frameworks

1. Smart cities transform urban development through technology. In the rapidly evolving landscape of urban development, smart cities have emerged as a beacon of technological innovation and efficiency¹. These interconnected urban ecosystems, powered by cutting-edge technologies and data-driven systems, promise to revolutionize the way we live, work, and interact within our urban environments. However, as we stand on the precipice of this urban revolution, we find ourselves facing a complex web of legal challenges, particularly in the realm of civil liability.

2. Science fiction becomes reality in global metropolises. The concept of smart cities, once confined to the pages of science fiction, has become a tangible reality in metropolises around the globe. From Singapore's sensor-laden streets² to Barcelona's interconnected public services³, and Toronto's ambitious Quayside project⁴, we are witnessing the gradual transformation of urban spaces into highly sophisticated, technology-driven entities. These smart cities leverage artificial intelligence (AI), the Internet of Things (IoT), big data analytics, and a myriad of other technologies to optimize resource allocation, enhance public services, and improve the overall quality of life for their inhabitants.

3. Technological integration raises unprecedented legal issues. Yet, as we embrace these technological advancements, we must also grapple with the profound legal implications they bring⁵, especially in the domain of civil liability. The integration of AI and new technologies into the very fabric of our urban infrastructure introduces unprecedented risks and challenges to our traditional understanding of responsibility and accountability.

¹ R. GIFFINGER AND H. GUDRUN, *Smart Cities: Ranking of European Medium-Sized Cities*, Centre of Regional Science, Vienna University of Technology, 2007, p. 10.

² V. Government of Singapore, *Smart Nation Singapore*, 2014, <https://www.smartnation.gov.sg/>.

³ V. Ajuntament de Barcelona, *Barcelona Smart City Strategy*, 2011, p. 6 : <https://www.barcelona.cat/infobarcelona/en/tema/smart-city>

⁴ V. Waterfront Toronto and Sidewalk Labs, *Master Innovation and Development Plan*, 2019, V. 1, p. 4.

⁵ M. FINCK, *Smart Urban Mobility: Law, Regulation, and Policy*, Springer-Verlag Berlin and Heidelberg, 2020.

4. Multiplication of stakeholders blurs responsibilities. At the heart of this issue lies the intricate network of stakeholders involved⁶ in the creation and operation of smart cities. Unlike traditional urban development projects, smart cities involve a complex ecosystem of actors, including local authorities, technology companies, start-ups, public service operators, and citizens themselves. This multiplicity of players blurs the lines of responsibility, making it increasingly difficult to attribute liability in the event of damages or malfunctions.

5. Determining liability in complex technological accidents is difficult. Consider, for instance, a scenario where an AI-powered traffic management system causes a multi-vehicle accident due to a glitch in its algorithm⁷. Who bears the responsibility in such a case? Is it the software developer who created the algorithm, the city authority that implemented the system, or the vehicle manufacturers whose cars interacted with the faulty system? The answer is far from straightforward and highlights the need for a comprehensive reevaluation of our liability frameworks.

6. AI autonomy challenges traditional liability models. Moreover, the pervasive use of artificial intelligence in smart city management introduces another layer of complexity to the liability equation⁸. As AI systems become more autonomous in their decision-making processes, questions arise about the attribution of responsibility when these systems make errors or cause harm⁹. Traditional liability models, which often rely on concepts of human agency and foreseeability, may prove inadequate in addressing the unique challenges posed by AI-driven urban systems.

⁶ A. TOWNSEND, *Smart Cities: Big Data, Civic Hackers, and the Quest for a New Utopia*, W. W. Norton & Company, 2014, p. 34.

⁷ Proposal for a Directive on liability for defective products, COM(2022) 495 final, 28 September 2022, article 4, <https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=COM:2022:495:FIN>

⁸ Proposal for a Regulation laying down harmonized rules on Artificial Intelligence (AI Act), COM(2021) 206 final, April 21, 2021, <https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A52021PC0206>

⁹ S. CHESTERMAN, *We, the Robots? Regulating Artificial Intelligence and the Limits of the Law*, Cambridge University Press, 2021, pp. 1-12, NUS Law Working Paper No. 2022/015

7. Mass data collection heightens privacy concerns. Perhaps one of the most pressing concerns in the smart city paradigm is the massive collection and utilization of personal data¹⁰. As cities become more connected, they inevitably accumulate vast amounts of information about their citizens – from their movement patterns to their energy consumption habits. While this data is crucial for optimizing city services, it also raises significant privacy concerns.

8. Surveillance technologies create additional legal risks. The implementation of what some critics term "techno-police" – advanced surveillance and monitoring systems – further exacerbates these concerns. In this context, determining liability for breaches of privacy or infringements on individual freedoms becomes a critical legal challenge¹¹.

9. Existing legal frameworks prove insufficient. As we navigate this new terrain, it becomes evident that our existing legal frameworks may be ill-equipped to handle the complexities of smart city liability¹². The rapid pace of technological advancement often outstrips the speed at which legislation can adapt, creating a legal vacuum that urgently needs to be addressed.

10. New liability approaches are being explored. In response to these challenges, legal scholars and policymakers are beginning to explore new approaches to civil liability in the context of smart cities¹³. Some propose the development of specific liability regimes tailored to the unique characteristics of AI and IoT technologies. Others advocate for a more flexible, principle-based approach that can adapt to the ever-changing technological landscape¹⁴.

¹⁰ Règlement (UE) 2016/679 du Parlement européen et du Conseil du 27 avril 2016 relatif à la protection des personnes physiques à l'égard du traitement des données à caractère personnel (RGPD), JOUE L 119, p. 1.

¹¹ CNIL, « La plateforme d'une ville, Les données personnelles au cœur de la fabrique de la smart city », Cahiers IP Innovation & prospective, n°05, sept 2017 https://www.cnil.fr/sites/cnil/files/atoms/files/cnil_cahiers_ip5.pdf

¹² P. CRAIG, *The Evolution of EU Law*, Oxford University Press, 2021, 3e éd., p. 112.

¹³ I. GIUFFRIDA, *Liability for AI Decision-Making: Some Legal and Ethical Challenges*, *Law, Innovation and Technology*, Fordham L. Rev., 2019, vol. 88.

¹⁴ JOSHUA A. T. FAIRFIELD, *Owned: Property, Privacy, and the New Digital Serfdom*, Cambridge University Press, 2017, p. 178.

11. Ethical questions must guide legal reforms. As we delve deeper into the intricacies of civil liability in smart cities, we must consider not only the legal aspects but also the ethical implications of our choices. How do we balance the pursuit of technological innovation with the protection of individual rights and freedoms? How can we ensure accountability in systems that are increasingly autonomous and opaque? These questions and challenges form the crux of our exploration into civil liability in the age of smart cities.

12. Legal decisions today will shape urban futures. As we embark on this journey, we must remain cognizant of the fact that the decisions we make today will shape the urban landscapes of tomorrow, influencing not just our legal systems but the very nature of our societal structures and individual liberties. As we explore the intricate legal landscape of smart cities, it is vital to address the multifaceted challenges that arise from their development and operation.

13. Structure of the analysis: responsibility and the impact of new technologies. The first section, on the challenges of responsibility in a multi-actor ecosystem, will illuminate the complexities surrounding responsibility chains when various stakeholders¹⁵, such as local authorities, technology companies, and citizens, interact within these advanced urban environments. This complexity complicates the attribution of liability, necessitating a reevaluation of traditional legal frameworks¹⁶. Building on this foundation, the second section, the impact of new technologies on liability regimes, will examine how emerging technologies like artificial intelligence and the Internet of Things are reshaping existing liability frameworks. We will analyze how these innovations not only introduce new risks but also challenge our conventional understanding of accountability in urban settings. Together, these sections will provide a

¹⁵ FRA, *Fundamental rights*, 2018, https://fra.europa.eu/sites/default/files/fra_uploads/fra-2018-fundamental-rights-report-2018_en.pdf

¹⁶ HELBERGER, N., KARPPINEN, K., & D'ACUNTO, L. (2018). *Exposure diversity as a design principle for recommender systems*. *Information, Communication and Society*, 21(2), 191-207. <https://doi.org/10.1080/1369118X.2016.1271900>

comprehensive overview of the evolving legal challenges posed by smart cities, highlighting the urgent need for adaptive legal solutions.

I. The Challenges of Responsibility in a Multi-Actor Ecosystem

14. Diverse stakeholders make liability attribution complex. The first subsection highlights the multifaceted legal challenges arising from the diverse stakeholders involved in urban innovation. This section will delve into the theoretical and practical implications of liability, illustrating how the interplay of various actors complicates the attribution of responsibility in cases of harm. Following this, we will explore specific issues in different phases of smart city projects, which will focus on how responsibilities shift throughout the lifecycle of a project. By analyzing distinct phases—from design to operation—we will uncover how liability concerns evolve and the unique challenges that arise at each stage. Together, these subsections will provide a comprehensive understanding of the dynamic legal landscape surrounding smart cities and the urgent need for adaptable frameworks to address these emerging issues.

A. The Complexity of Responsibility Chains

I. Theoretical challenges

15. Responsibility chains become increasingly difficult to untangle. The increasing complexity of responsibility chains in the field of technological innovation and smart cities presents significant legal challenges that require a multifaceted analysis. This complexity stems from a variety of factors, each contributing to the intricate web of liability issues in modern urban environments.

a. Multiplicity of Liability Regimes

16. Multiple overlapping legal regimes complicate standards. At the core of this complexity is the multiplicity of liability regimes governing technological innovation. The diverse nature of smart city technologies necessitates the application of various legal frameworks, including contract law, civil liability, intellectual property law, and sector-specific regulations. This diversity complicates the process of determining applicable legal standards in cases of dispute or harm.

b. The new European directive on liability for defective products

17. The new directive expands liability to digital systems. The new European directive on liability for defective products¹⁷ brings significant changes that will have a major impact on smart cities and connected objects.

- Article 4 broadens the definition of "product"¹⁸ to include software and digital files, thus encompassing systems used in smart cities. This means that intelligent urban management systems, smart city applications, and urban data platforms will now be considered full-fledged products, subject to the liability regime for defective products. This extension could lead to increased liability for software developers and digital solution providers for smart cities, forcing them to strengthen their quality control and security processes.
- Article 6, by explicitly recognizing products with digital elements and related digital services, encompasses the entire IoT ecosystem of smart cities. This could include smart sensors, traffic control systems, smart

¹⁷ Directive (EU) 2024/2853 of the European Parliament and of the Council of 23 October 2024 on liability for defective products and repealing Council Directive 85/374/EEC (Text with EEA relevance)

¹⁸ S. BORGHETTI, "Taking EU Product Liability Law Seriously: How Can the Product Liability Directive Effectively Contribute to Consumer Protection?", French journal of legal policy, n°1, Dec. 2023, p. 137.

lighting networks, and other connected infrastructures. This explicit recognition clarifies the legal framework for these hybrid technologies, combining hardware and software, which are at the heart of smart cities.

- Article 7, which introduces manufacturer liability¹⁹ for defects related to software updates and cybersecurity, is particularly crucial for smart cities. It implies that technology providers for smart cities will need to ensure a high level of security and reliability throughout the lifecycle of their products, including after initial deployment. This could lead to more rigorous development practices, more frequent update cycles, and increased attention to cybersecurity in the design of intelligent urban systems.
- Article 9, which takes into account remanufactured products, could have implications for the circular economy in smart cities, potentially encouraging the reuse and refurbishment of smart urban equipment while clarifying associated responsibilities. Article 14, by easing the burden of proof for victims in certain complex cases, could facilitate citizens' recourse in case of damage caused by defective smart city systems, thus strengthening consumer protection in the digital urban environment.
- Article 8, which requires increased transparency from manufacturers, could lead to better understanding and more effective control of smart city systems by municipal authorities and citizens, potentially fostering greater trust in these technologies. Finally, Article 5, extending liability to online marketplace operators in certain circumstances, could affect the distribution and marketing of technologies and services for smart cities, encouraging these platforms to exercise greater diligence in selecting and controlling the products they offer.

These changes will require significant adaptation of practices by actors involved in the development and deployment of smart cities, strengthening consumer protection and clarifying responsibilities in this complex technological

¹⁹J.KESTELYN, "A Security Leader's Guide to the New Product Liability Directive", Nov. 2024, <https://www.bugcrowd.com/blog/a-security-leaders-guide-to-the-new-product-liability-directive/>

ecosystem. This could lead to safer, more transparent, and more responsible smart cities, but also potentially to higher development and maintenance costs for these advanced urban technologies.

c. Contractual Complexity

18. Contractual stacking increases difficulty in assigning fault. Contractual complexity adds another layer to the responsibility puzzle. Smart city projects often involve multiple parties and intricate technical aspects, making it difficult to attribute responsibility in the event of disputes. This complexity is further amplified by the international nature of many technological innovations, introducing issues of private international law alongside substantive legal questions. The phenomenon of contractual stacking and the involvement of multiple providers²⁰ in technological projects exacerbate the difficulty of identifying individual responsibilities when malfunctions or damages occur. Moreover, the difficulty of establishing clear causal links between actions and resulting harms in complex technological systems challenges traditional civil liability principles based on fault and causality.

d. Liability of Autonomous Systems

19. Autonomous systems challenge existing liability models. Perhaps one of the most pressing challenges is the emergence of autonomous systems based on artificial intelligence. These systems, capable of making independent decisions, raise unprecedented questions about liability attribution that current legal frameworks are ill-equipped to address. In conclusion, the increasing complexity of responsibility chains in technological innovation requires a thorough rethinking of legal adaptations. The challenge is to find a balance between protecting potential victims, encouraging innovation, and providing

²⁰ B. A KOCH., *Liability for Emerging Digital Technologies: An Overview*, JETL 2020; 11(2): 115–136.

legal certainty for the actors involved. This complexity may call for the development of new, specific legal frameworks capable of addressing the unique characteristics of emerging technologies and the complex ecosystems in which they operate.

2. Practical Application of legal challenges

20. Real-world smart city projects reveal liability puzzles. In smart cities, numerous actors operate simultaneously, making the attribution of responsibility particularly complex.

Take the example of the failed "Quayside" smart city project in Toronto, developed by Sidewalk Labs, a subsidiary of Alphabet. This project involved the city of Toronto, technology companies, local start-ups, and public service operators. In the event of a malfunction, such as a personal data breach, it would have been difficult to precisely determine the responsibilities of each stakeholder. This multiplicity of actors creates a true legal puzzle for establishing liability in cases of harm.

The complexity of responsibility chains in smart cities is a major challenge for contemporary law.

21. The Quayside project exemplifies governance complexity. The Quayside project involved a multitude of actors with various roles and responsibilities. Waterfront Toronto, a tripartite government agency, was tasked with overseeing the project and issued the initial call for proposals. Sidewalk Labs, a subsidiary of Alphabet Inc., was selected as the innovation and financing partner responsible for planning and technological development. The city of Toronto itself was involved in urban planning decisions and the provision of municipal services. Additionally, various technology companies and local start-ups were set to participate in the development of specific solutions, while public service operators were responsible for integrating new technologies into existing infrastructure.

This multiplicity of actors generated several levels of complexity regarding responsibility. First, the "co-creation" partnership between Waterfront Toronto and Sidewalk Labs blurred the lines between public and private responsibilities, creating confusion over roles. It was not always clear who was actually leading the planning process, which could have been problematic in the event of a dispute.

22. Data management and automation complicate liability attribution. Data management became a major point of contention in the project²¹. Sidewalk Labs proposed that a "civic data trust" be created to manage the collected data, but this did not suffice to dispel concerns about privacy protection. In the case of a personal data breach, it would have been extremely difficult to pinpoint the responsibilities of each stakeholder. The issue of responsibility for malfunctioning automated systems also posed a challenge. If, for example, a traffic management system had caused an accident, it would have been complex to determine who would be liable: the software developer, the system operator, or the city itself.

23. Surveillance raises further risks of rights violations. The extensive use of sensors and cameras planned in the project raised crucial questions about liability in cases of misuse of surveillance data. It was unclear who would be held accountable if these technologies were used inappropriately, infringing on citizens' individual freedoms. The project's evolution, expanding from a proposed 12-acre area to a master plan covering 190 acres, further complicated the attribution of responsibilities by significantly widening the scope of action and the number of actors involved. These complexities led to significant tensions within the project. The most striking example was the resignation of Ann Cavoukian²², a privacy expert, who left her advisory role due to serious concerns over data management. Ultimately, these difficulties in clearly establishing responsibilities contributed to the project's failure. Sidewalk Labs

²¹ Waterfront Toronto, Summary of Public Consultations on Quayside, 2020, <https://www.waterfronttoronto.ca/our-projects/quayside>

²² G. CANON, "City of surveillance: privacy expert quits Toronto's smart-city project", The Guardian, 2018.

withdrew in 2020, officially citing economic uncertainties, however, governance and liability issues likely played a significant role in this decision.

25. Smart city projects demand adapted legal frameworks. The case of Quayside perfectly illustrates how the multiplicity of actors in smart cities can create a true legal puzzle for establishing liability in cases of harm. It underscores the urgent need to develop legal frameworks tailored to these new, complex urban ecosystems to ensure clear attribution of responsibility and adequate protection of citizens' rights. *Moreover, we should understand that responsibilities also vary depending on the phase of the project.*

B. Specific Issues in Different Phases of Smart City Projects

26. Liability shifts across different project phases. Responsibility can vary among parties between different phases of a project. For example, during the design phase, responsibility might fall on engineers and technology companies. In Songdo, South Korea, a purpose-built smart city, design issues in the waste management system caused malfunctions, raising the question of who was responsible: the system's designers or the municipality that approved it? During the operational phase, responsibility may extend to the users themselves. In Barcelona, the use of sensors for traffic management raises questions about liability in the event of an accident: is the system to blame, or the driver who did not follow the signals?

27. Each phase of a smart city project presents unique challenges. Smart city projects typically involve several distinct phases, each presenting specific liability challenges. Let's examine these phases and their respective issues:

I. Design Phase

28. Designers and approving authorities share initial responsibility. In the initial phase²³, responsibility primarily rests with designers, engineers, and technology companies. The example of Songdo in South Korea illustrates the challenges in this phase. This smart city, built from scratch, faced problems with its waste management system. The issue of responsibility arose between the system designers and the municipality that approved it. Another example is the Quayside project in Toronto²⁴, where Sidewalk Labs (a subsidiary of Alphabet) was responsible for planning and technological development. The project's complexity raised questions about future liability, especially regarding personal data protection:

Who is responsible for design errors?

How should liability be allocated between designers and the authorities approving the plans?

Potential solutions to these problems include establishing a shared liability framework between designers and approving authorities, incorporating:

- Mandatory independent audits of plans before approval.
- Specific professional liability insurance for smart city system designers.
- Detailed contractual clauses specifying each party's responsibilities.

2. Deployment Phase

29. Installers and operators assume risk during deployment. During deployment, responsibility extends to installers, integrators, and system operators. In Nice, France, the "Safe City" project using facial recognition²⁵ and

²³ OECD, Smart Cities and Inclusive Growth, 2020, p. 18 : <https://www.oecd.org/cfe/cities/smart-cities.html>

²⁴ S. Bannerman, A. Orasch, "Privacy and smart cities: A Canadian survey", Canadian Journal of Urban Research, Summer 2020, V. 29, Issue 1, pages 17-38.

²⁵ CNIL, Reconnaissance faciale : avis et recommandations, 2019, https://www.cnil.fr/sites/cnil/files/atoms/files/reconnaissance_faciale.pdf

video analysis for public safety raised questions about who would be liable in the event of issues during the installation or commissioning of these sensitive technologies.

Who is responsible for problems during installation?

How should liability be managed in cases of delays or budget overruns?

Possible solutions include:

- Implementing a certification system for smart city technology installers
- Creating strict testing and validation protocols before commissioning.
- Establishing detailed contracts with clear penalty and liability clauses for delays and budget overruns.

3. Operational Phase

30. Liability during operations depends on system reliability and user behavior.

Once systems are in place, liability may extend to users and system managers. The example of Barcelona, where sensors are used for traffic management, highlights this issue. In the event of an accident, it remains unclear whether the liability rests with the traffic management system or with the driver who failed to follow the directions. In Singapore, AI systems used to predict traffic congestion and adjust traffic lights in real-time raise similar questions. If an AI error caused an accident, who would be held liable? The software developer, the city that implemented it, or the AI itself?

Who is responsible in the event of an accident or damage caused by an automated system?

How should liability be managed between users and system operators?

Potential solutions in these situations include:

- Developing a specific legal framework for the liability of automated systems in smart cities.

- Implementing "black boxes" for critical systems, enabling tracing of decisions made.
- Creating a special compensation fund for victims of smart city system malfunctions.

4. Maintenance and Evolution Phase

31. Continuous updates increase maintenance and cybersecurity risks. In this phase, liability falls on those responsible for maintenance, updates, and system upgrades. In Amsterdam, the "Smart City" project involves ongoing collaboration between the city, technology companies, and citizens. Responsibility in the event of issues related to updates or system evolution remains complex.

Who is responsible for continuous updates and system security?

How should liability be managed in the event of a security breach or hacking?

Potential solutions include:

- Establishing long-term maintenance contracts with clear obligations for technology providers.
- Implementing regular and mandatory security audits.
- Creating an independent oversight body to monitor the security and evolution of smart city systems.

5. End-of-Life or Replacement Phase

32. Data management and dismantling obligations arise at system end-of-life. This phase raises liability issues related to data management, dismantling obsolete infrastructure, and transitioning to new systems. The case of San Diego, USA, where smart streetlights equipped with cameras and microphones

sparked controversy²⁶, illustrates the potential challenges at the end of a system's life or during replacement. In San Diego, the controversial use of smart streetlights with cameras and microphones raised questions about data management and the dismantling of these systems.

Who is responsible for managing the collected data after a system reaches its end-of-life?

How should liability be allocated for the secure dismantling of obsolete infrastructure?

Potential solutions include:

- Establishing strict protocols for the deletion or anonymization of data at the end of a system's life.
- Creating legal obligations for technology providers regarding the dismantling and recycling of infrastructure.
- Setting up a guarantee fund to cover dismantling costs in case the provider goes bankrupt.

33. A collaborative legal approach is essential for all phases. For each phase, it is crucial to develop suitable legal frameworks, clear protocols, and mechanisms for shared responsibility. This could involve creating new insurance schemes, establishing certification and oversight bodies, and adapting existing laws to account for the specific characteristics of smart city technologies. A collaborative approach involving public authorities, technology companies, legal experts, and citizens will be essential for developing effective and fair solutions.

34. As we explore the intricate challenges of responsibility in the multi-actor ecosystem of smart cities, it becomes evident that these complexities are not static but evolve alongside technological advancements. The multifaceted nature of liability in smart urban environments sets the stage for our next area

²⁶ City of San Diego, Privacy Impact Assessment for Smart Streetlights, 2018, <https://www.sandiego.gov/sites/default/files/smart-streetlights-impact-report.pdf>

of focus: the profound impact of emerging technologies on existing liability regimes.

While the first section highlighted the difficulties in attributing responsibility among various stakeholders, the second part of our analysis will delve into how cutting-edge innovations are fundamentally reshaping our understanding of liability. As we transition from examining the ecosystem to scrutinizing the technologies themselves, we will see how artificial intelligence, the Internet of Things, and other smart city technologies are not only introducing new risks but also challenging the very foundations of traditional legal frameworks.

This shift in perspective will allow us to explore how the rapid pace of technological change is outstripping our ability to adapt legal structures, creating a pressing need for innovative approaches to liability. By examining these technological impacts, we will gain a more comprehensive understanding of the legal challenges facing smart cities and the urgent need for adaptive solutions that can keep pace with urban innovation.

I. The Impact of New Technologies on Liability Regimes

35. Emerging technologies reshape traditional liability frameworks. As we delve deeper into the legal implications of smart cities, it becomes crucial to examine how emerging technologies are reshaping traditional liability frameworks. This second section will explore two key areas where technological advancements are challenging our conventional understanding of responsibility and accountability in urban environments.

36. Artificial intelligence complicates the attribution of liability. First, we will address the questions raised by the use of artificial intelligence in smart city management. This subsection will examine how AI's increasing autonomy and decision-making capabilities are complicating the attribution of liability, using examples from various cities and discussing ongoing legislative efforts, particularly in the European Union.

37. Mass data collection challenges privacy and civil liberties. Following this, we will explore the challenges related to data protection and individual freedoms. This part will focus on the legal and ethical concerns arising from the extensive data collection and surveillance technologies employed in smart cities²⁷. We will analyze how these technologies are pushing the boundaries of privacy laws and civil liberties, using case studies from cities like Nice and San Diego to illustrate the complex liability issues at stake.

38. Technological advances demand adaptive legal frameworks. Together, these subsections will highlight how new technologies are not only introducing novel risks but also necessitating a fundamental reconsideration of our legal approaches to liability in the context of smart urban environments.

²⁷ World Economic Forum, "Governing Smart Cities: Policy benchmarks for ethical and responsible smart city development", White paper, 2021, https://www3.weforum.org/docs/WEF_Governing_Smart_Cities_2021.pdf

A. Questions Raised by the Use of Artificial Intelligence

39. AI's autonomy creates new legal uncertainties. The growing use of artificial intelligence in urban management brings unprecedented legal questions, particularly regarding liability. These issues are at the forefront of the European Union's efforts to establish a legal framework tailored to these new technologies.

40. The AI Act introduces a structured regulatory framework. The European Commission has proposed several legislative texts to regulate AI usage and define liability in case of damages. Among these are the AI Act, a revision of the Product Liability Directive, and a new directive on AI liability. The AI Act aims to create a regulatory compliance framework for AI systems, specifying the obligations of different actors involved in the AI value chain, such as providers, importers, users, and distributors.

41. High-risk AI systems face stricter obligations. The AI Act of the European Union will have a significant impact on the development and management of smart cities. Here are the main implications:

Classification of AI systems:

Article 6 establishes a risk-based classification of AI systems. Many systems used in smart cities could be classified as "high-risk," particularly those mentioned in Annex III of the Act, such as traffic management systems (point 2(a)) or public security surveillance systems (point 6(a)).

Example: Barcelona's traffic management system

This system uses AI to optimize traffic flow without specific risk classification. Under Article 6, this system would likely be classified as "high-risk" (Annex III, point 2(a)). This classification would require Barcelona to implement stricter safety measures, conduct regular risk assessments, and ensure human oversight.

42. Increased responsibilities for providers and municipalities. Articles 16 to 29 detail the obligations of providers of high-risk AI systems, including conformity assessments (Article 43) and post-market monitoring (Article 61). Municipalities using these systems will need to comply with user obligations defined in Articles 29 and 30.

Example: Amsterdam's City Data platform

This platform collects and shares urban data with minimal oversight. As a high-risk AI system, providers would need to conduct conformity assessments (Article 43) and implement post-market monitoring (Article 61). Amsterdam, as a user, would need to comply with obligations in Articles 29 and 30, including training staff and monitoring for anomalies.

43. Transparency and explainability become mandatory. Article 13 requires high-risk AI systems to be sufficiently transparent to allow users to interpret the its results. This will apply to decisions made by AI systems in urban management.

44. AI and data protection must align with GDPR standards. While the AI Act does not replace the GDPR, Article 10 strengthens requirements for personal data protection in the context of AI, which will impact data collection and use in smart cities.

45. Liability rules are clarified but traditional frameworks persist. Article 69 provides that the AI Act does not affect existing civil liability rules, but the clarifications on the obligations of different actors could influence the attribution of responsibility in case of damages.

46. Innovation incentives and heavy sanctions balance regulation. Article 55 provides for the creation of "regulatory sandboxes" to foster innovation, which could benefit the development of AI solutions for smart cities. Article 71 provides for significant sanctions in case of non-compliance, up to 30 million euros or 6% of total worldwide annual turnover for the most serious infringements.

Example: Paris's facial recognition system for public transport

In the case of Paris, non-compliance with data protection rules resulted in GDPR fines. Article 71 introduces potentially larger fines (up to €30 million or 6% of global turnover). Paris would therefore face significantly higher financial risks for non-compliant AI systems.

47. Governance structures will oversee AI compliance. Articles 56 to 58 establish a governance system at EU and Member State levels, including the creation of a

European Artificial Intelligence Board, which will impact the regulation of AI in smart cities.

48. The AI Act reshapes urban AI management in Europe. In conclusion, the AI Act will have a profound impact on how AI is developed, deployed, and used in smart cities in Europe. It will require municipalities and technology providers to rethink their approaches to urban AI, placing greater emphasis on safety, transparency, and accountability.

The increasing reliance on AI and data-driven technologies in urban environments not only raises questions about liability and responsibility but also poses significant challenges to privacy and civil liberties. As we transition to examining these challenges, it becomes clear that the complexities of data protection and individual freedoms are inextricably linked to the broader issues of AI regulation and smart city management.

B. Challenges Related to Data Protection and Individual Freedoms

49. Massive data collection increases risks to privacy rights. The massive collection of data in smart cities raises significant concerns about privacy protection. In Nice, France, the "Safe City" project utilizes facial recognition and video analytics for public safety, but who would be held accountable in case of data misuse? Would it be the city, the technology provider, or both? Moreover, the use of these surveillance technologies brings up questions about individual freedoms. In San Diego, USA, the use of smart streetlights equipped with cameras and microphones has sparked controversies over mass surveillance. If civil liberties are infringed, how would liability be allocated between the municipality and the technology providers? The issues surrounding data protection and individual freedoms in the context of smart cities are complex, raising numerous legal and ethical questions. In the following, we use these examples as case studies and examine them in more detail.

1. The Case of Nice and the "Safe City" Project

50. **The Safe City project in Nice reveals complex liability issues.** The city of Nice serves as a prime example of the challenges posed by using advanced surveillance technologies in public spaces. Already equipped with 4,000 cameras, Nice aims to expand its surveillance capabilities using technologies like facial recognition and automated video analytics. However, these ambitions face significant legal hurdles.

The French Data Protection Authority (CNIL) plays a critical role in regulating these technologies. For instance, it reviewed the "REPORTY" mobile app proposed by the city, which allowed citizens to report incidents to the municipal police. The CNIL deemed that this system posed high risks to privacy and security, emphasizing the need for specific legislative oversight for such systems.

The question of liability when the data collected is misused is especially complex, and potentially involves multiple parties:

- The **municipality**, as the data controller, is primarily responsible for ensuring the lawful use of these technologies.
- **Technology providers** could be seen as data processors, with obligations to implement technical safeguards for data protection.
- **System operators** might also bear responsibility in cases of data mismanagement or unlawful use.

Digital liability law is thus multifaceted and encompasses a wide range of legal issues, including liability for failing to secure personal data, data theft, and breaches of privacy.

2. The Case of San Diego's Smart Streetlights

51. **San Diego's smart streetlights raise mass surveillance concerns.** San Diego's deployment of smart streetlights equipped with cameras and microphones exemplifies concerns about mass surveillance. In such cases, liability could be

shared between the municipality and technology providers. The city, as the data controller, would primarily be responsible for ensuring compliance with data protection laws and safeguarding individual freedoms. Technology providers, however, might be liable if it is proven that they failed to implement necessary technical safeguards or exceeded their role as data processors.

3. European Efforts to Modernize Liability Rules

52. The European Union works on modernizing liability frameworks. The European Commission is currently working on new directives on liability applicable to AI-based products, aiming to modernize existing rules and adapt them to recent technological advancements. These directives include additional guarantees for claimants in liability cases, to address the opacity of AI systems²⁸.

54. Protecting fundamental rights must balance innovation. Protecting data and individual freedoms in smart cities requires a delicate balance between technological innovation and the respect for fundamental rights. Existing legal frameworks are often challenged by these new technologies, highlighting the need for continuous legislative adaptation. Liability for civil rights violations or data misuse will likely need to be established on a case-by-case basis, taking into account the complexity of the implemented systems and the multiplicity of actors involved.

Smart cities like Singapore, Barcelona, and Toronto show that these challenges are already a reality. It is crucial to adapt legal frameworks to address these new issues while maintaining a balance between technological progress and citizen rights protection. This could involve creating new liability regimes tailored to emerging technologies and clarifying the responsibilities of the various stakeholders involved.

²⁸ B. GOODMAN AND S. FLAXMAN, “European Union Regulations on Algorithmic Decision-Making and a “Right to Explanation”, *AI Magazine*, vol. 38, no. 3, 2017, p. 50, DOI: 10.1609/aimag.v38i3.2741

Conclusion

The emergence of smart cities brings about unprecedented legal challenges in terms of civil liability, data protection, and the safeguarding of individual freedoms. As cities across the globe—such as Singapore, Barcelona, Nice, and Toronto—integrate advanced technologies into urban management, questions of responsibility and accountability become more pressing. These challenges manifest across various phases of smart city projects, from design and deployment to maintenance and end-of-life management, each with specific liability concerns.

The increasing use of artificial intelligence, data collection, and surveillance technologies in smart cities raises complex legal and ethical questions. While these innovations offer the potential for more efficient urban management, they also pose risks to privacy, data security, and fundamental rights. The evolving regulatory frameworks, particularly in the European Union, seek to address these issues by modernizing liability rules and creating new legal standards tailored to emerging technologies.

To navigate this rapidly changing landscape, it is essential to adapt existing legal frameworks and develop new liability regimes that can effectively allocate responsibility among the various stakeholders involved in smart city projects. This requires a collaborative approach between public authorities, technology providers, legal experts, and citizens to ensure that the benefits of technological advancements are harnessed while protecting the rights of individuals.

Ultimately, achieving a balance between innovation and regulation will be crucial, to build smart cities that are not only technologically advanced but also ethically sound and legally robust.