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SMARt COmmunities Skills Development in Europe

Work with e-Services

Available to Citizens

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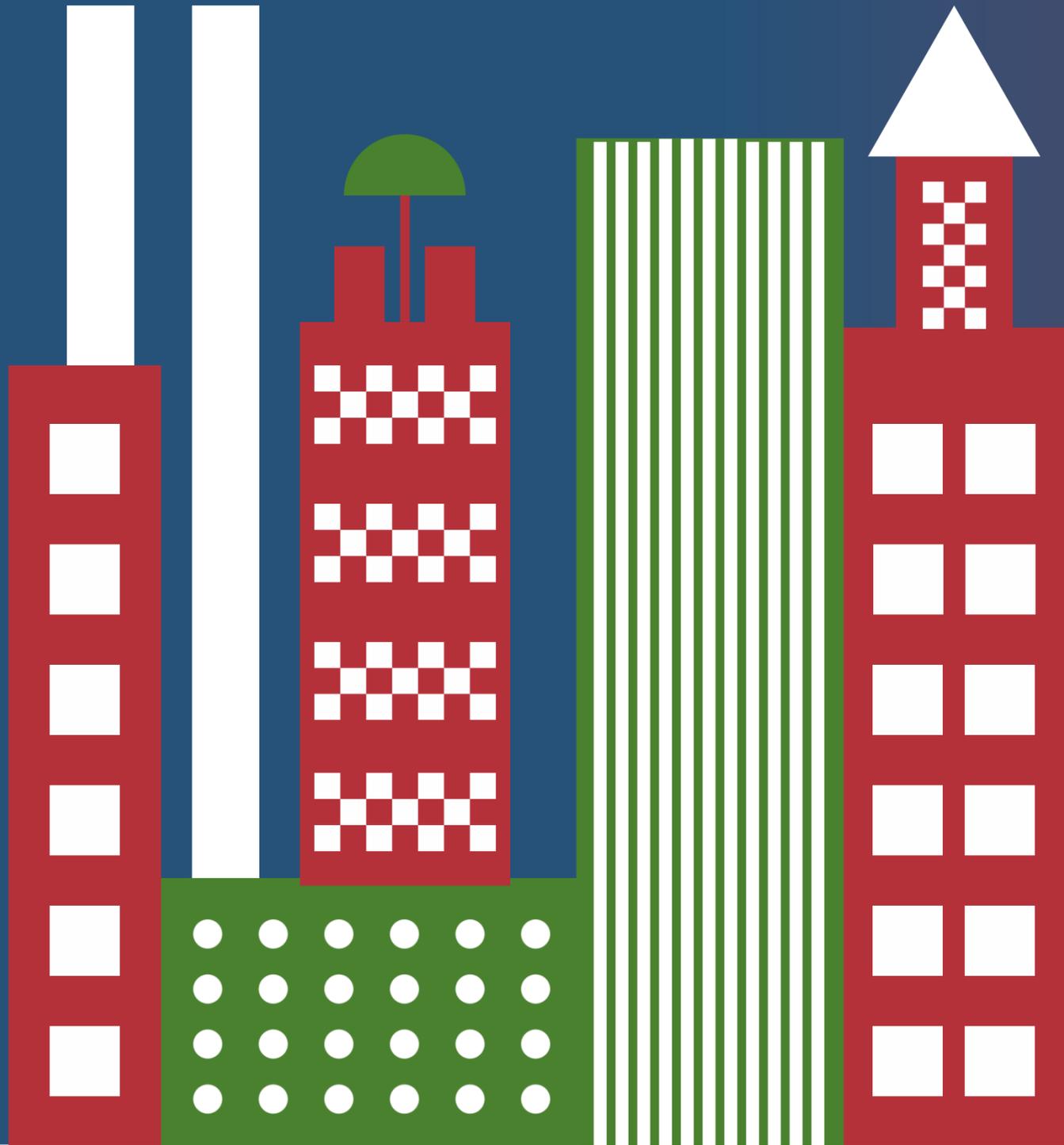
Work with e-Services Available to Citizens

Unit 1 – Understanding

e-Services in Smart cities

Module Aim & Objectives

- This module explores the ecosystem of e-services in smart cities and digital public administrations.

- It focuses on the use and management of digital platforms that improve citizen access to information and public services.

- Learners examine how e-services are designed, secured, and evaluated for efficiency, transparency, and inclusiveness, developing the skills to promote sustainable, citizen-centred digital transformation.

Contents

- **Unit 1 – Understanding e-Services**

- Unit 2 – Governance and Management of e-Services

- Unit 3 – Supporting Citizens and Promoting Digital Inclusion

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Unit 1 Aim & Objectives

- This unit introduces the concept and purpose of e-services in smart cities and digital public administrations.

- Learners explore the technologies, types, and stakeholders that enable citizen access to digital public services.

- It also examines data protection, cybersecurity, and trust as key factors for effective and secure e-service delivery.

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Unit 1 Learning Outcomes

By the end of this unit, learners will be able to:

- **Define** the concept and purpose of e-services within smart cities and digital public administrations, explaining their role in improving citizen access to public information and services.

- **Describe** the key digital technologies and infrastructures — such as IoT, cloud computing, and data analytics — that enable the development and delivery of smart city e-services.

- **Identify and classify** the main categories of smart city e-services and their stakeholders, illustrating how different actors (public authorities, private providers, citizens) interact in the service ecosystem.

- **Analyze** the principles of data protection, cybersecurity, and citizen trust that ensure the secure and reliable operation of e-services.
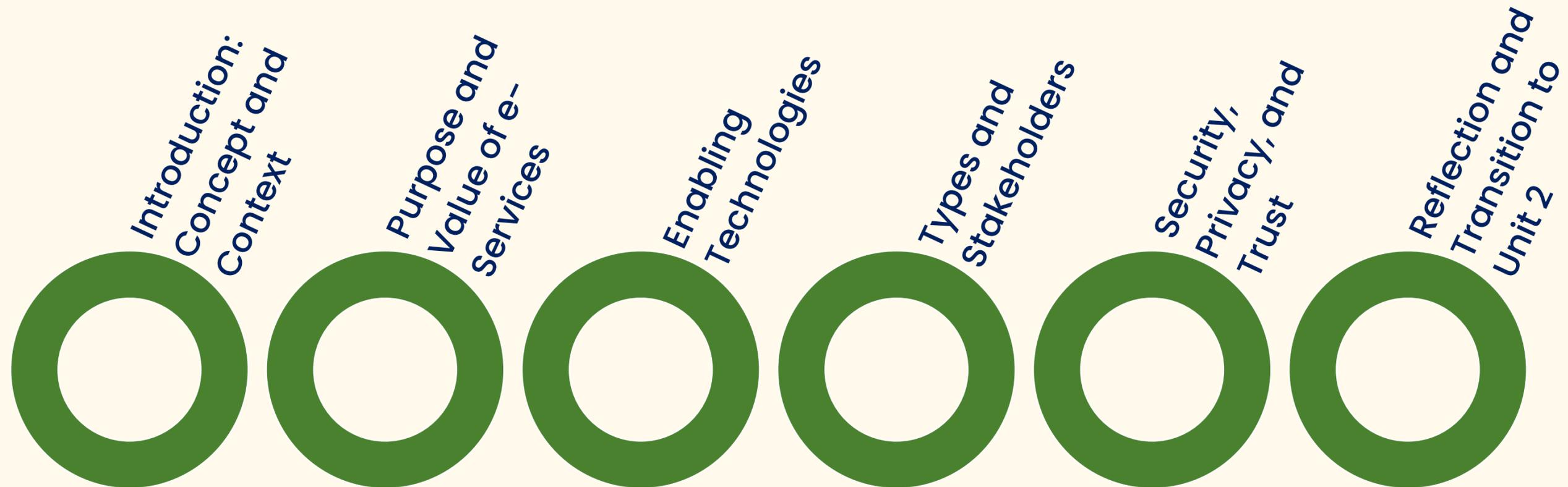
Unit 1 Roadmap

Introduction: Concept and Context

Purpose and Value of e-Services

Enabling Technologies

Types and Stakeholders

Security, Privacy, and Trust

Reflection and Transition to Unit 2

Introduction to Smart City e-Services

- Although definitions of 'Smart City' and 'Smart City services' differ across the literature, there is a consensus that information technology constitutes a fundamental component of both constructs.

- Advancements in these technologies facilitate the development of service-oriented applications that are increasingly customized to meet the needs of urban populations.

- The unifying element among these within the Smart City framework is their intrinsic connection to urban service delivery.

- *Smart city e-services are digitally enabled public services designed to deliver public value through sustainable, citizen-oriented, and data-driven service models.*

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Why e-Services Matter for Citizens

- E-services are usually accessible regardless of time or place that is provided by city manager to improve citizens' quality of life.

- Beyond efficiency, public e-services aim to improve quality of life, transparency, accessibility, and long-term sustainability.

- There is a diversity of e-services and innovation due to the rapid development of smart city across globe

- Each city in different countries has focus on different services.

How Cities Deliver e-Services

- Smart city services offer efficient solutions to address challenges related to urban mobility, public service delivery, and safety, while concurrently advancing sustainability objectives.

- Smart city e-services are delivered through different organizational and business models, depending on governance structures, partnerships, and service goals.

- Municipalities leverage smart city platforms to expedite and simplify the deployment of sophisticated tools that deliver resilient services targeting prevalent urban concerns.

- These applications frequently utilize a unified mission-critical network and IoT infrastructure to enhance security, operational efficiency, and scalability.
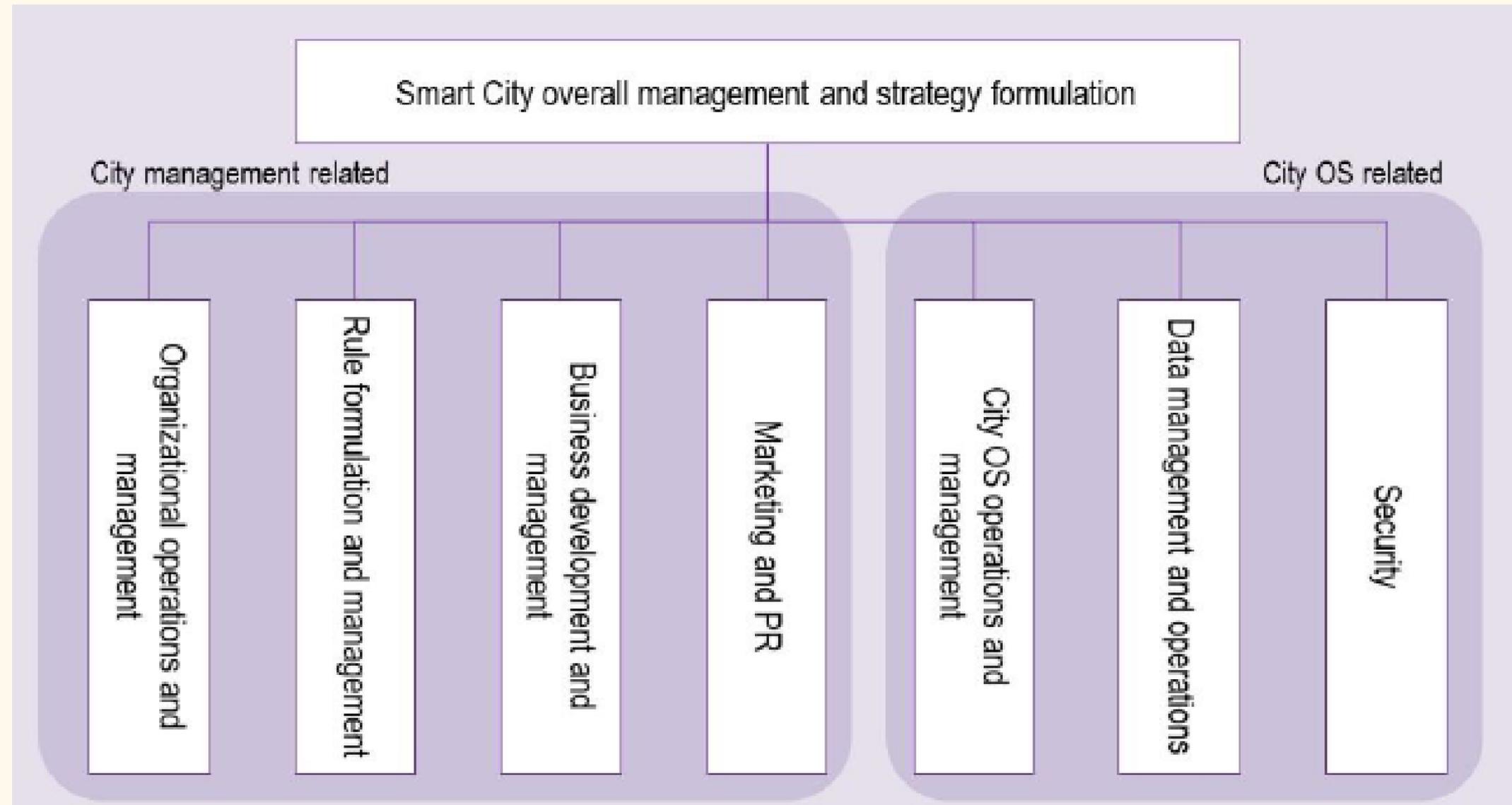
From Vision to Service Portfolio

Figure 1. Smart city overall management and strategy formulation. **Source:** Adapted from Hitachi (2020), *Smart City OS functional architecture, Hitachi Review*, 69(4).

11

Enabling Technologies for e-Services

Figure 2. Smart city business services domains.
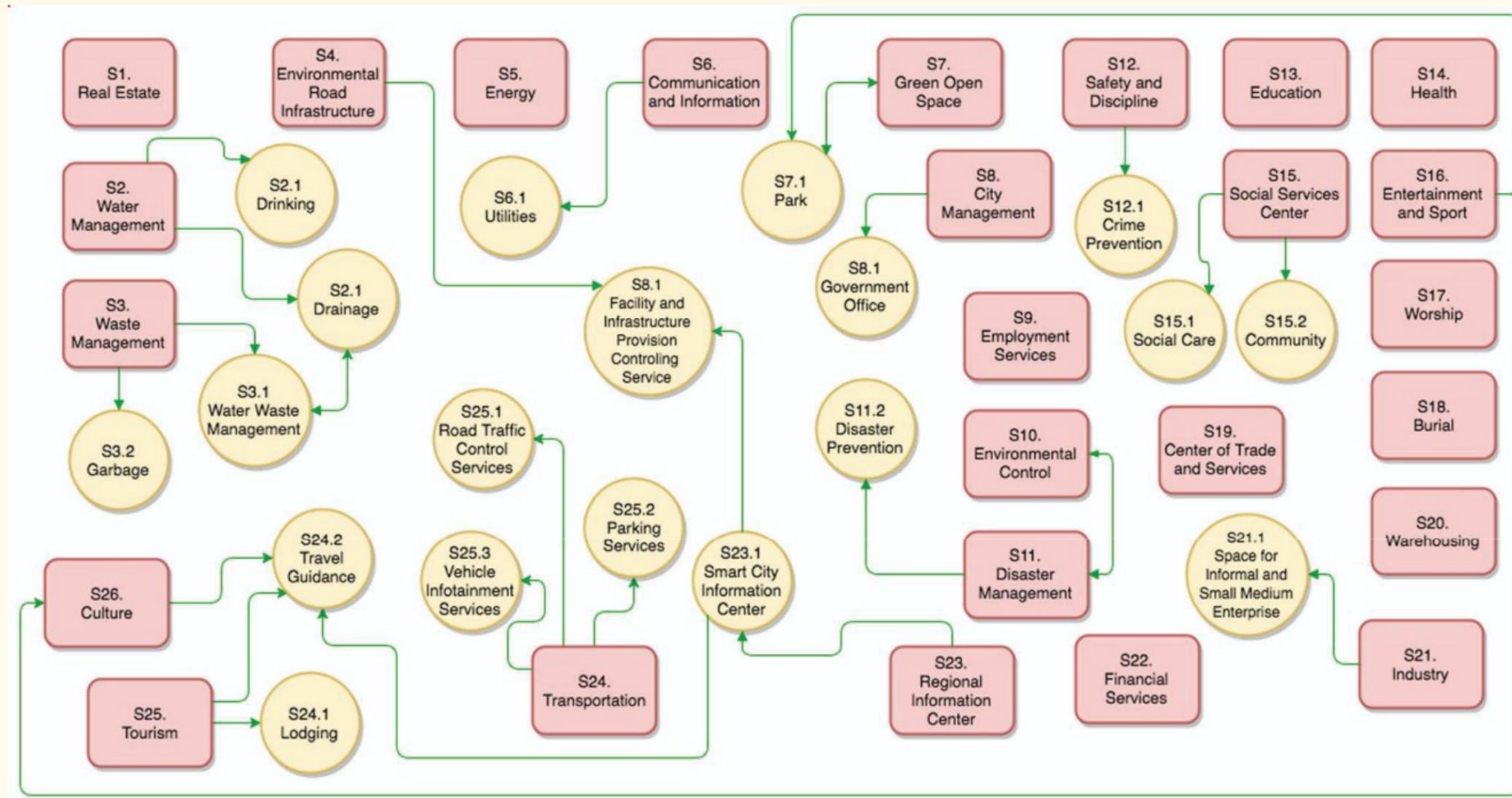
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Smart City e-Service Catalogue

Figure 3. SC Service Catalogue. Source: Oktaria, D., & Kurniawan, N. B. (2017, October). Smart city services: A systematic literature review.

Service Categories & Stakeholders

Category	Examples of e-Services	Main Stakeholders
Governance & Administration	e-Voting, e-Participation platforms, Open data portals, e-Permits	Local & regional authorities, citizens, civil society
Mobility & Transport	Smart parking, traffic monitoring, public transport apps	Citizens, transport agencies, mobility providers
Environment & Sustainability	Smart waste collection, air quality monitoring, energy management	Municipal services, citizens, environmental agencies
Public Safety & Health	Smart surveillance, emergency response, e-Health systems	Police, health authorities, hospitals, citizens
Economy & Business Services	e-Procurement, digital taxation, local business portals	SMEs, entrepreneurs, government departments
Education & Social Inclusion	e-Learning, citizen support portals, cultural heritage apps	Educational institutions, NGOs, community centers

14

Service Providers and Roles

Smart Energy	Smart Security	Smart Governance	Smart Policies	Smart Agriculture
Smart Transportation	Smart Maintenance	Smart Feedbacks	Smart Users	Smart Services
Smart Environment	Smart Economy	Smart Communication	Smart Healthcare	Smart Education
Smart Living	Smart Industries	Smart Energy	Sustainable Development	Smart Wellbeing
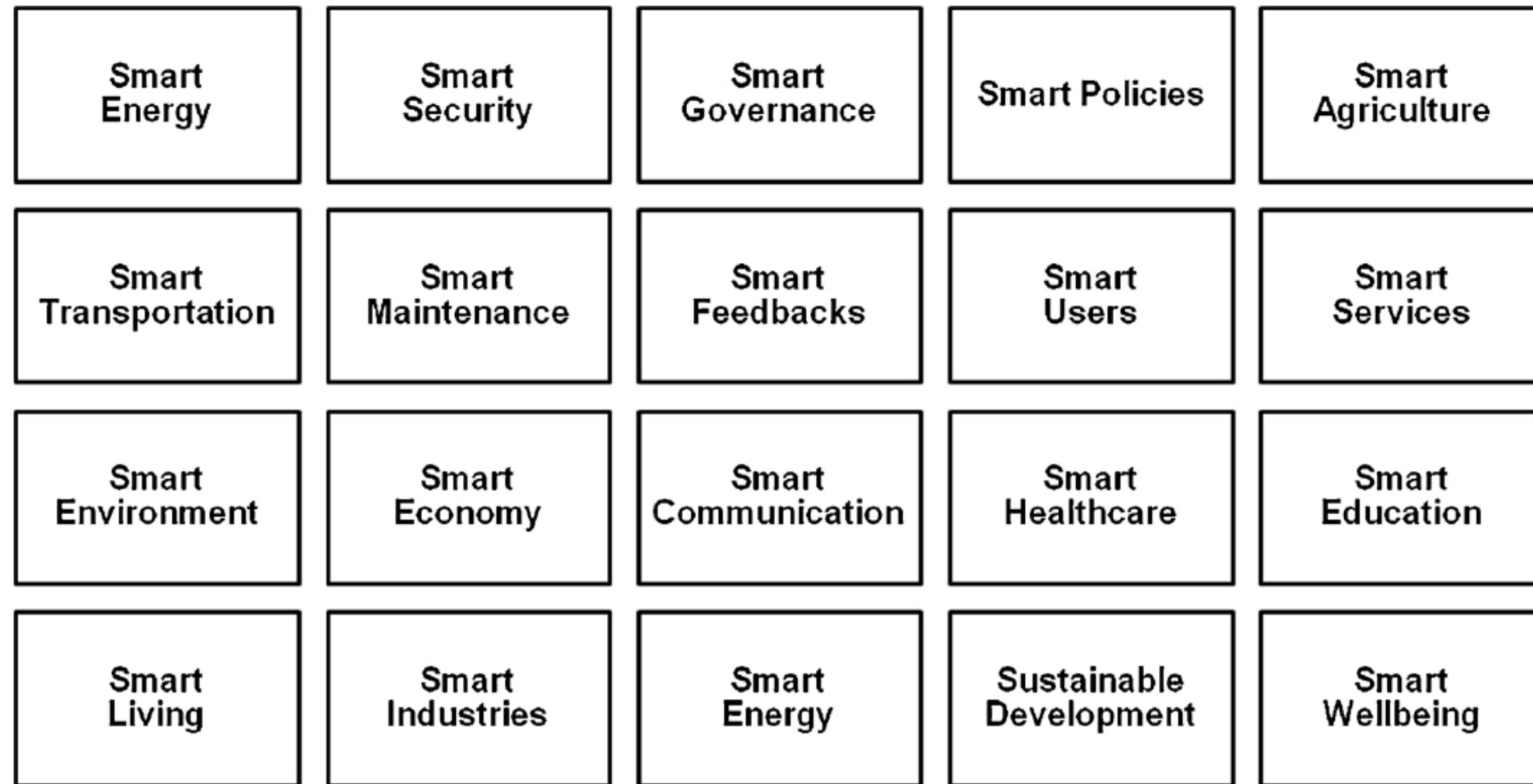
Figure 4. SC service provides

Smart Public Services as Sustainable Service Models

- **Smart city services are delivered through structured service models**

- **These models define:**
  - value for citizens
  - stakeholders involved
  - required resources
  - expected impacts

- **Sustainability (economic, social, environmental) is a core design principle**

Smart Public Services as Sustainable Service Models

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From Business Processes to Digital Services
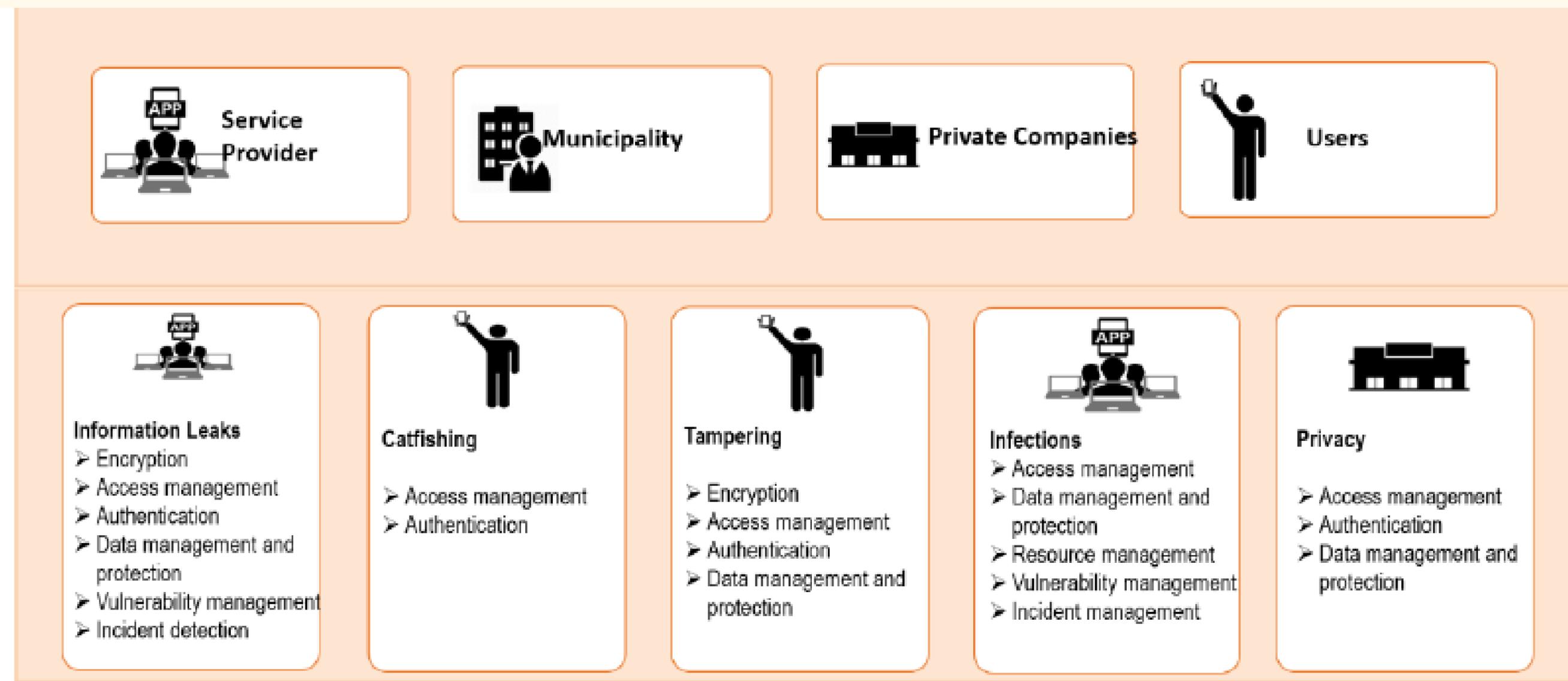
Figure 6. From Business Processes to Digital Services

18

Security Risks in Smart City e-Services

Figure 7. Security Risks in Smart City e-Services. Source: Amalgamation of Advanced Technologies for Sustainable Development of Smart City Environment: A Review

GDPR and Data Protection in e-Services
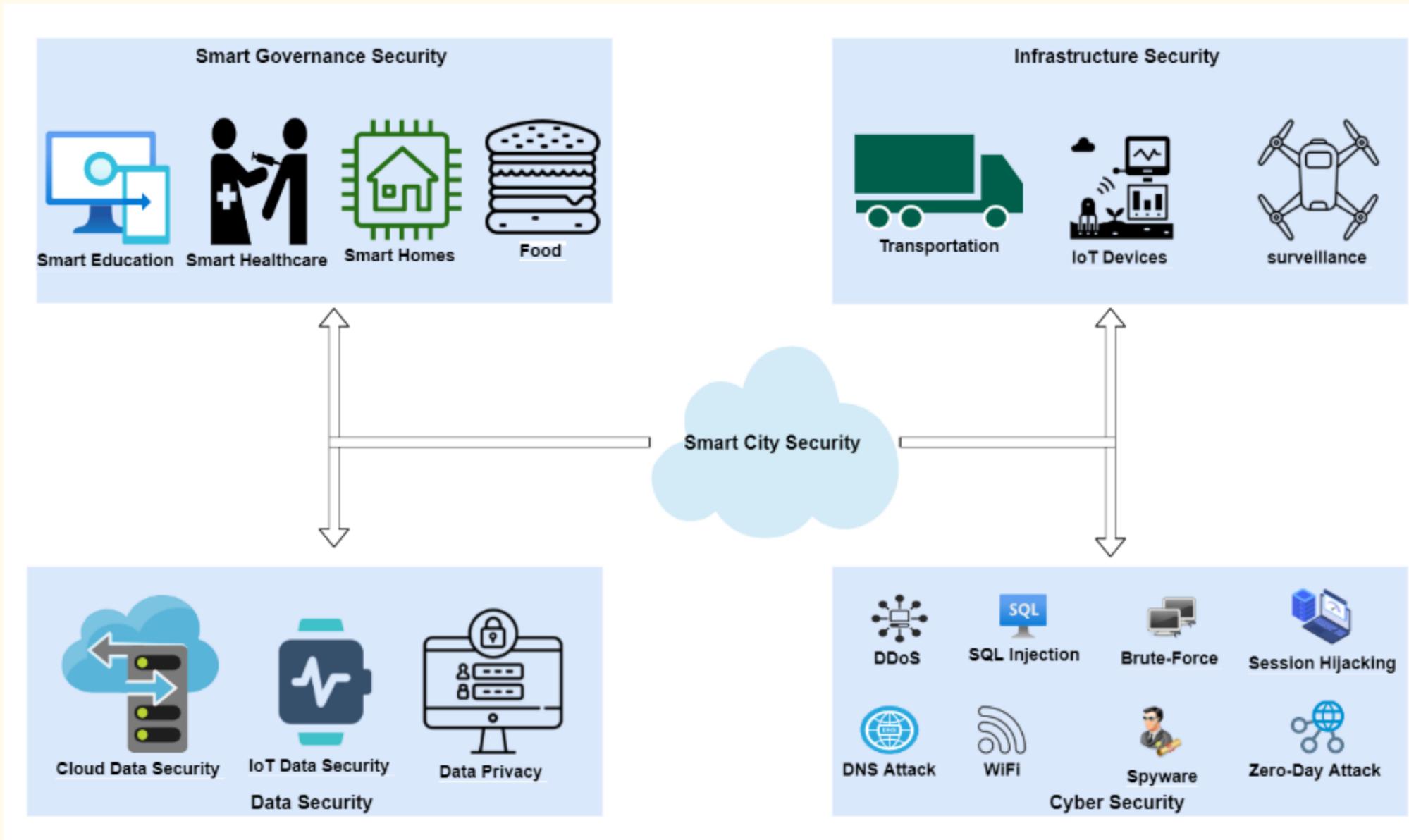
- Smart City services represent critical subjects within the scope of the General Data Protection Regulation (GDPR), which has been enforceable across the European Union (EU) since May 25, 2018.

- The enforcement of this regulation has significantly heightened the regulatory obligations concerning data protection for Smart City applications.

- Notably, the obligatory Data Protection Impact Assessment (DPIA) process introduces a substantial challenge for data processing operations that present "high risks to the rights and freedoms of individuals" as defined by Regulation (EU) 2016/679 (GDPR, 2016).

DPIA: Compliance and Security Challenges

Figure 8. Compliance and Security Challenges. Source: Vandercruysse, L., Buts, C., & Dooms, M. (2020). A typology of smart city services: the case of data protection impact assessment. Cities, 104, 102731.

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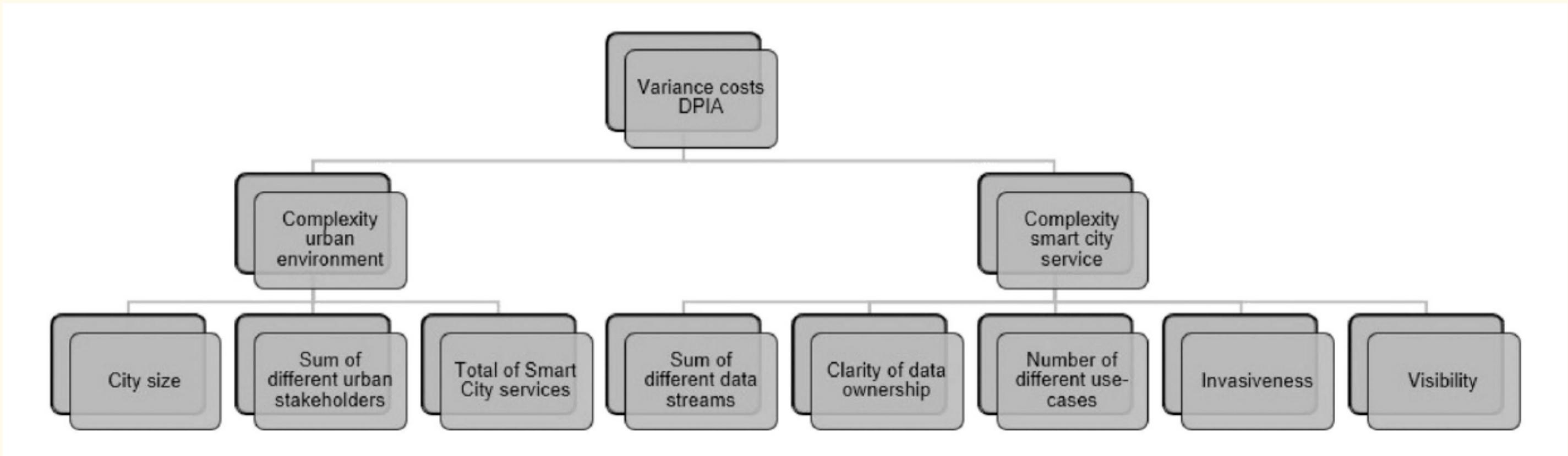
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Service Complexity and Citizen Trust
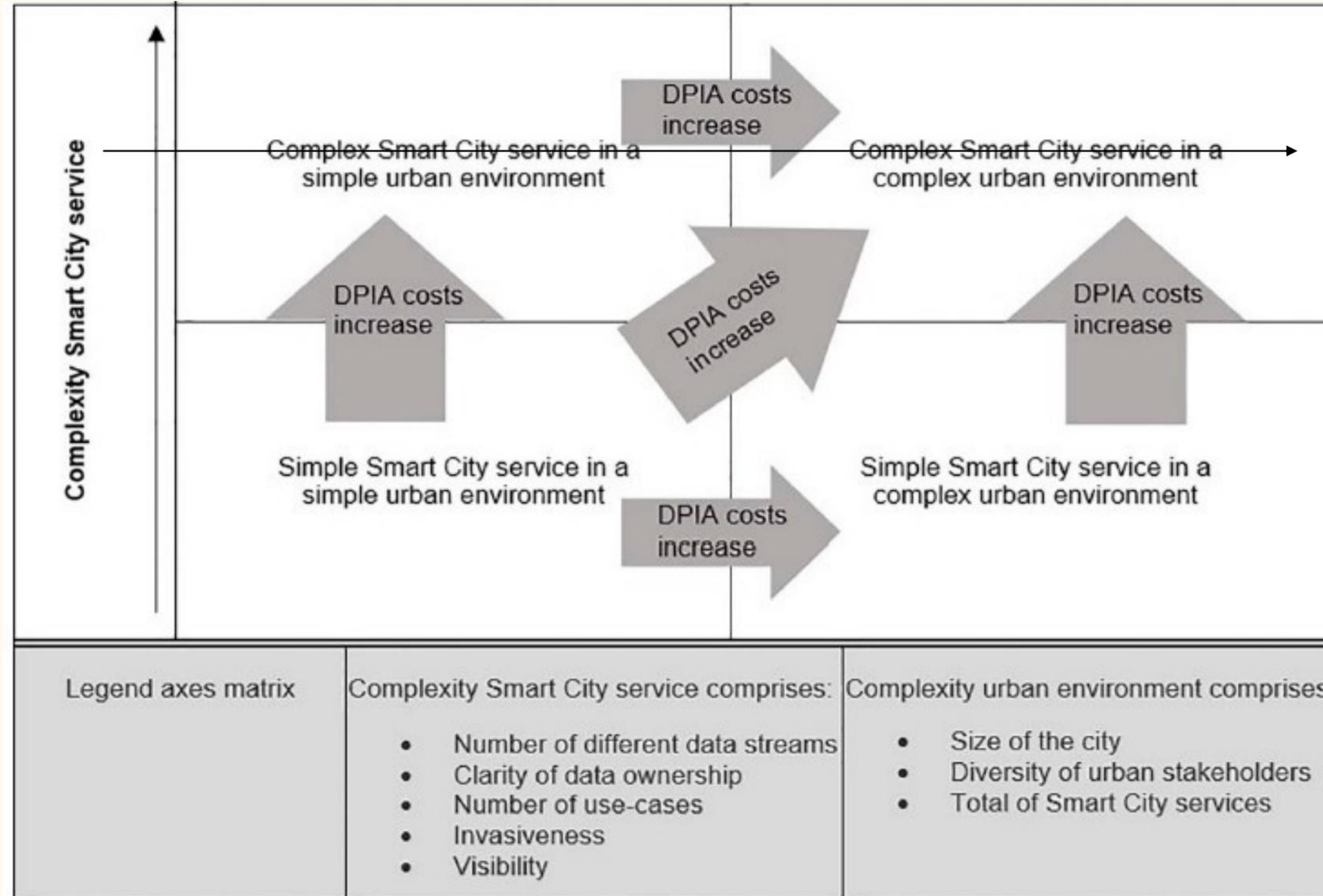
Figure 9. Service Complexity and Citizen Trust. Source: Vandercruysse, L., Buts, C., & Dooms, M. (2020). A typology of smart city services: the case of data protection impact assessment. *Cities*, *104*, 102731.

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Securing e-Services: Three Lines of Defense

01

Identify the functions and information that should be protected regarding provided services

02

Remove vulnerabilities related to service content at the planning, design, and development phases

03

Check or monitor illegal commands and requests to applications

23

Step 1: Identify Critical Functions & Sensitive Data

01

- **Identify** the **essential functions** (such as communication, display, and control) and sensitive information (including personal data and design specifications) encompassed within the "Service" category.

- Furthermore, beyond the risks of data leakage and falsification, consider the potential security threats where Smart City services may be exploited as platforms for launching attacks on other systems, or where the services themselves may be subject to unauthorized manipulation or control.

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Step 2: Design Out Vulnerabilities

02

- **Verification and evaluation of safe and secure design**
- **Introduction of authentication function**
- **Initial settings**
- **Encryption**

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03

- It is imperative to identify anomalous conditions promptly when irregular operations arise due to system defects or malicious attacks, to mitigate the propagation of adverse effects.

- For instance, in services processing user inputs, it is essential to verify whether these inputs contain unauthorized commands that may induce unintended behaviors within the system.

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Top User Concerns About Smart City e-Services
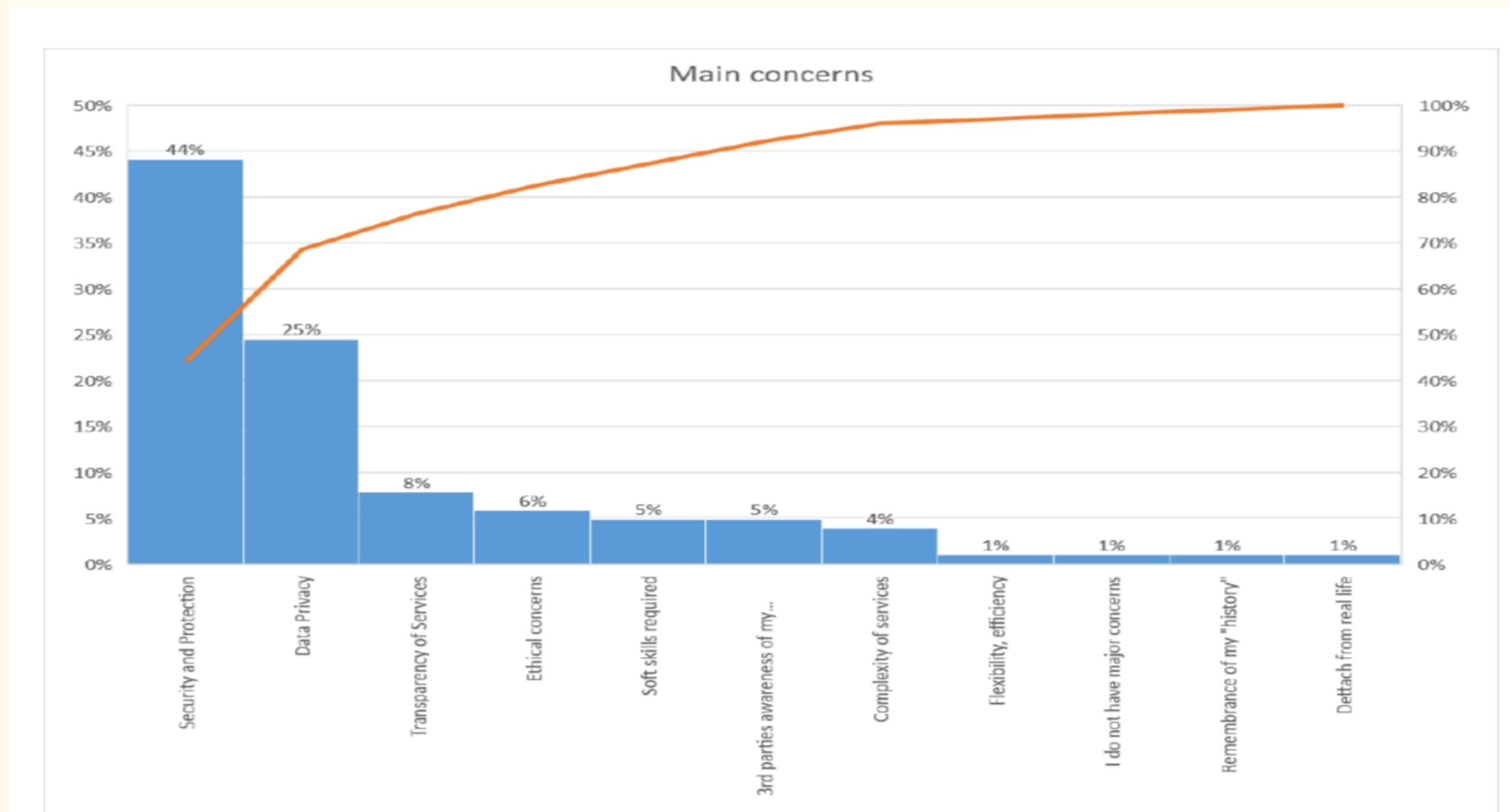
Figure 10. Lytras, M. D., & Visvizi, A. (2018).

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Success Factors for Smart City e-Services

- **Several factors might impact the success of smart services that a city need**
  - ○ **Lack of interest in data integration by some stakeholders and their resistance to share data**
  - ○ **involving citizens both in policy decisions related to the smart city and in the development of smart city services**

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Unit 1 completed! – What's next?

- To consolidate your learning and reflect on the key concepts covered, please take a moment to complete this quiz.

- Your feedback and results will help you track your progress and support continuous improvement of the training experience.

- By completing this quiz, you will also become eligible to receive a certificate of successful training completion.

Click the link to begin the quiz!

References

- Leclercq, E., & Rijshouwer, E. (2022). Enabling citizens' right to the smart city through the co-creation of digital platforms. Urban Transformations, 4(1), 1–15. https://doi.org/10.1186/s42854-022-00030-y
- Lee, M. S., & Jeong, G. Y. (2022). The effects of internal market orientation on service providers' service innovative behavior: a serial multiple mediation effect on perceived social capital on customers and work engagement. *Sustainability*, *14*(23), 15891.
- Scholtz, B. (2022). Access to technology and data in smart cities for South Korea. Proceedings of the AIS SIGED International Conference on Information Systems Education and Research (ACIST). https://digitalcommons.kennesaw.edu/acist/80
- Han, J. (2021). *A critical review of the smart city in relation to citizen participation. Cities*, 115, 103239. https://doi.org/10.1016/j.cities.2021.103239
- Zhu, Y., Wang, J., & Chen, R. (2021). Analysing the impact of smart city service quality on citizen engagement. Frontiers in Psychology, 12, 843608. https://doi.org/10.3389/fpsyg.2021.843608
- Axelsson, K. (2024). Exploring services in a smart city through socio-technical perspectives. Government Information Quarterly, 41(2). https://doi.org/10.1016/j.giq.2024.102145
- Dahmane, A., et al. (2025). Smart Cities Services and Solutions: A Systematic Review. Sustainable Computing: Informatics and Systems, 45, 100875. https://doi.org/10.1016/j.suscom.2024.100875
- Mijac, M., Andlar, G., & Knezevic, M. (2017). Smart city services driven by IoT: A systematic review. International Conference on Information Technology Systems and Innovation (ICITSI), Bandung, Indonesia, 206–213. https://doi.org/10.1109/ICITSI.2017.8267944
- Malodia, S., Pal, D., & Rana, N. P. (2021). The future of e-government: An integrated conceptual framework. Technological Forecasting & Social Change, 170, 120952. https://doi.org/10.1016/j.techfore.2021.120952
- OECD. (2023). Smart city data governance. OECD Report. https://www.oecd.org/content/dam/oecd/en/publications/reports/2023/10/smart-city-data-governance_fc19e878/e57ce301-en.pdf
- Visvizi, A., & Lytras, M. D. (2019). Sustainable Smart Cities and Smart Villages Research: Rethinking Security, Safety, Well-being, and Happiness. Sustainability, 12(1), 215. https://doi.org/10.3390/su12010215
- Al Sharif, R., & Pokharel, S. (2022). Smart city dimensions and associated risks: Review of literature. Sustainable Cities and Society, 77, 103542.
- Rani, S., Mishra, R. K., Usman, M., Kataria, A., Kumar, P., Bhambri, P., & Mishra, A. K. (2021). Amalgamation of advanced technologies for sustainable development of smart city environment: a review. *IEEE Access*, *9*, 150060-150087.
- Lytras, M. D., & Visvizi, A. (2018). Who uses smart city services and what to make of it: Toward interdisciplinary smart cities research. Sustainability, 10(6)
- D. Oktaria, Suhardi and N. B. Kurniawan, "Smart city services: A systematic literature review," *2017 International Conference on Information Technology Systems and Innovation (ICITSI)*, Bandung, Indonesia, 2017, pp. 206-213, doi: 10.1109/ICITSI.2017.8267944.
- Ahad, M. A., Paiva, S., Tripathi, G., & Feroz, N. (2020). Enabling technologies and sustainable smart cities. *Sustainable cities and society*, *61*, 102301.
- Vandercruysse, L., Buts, C., & Dooms, M. (2020). A typology of smart city services: the case of data protection impact assessment. *Cities*, *104*, 102731.

Further Reading

📖 Ahad, M. A., Paiva, S., Tripathi, G., & Feroz, N. (2020). Enabling Technologies and Sustainable Smart Cities. Sustainable Cities and Society, 61, 102301.→ Explains how IoT, cloud computing, and data analytics enable smart city service delivery — perfectly aligned with your "enabling technologies" slides.

📖 Vandercruysse, L., Buts, C., & Dooms, M. (2020). A Typology of Smart City Services: The Case of Data Protection Impact Assessment. Cities, 104, 102731.→ Focuses on security, privacy, and data-protection principles in smart city service management — directly linked to your GDPR and cybersecurity section.

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