

Executive summary

Key trends in smart city data governance

Smart cities aim to boost citizens' well-being, promote sustainable environments and optimise public service delivery by leveraging technologies, in particular digital technologies. Forecasts predict that the global Internet of Things (IoT) market in smart cities will grow from USD 300 billion in 2021 to over USD 650 billion by 2026. In the United States alone, cities are expected to invest USD 41 trillion over the next 2 decades to upgrade and benefit from digital technologies.

Digital technologies (e.g. artificial intelligence [AI], IoT, big data), innovations in robotics, drone technology as well as supporting digital infrastructure and devices (e.g. wireless broadband networks, smartphones and cloud computing) generate a vast amount of real-time data that can help both public and private sectors to innovate and deliver public services more efficiently and effectively. However, the amount of data generated is growing more rapidly than governments' capacity to store and process them. Only 2% of new data produced in 2020 was saved and retained in 2021, and estimates also suggest that only 1% of IoT data are utilised.

The success of smart city projects largely depends on the availability and effective use of data. This is why some countries have issued a national data strategy to unlock the power of data and guide their use in the development of smart cities (e.g. Japan and United Kingdom national data strategies). Open data are sometimes included as a core component of such national data strategies to ensure that data from public organisations are available to everyone in open, free and accessible formats (e.g. Spain's Platform for Data Intermediation; Sweden's National Geodata Strategy). Several countries have also issued guidelines and regulatory frameworks to ensure data privacy and security, as well as to build trust (e.g. Japan's Act on the Protection of Personal Information). Some countries are developing smart city standard frameworks aimed at providing a unifying ontology (the representation and definition of concepts and their relationships) across the board to handle data from different sources and fields (e.g. India's Data Exchange Platform the United Kingdom's standard for smart cities PD 8100).

At the local level, cities are adopting a human-centric approach in the use of data and digital technologies to place residents' needs at the centre of policy making (e.g. Vienna, Austria). Cities have also adopted a range of mechanisms to unlock the potential of smart city initiatives. For instance, some cities have appointed a local chief data officer to provide strategic leadership on data management (e.g. Barcelona in Spain, Paris, France, and Reykjavík, Iceland). Other cities have set up local data strategies at the core of decision-making processes with the objective of tackling practical data and urban challenges. For instance, Vienna's Data Excellence Strategy tackles data silos, unclear data responsibility and data acquisitions; in the United Kingdom, the outcome-oriented data methodology of the London Office of Technology and Information helps governments define the desired outcomes of local policy, barriers to achieving them, potential solutions and the data needed to design and implement them. Some cities, such as Paris, are making all structured data accessible by open license arrangements to promote their reuse and generate new applications. Other cities, such as Seoul, Korea, have developed data dashboards that centralise and visualise all urban data from different sectors to produce real-time indicators. Cities also contribute to

ensuring the privacy and security of data collected through digital technologies by setting ethics and security oversight committees (e.g. Seattle's Privacy and Cybersecurity Committee in the United States), adopting ethical guidelines for data management to generate trust (e.g. Bilbao's Data Manifesto in Spain) and defining opt-out procedures as part of data collection (e.g. the city of Takamatsu, Japan). To strengthen cybersecurity, cities are setting up dedicated teams (e.g. Security Operations Centre, Madrid, Spain) and classifying data according to privacy risk levels to support data management (e.g. New York City, United States, privacy risk levels of IoT data).

Both national and local governments have been working to set up a data architecture that reflects data quality standards, semantics and interoperability for data processing and sharing. A range of national data interoperability frameworks seeks to foster collaboration and co-ordination among stakeholders to boost efficiency and effectiveness gains from data management (e.g. Argentina, France, Japan, Luxembourg). At the subnational level, interoperability is often ensured through agreements (e.g. Dutch Metropolitan Innovations initiative) or city platforms (e.g. Barcelona in Spain, Hamburg in Germany, Nantes Métropole in France, Seoul, Korea) for data sharing among local governments, between local governments and the private sector, or through the organisation of events or fora (e.g. Sketch Lab in Toyama, Japan).

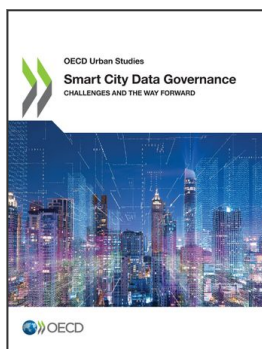
Challenges and recommendations

Despite the wide range of local and national initiatives to enhance smart city data governance, urban data still raises a set of management, regulatory, access and security challenges for both national and city governments:

- **Insufficient financial resources** for smart city data strategies are a key challenge, which prevents cities from accessing the adequate technology to process and store data and from upscaling smart city projects. A possible way forward for city governments could be to combine different budget streams to build synergies among several investment programmes and to work with neighbouring cities to pool resources together towards common goals, as well as to partner with the private sector by building a business case on the value of data.
- **A lack of business models** for financing and refinancing data collection and transfer is also a primary concern for local and national government officials. The requirements to open public (national and local) data, generally free of charge, can limit the scope of public sector bodies unable to invest in innovative digital applications. One option is to build agreements among a wide range of stakeholders to facilitate data sharing through a data ecosystem where all co-operate for its maintenance and sustainability over time.
- **Access to skilled data management and analytics experts** is also a recurrent problem for national and local governments. For example, the United Kingdom estimates that 90% of senior civil servants need to be upskilled in digital and data essentials. Organising regular workshops and networking events among data officers at all levels of government, using simple tools and interfaces for data usage, as well as creating partnerships between information technology managers and service providers to improve knowledge and co-operation and, with the help of educational institutions, could help upskill the public workforce.
- **The compliance of private companies** with the national legislation on data sharing and protection can also challenge smart city projects' implementation. In response, implementing audit mechanisms may assist in verifying that data sharing and portability requirements among stakeholders, as well as data reporting to public authorities, abide by the legislation on processing and retaining data.
- **Digital technologies are prone to data security and safety risks** related to leaks and cyberattacks. Governments at all levels need to invest in stepping up cybersecurity capacity and capability, by setting up digital security committees to discuss challenges and possible solutions

and developing agreements with the private sector to provide technical support and capacity building to local governments for example.

- **Smart city data are often stored in silos**, which often prevents interoperability. National and local governments should build data platforms that enable data sharing across city departments, sectoral policies and levels of government with relative ease and adopt data standards to facilitate common sharing and understanding while promoting open data policies.



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