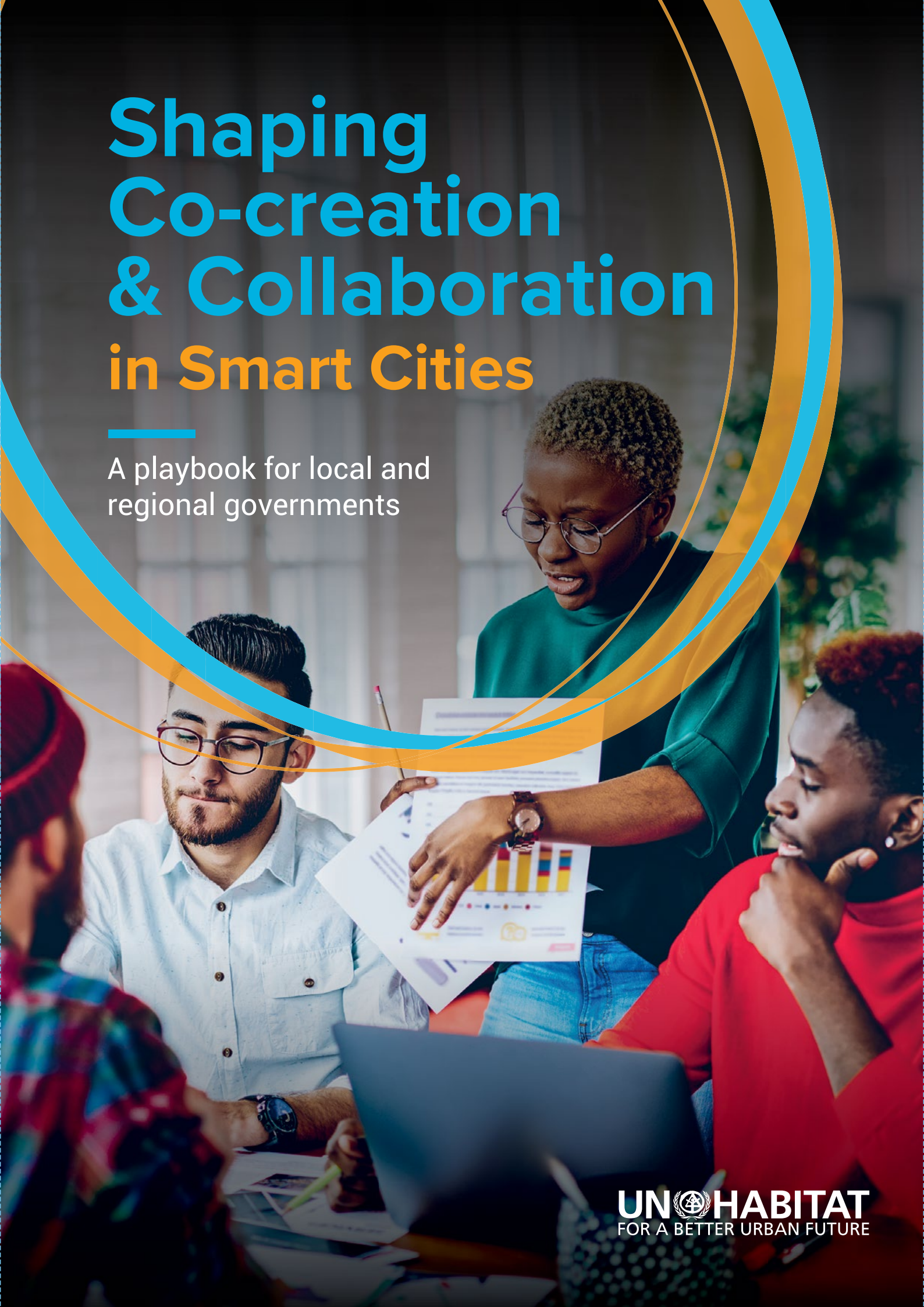
Shaping Co-creation & Collaboration in Smart Cities

A playbook for local and regional governments



UN HABITAT
FOR A BETTER URBAN FUTURE

UN HABITAT
FOR A BETTER URBAN FUTURE

Centering People in Smart Cities
A playbook for local and regional governments

United Nations Human Settlements Programme (UN-Habitat)
P.O. Box 30030 00100 Nairobi GPO KENYA
Tel: 254-020-7623120 (Central Office)
www.unhabitat.org

HS/044/21E

Cover photo © GaudiLab / Shutterstock.com

Acknowledgements
Project supervisors: Katja Schaefer, Pontus Westerberg
Principal author: Emily Royall
Contributors: Livia Schaeffer Nonose, Miles Lewis
Peer reviewers: Ivan Thung, Calum Handforth, Elin Andersdotter Fabre, Elba Fuster Figuerola, Christelle Lahoud, Ana D. Georgieva
Editor: Peyman Pejman
Design and layout: Austin Ogola

Contents

Chapters

Tables

Boxes

Foreword

Ms. Maimunah Mohd Sharif

Under-Secretary-General and Executive Director, United Nations Human Settlements Programme (UN-Habitat)

As the agency with the mandate to coordinate urbanisation matters within the UN System, UN-Habitat often highlights that half the world's population - 3.5 billion people - now live in cities. The world is both urbanising and digitising at a rapid pace and we see that digital technologies have great potential to assist Member States in their efforts to achieve sustainable urban development. The 'smart city' as a concept is the lynchpin connecting these two global mega-trends. It can help Member States achieve positive transformative change by harnessing ICTs and digital technologies to improve urban efficiency, quality of life and sustainability.

Whilst digital technology can have enormous transformative potential for positive change, it can also perpetuate existing social and economic inequalities. In 2020, I saw many children struggle to get 'connected' including the students in my rural village with many missing out on their educational needs.

To address this yawning digital divide, the UN Secretary-General has made a strong case for human rights in digital spaces in his 2020 Roadmap for Digital Cooperation, which lays out key areas for action including universal connectivity, promoting digital public goods, and ensuring trust and security in the digital environment. Additionally, in the Connect 2030 Agenda, our colleagues at ITU commit to bridging the digital divide for an inclusive information society and enabling the provision of broadband access for all, leaving no one offline.

For UN-Habitat, the use of digital technologies in cities and by cities must be appropriate to ensure that the prosperity they bring is shared among urban residents, cities and regions. Ultimately, the deployment of technology needs to be grounded in the real needs of people. It should pay particular attention to underserved populations in order to address inequalities and bridge social and spatial divides. Our people-centered smart cities flagship programme was launched in 2020 to provide strategic and technical advice to local, regional and national governments to enable them to take a strategic and proactive approach to digital transformation, while meaningfully engaging their residents and ensuring human rights in digital spaces.

We must address the elephant in the room. People-centered smart cities cannot be built when so many remain outside of the digital world. The people-centered smart cities Playbook Series aims to help cities and communities ensure that urban digital transformation works for the benefit of all, driving sustainability, inclusion and prosperity in the process. Each playbook in the series represents one of five Pillars of People-Centered Smart City development: Community, Digital Equity, Infrastructure, Security and Capacity. Collectively, the playbooks outline key activities, provide recommended actions, and policy toolkits that provide actionable guidance for cities seeking to ensure a more equitable, inclusive and sustainable future for smart cities.

About UN-Habitat

The United Nations Human Settlements Programme (UN-Habitat) is the United Nations programme working towards a better urban future. Our mission is to promote socially and environmentally sustainable human settlements development and the achievement of adequate shelter for all. We work with partners to build inclusive, safe, resilient and sustainable cities and communities and promote urbanization as a positive transformative force for people and communities, reducing inequality, discrimination and poverty. UN-Habitat provides technical assistance, policy advice, knowledge and capacity building to national and local governments in over 90 countries.

UN-Habitat is coordinating the implementation of the UN System-Wide Strategy on Sustainable Urban Development[1] and in close coordination with national and local governments, the agency leads the monitoring of Sustainable Development Goal 11 (SDG11) on sustainable cities and communities as well as the New Urban Agenda.

UN-Habitat's approach to people-centered smart cities

Launched in 2020, UN-Habitat's flagship programme 'people-centered smart cities' acknowledges the transformative potential that digital technologies can have for sustainable urban development. Through the people-centered smart cities flagship programme, UN-Habitat provides strategic and technical support on **digital transformation** to national, regional and local governments.

Digital transformation is now critical to meet the demands of sustainable urban development. In the past decade, internet connectivity has become a requisite for full participation in society, including access to education, affordable housing, and critical government services -- yet 3.7 billion people were offline in 2019[2]. In recent years, digital innovations like civic technology, geographic information systems, the sharing economy, open data, and digital platforms have changed how people understand, manage and participate in cities. The COVID-19 pandemic introduced even greater urgency for local and national governments alike to bridge the digital divide especially for marginalized groups and informal settlement communities[3], build more efficient and secure data management systems, and protect citizens' privacy when using digital services. These activities are the foundation for inclusive and resilient smart cities.

Unfortunately, many 'smart city' initiatives have fallen short on sustainability, where technology has been applied uncritically, based on supply rather than demand. Investments in smart city projects that prioritize technology's capabilities over residents' needs have not delivered expected impacts. Instead, we see trends towards surveillance, private ownership of digital public goods and infrastructure, and the perpetuation of discrimination through automated decision-making powered by artificial intelligence. As cities have become testing sites for these new technologies, there is growing concern about a lack of oversight, transparency, and potential human rights violations in smart city frameworks.

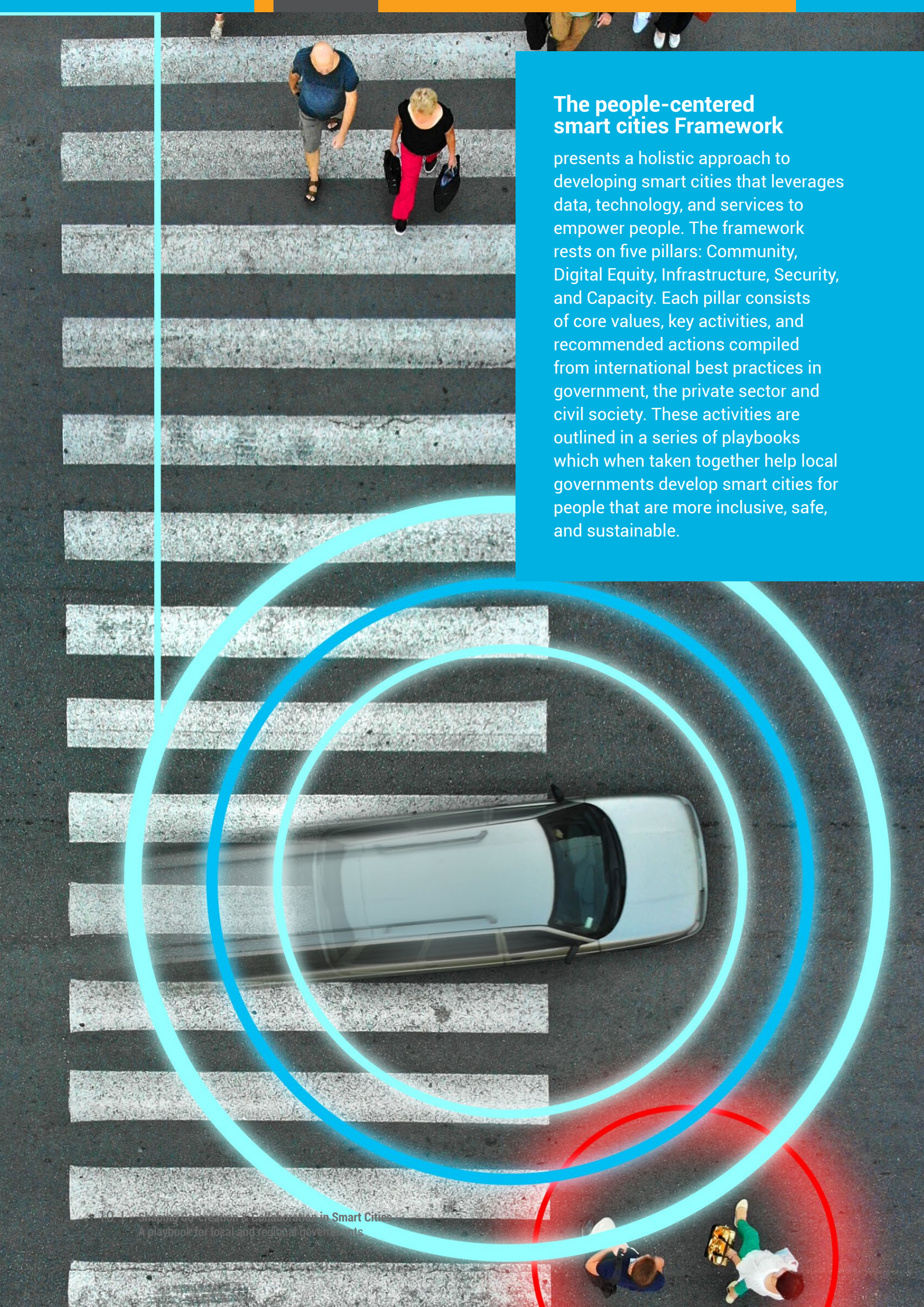
Smart cities can have a tremendous positive impact on people's lives, but only when people are at the center of the development process. This is why UN-Habitat is introducing the '**people-centered smart cities**' approach, which aims to show how smart cities can be an inclusive force for good, if implemented with a firm commitment to improving people's lives and building city systems that truly serve their communities. This requires engaging deeply with the needs of all residents and urban stakeholders through meaningful community participation, bridging the digital divide, developing essential digital infrastructure and governance, and building capacity through multi-stakeholder partnerships. It also requires governments to take a strategic approach to digital transformation, understanding its potential, and ensuring that it aligns with existing priorities as outlined in the 2030 Agenda for Sustainable Development, including sustainable transport, inclusive neighbourhood planning, providing affordable housing and reducing carbon emissions.

This new series of playbooks is a key normative component of UN-Habitat's people-centered smart cities flagship programme that aims to empower local governments to take a **multi-stakeholder approach to digital transformation that realizes sustainability, inclusivity, prosperity and human rights for the benefit of all.** To that end, local, regional and national governments will find pragmatic guidance for how to develop smart city strategies that are more inclusive, sustainable, and aligned to the actual needs of residents. We look forward to working with a wide variety of partners to implement the recommendations from the playbooks in a collaborative manner.

3.7 billion people

were offline in 2019

In the past decade, internet connectivity has become a requisite for full participation in society, including access to education, affordable housing, and critical government services.



The people-centered smart cities Framework

presents a holistic approach to developing smart cities that leverages data, technology, and services to empower people. The framework rests on five pillars: Community, Digital Equity, Infrastructure, Security, and Capacity. Each pillar consists of core values, key activities, and recommended actions compiled from international best practices in government, the private sector and civil society. These activities are outlined in a series of playbooks which when taken together help local governments develop smart cities for people that are more inclusive, safe, and sustainable.

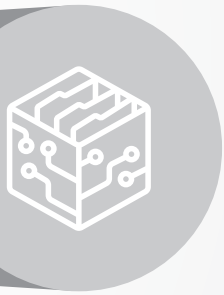
Community Pillar

Digital Equity Pillar

Community Pillar

This pillar addresses how local governments can work to place people and their needs at the centre of smart city development.

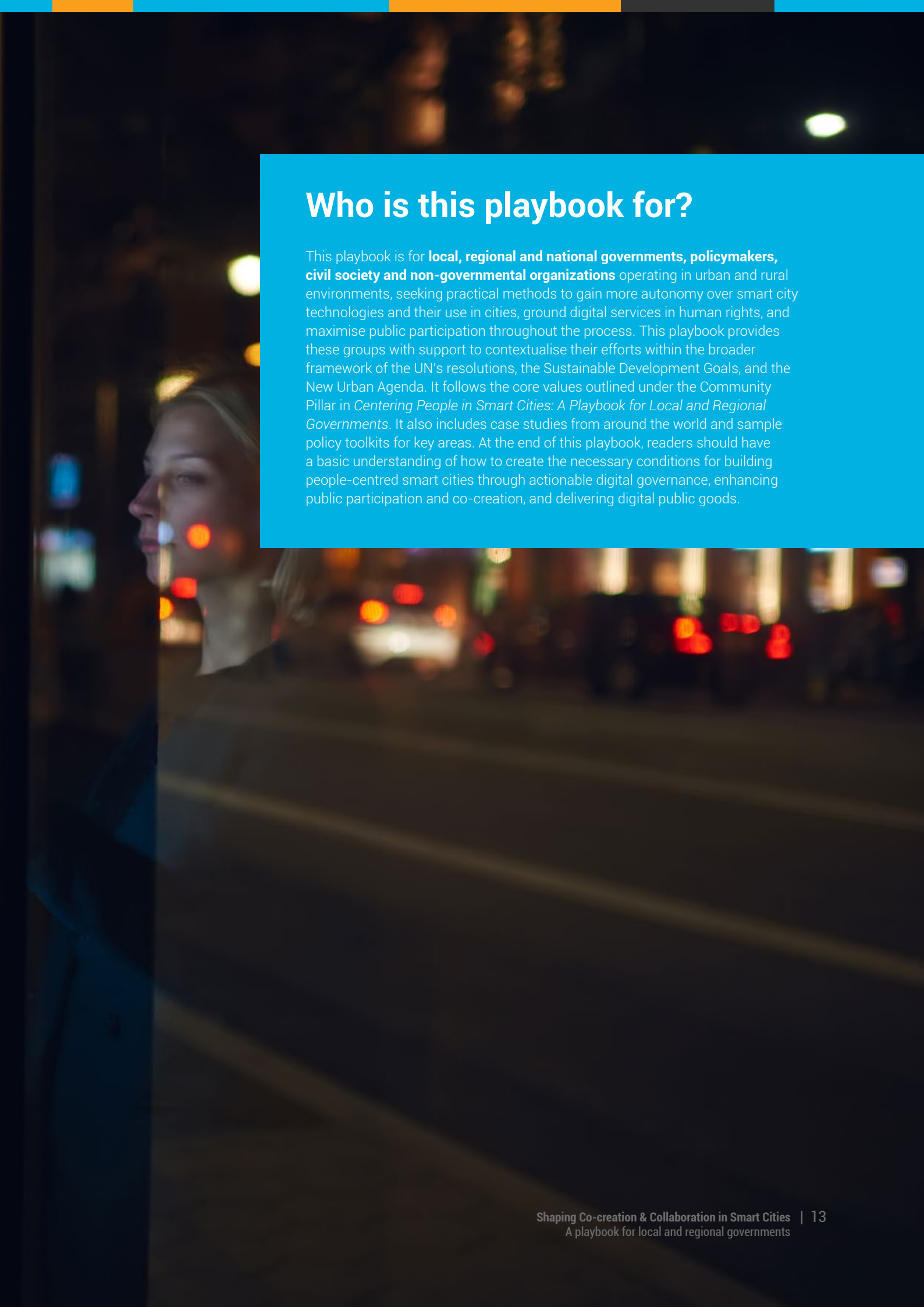
- **Activity 1:** Centre smart city activities on people's needs.
- **Activity 2:** Ground smart city infrastructure and services in digital human rights by maximising community participation, representation, transparency and control.
- **Activity 3:** Provide digital public goods that are open, transparent, accessible and interoperable.



Infrastructure Pillar

Security Pillar

Capacity Pillar

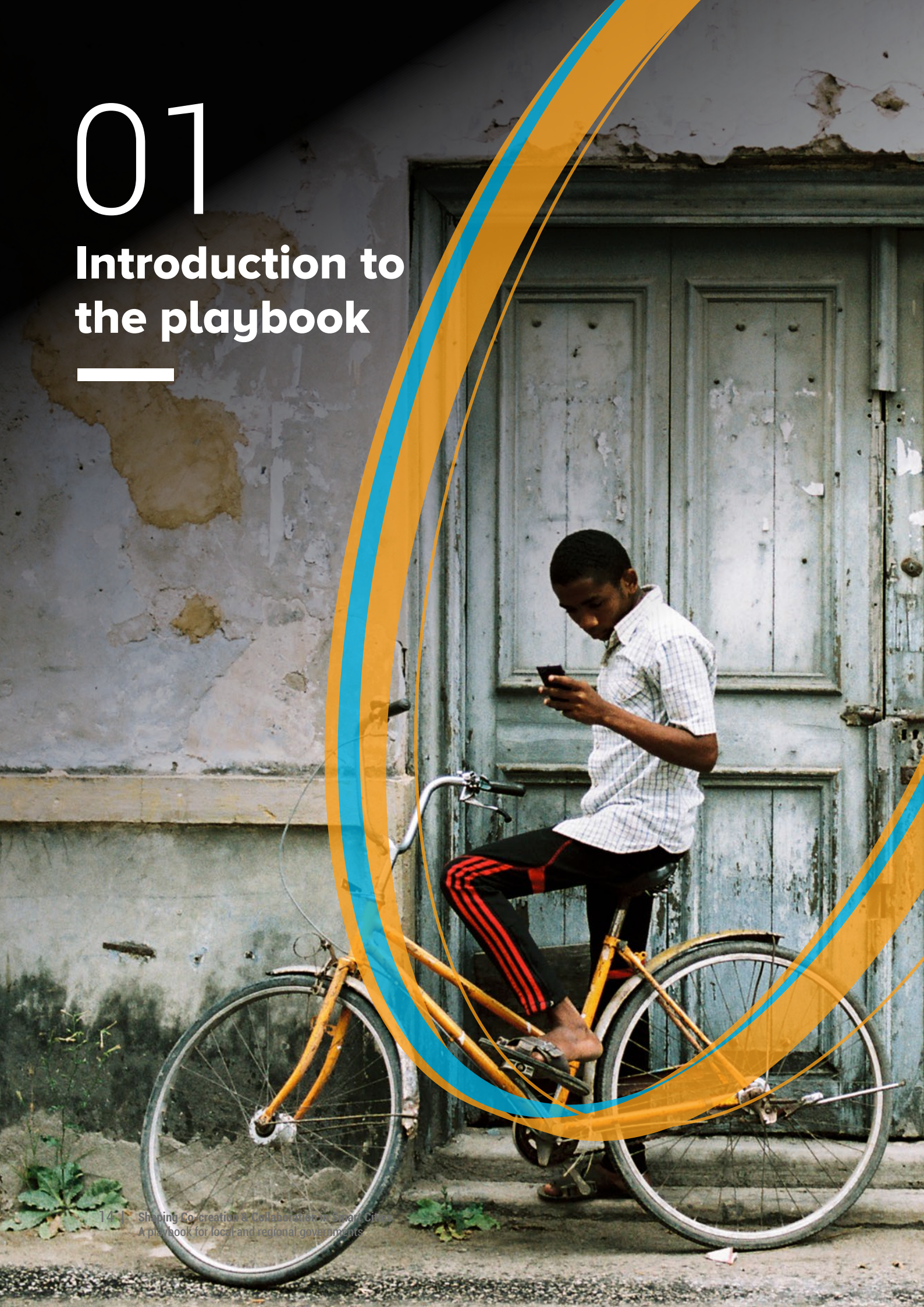


Who is this playbook for?

This playbook is for **local, regional and national governments, policymakers, civil society and non-governmental organizations** operating in urban and rural environments, seeking practical methods to gain more autonomy over smart city technologies and their use in cities, ground digital services in human rights, and maximise public participation throughout the process. This playbook provides these groups with support to contextualise their efforts within the broader framework of the UN's resolutions, the Sustainable Development Goals, and the New Urban Agenda. It follows the core values outlined under the Community Pillar in *Centering People in Smart Cities: A Playbook for Local and Regional Governments*. It also includes case studies from around the world and sample policy toolkits for key areas. At the end of this playbook, readers should have a basic understanding of how to create the necessary conditions for building people-centred smart cities through actionable digital governance, enhancing public participation and co-creation, and delivering digital public goods.

01

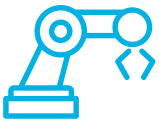
Introduction to the playbook



In order to make smart cities work for people, local governments need to shift from being reactive to disruptive technologies and towards proactively shaping the conditions for their use in collaboration with the communities they serve.

Doing so requires three main things:

1 Autonomy



Achieving autonomy over the development and use of smart city technology,

2 New services

Establishing a new generation of services that are open, accessible, transparent and interoperable, and

3 Human rights

Establishing a commitment to integrating human rights into digital services across the organization.

This playbook provides guidance to municipalities to accomplish goals in each area that can drive achievement of the SDGs and spark the development of people-centred smart cities.

City governments already have the tools to achieve people-centred smart city goals. Municipal codes and ordinances, right-of-way regulation and procurement processes can be leveraged by city governments to establish more autonomy over smart city technologies. By using these tools, local governments can create more oversight and unlock opportunities for residents to inform the process of technology development and use. To be successful, cities should first adopt a strategy that **centres smart city technology and development on people's needs.** Section 02 outlines how local governments can develop a **digital governance plan** where local governments can introduce controls, regulation and policies for digital transformation that increase opportunities for transparency and public oversight.

For many local governments, digital technologies now shape how residents access services, use infrastructure and participate in civic engagement processes. However, recent case studies have shown that the use of technology in smart cities can also erode social protections, deepen inequalities and exacerbate existing discrimination, such as through the use of facial recognition or artificial intelligence in automated decision-making[4]. This is especially true for marginalised groups including women, LGBTQIA + communities, refugees and persons on the move, the elderly, and those who have been left behind. **Digital human rights** seek to offer human rights protections as they relate to the use and experience of technology, and enable residents to safely live and participate in smart city development[5]. Cities can work to ensure the ethical use of smart city technologies by **maximising transparency and inclusivity through public participation and representation.** Section 03 outlines how local governments can integrate digital human rights into their services, develop guiding principles to establish them across the organization and create open, participatory, and transparent opportunities for residents to shape the development and use of smart city technology on their own terms.

Residents play a critical role in the development, evaluation and decision-making around processes of smart city technology, which itself can be enhanced by more convenient and inclusive modes of **e-participation** that supplement in-person community engagement. By establishing **civic technology** programmes, running hackathons and other activities that encourage public solution-building to smart city challenges, and lowering barriers to citizens, local businesses and local start-ups' participation, cities can create an ecosystem of co-creation that is more inclusive and representative of the communities they serve. Section 03. provides examples showing how cities are engaging **residents as technology developers, evaluators and decision-makers in smart cities.**

Capturing the full value of advances in digital technology will require investment in a new generation of digital public infrastructure that **provides open, accessible and interoperable digital public goods**. The Digital Public Goods Alliance (DPGA) defines **digital public goods**[6] as: 'open source software, open data, open AI models, open standards and open content that adhere to privacy and other applicable laws and best practises, do no harm, and help attain the SDGs[7].' National and local governments in developing contexts can greatly benefit from digital public goods, as they can reduce costs and complexity for lower-income countries by improving access to current technologies. The COVID-19 pandemic also highlighted the value of digital public goods, where small teams were able to rapidly build digital public infrastructure that was widely adopted. Section 04 provides a primer on digital public goods and the Digital Public Good Standard, which organizations can use to guide the development of these services.

This playbook is broken down into three **activities** that support the Community Pillar of the people-centred smart city approach. Each activity includes **core values** to your process and overall organizational culture and strategic **goals** that your organization can adopt. For each goal, we outline a series of actions, recommendations and case studies that will help you take action right away. Finally, we end each activity with a policy toolkit, that highlights model policies you can draw inspiration from or adapt for your own context.


ПЛИТКА ДЕШЕВЛЕ УБЕДИСЬ!
в ПЕТРОВИЧЕ
petrovich.ru
КРУПНЕЙШИЙ ИНТЕРНЕТ МАГАЗИН ТОВАРОВ ДЛЯ СТРОЙКИ И РЕМОНТА
ВОЗВРАТ ТОВАРОВ 120 ДНЕЙ
ЧЕСТНЫЙ ПОДЪЕМ НА ЭТАЖ
ДОСТАВКА ЗА 2 ЧАСА
8 800 333 88 67

02

ACTIVITY 1:

Centre smart city activities on people's needs

SDG 8, 16.
New Urban Agenda 91

Core Values

1 People

Value 1: People's rights should be protected in digital spaces, and cities should work to ensure transparency and public oversight over smart city technology use.

2 Partnerships

Value 2: Partnerships with the private sector should balance risk and control in order to achieve optimal outcomes for end users and residents.

3 Participation

Value 3: Governments should procure smart city technology to meet a demonstrated public need expressed through public participatory processes.

Introduction

Many cities struggle with tight budgets and are increasingly reliant on competitive funding from national governments, private sector actors or international NGOs to implement the technologies and services they need. When local governments compete for funds, they sometimes lose sight of the real, everyday needs of their residents. Additionally, because the pace of technology is moving so quickly, cities often find themselves having to react to technological innovation rather than proactively creating the conditions for technology development. When the local government's only role is to regulate, the private sector can miss critical opportunities to work with them to build technologies cities actually need. Therefore, it is important that local government leadership work to understand the needs of their constituents, and the realities of their departments in order to effectively communicate objectives and constraints to solution providers. Even further, local governments can create platforms to expand opportunities for the public to innovate and develop smart city solutions on their own terms. For all these reasons, re-centring smart city activities on people's needs is one of the most important activities under the community pillar of people-centred smart cities.

Taking a bold approach to digital governance can help local governments create the conditions necessary to achieve greater autonomy over smart city technology, services and infrastructure. This approach works by aligning the use of **information and communication technologies (ICTs)** with the laws, needs and interests of people subject to a local, regional or national governing body. In such a framework, local governments can use tools like procurement standards, municipal codes, ordinances, public right of way laws, and other tools to make sure the development and deployment of technology doesn't adversely impact residents, and create new opportunities for residents to shape the process. Activities in a plan for digital governance can include:

- **Adopting open standards** - For example, The African Data Consensus developed at the High Level Conference on Data Revolution held in Addis Ababa in 2015 established open data standards for national and local governments[8].
- **Ensuring data ownership** - For example, the City of San Antonio has mandated in its data governance policy that departments provide contract language that ensures ownership over data generated by technologies they procure[9].
- **Ensuring interoperability** - For example, the City of Gijon has deployed a public and interoperable Internet of Things infrastructure based on PE Smart Urban Network and the open standard 6LoWPAN.
- **'Dig once' to leverage existing assets or build new infrastructure** - For example, Mexico City's ADIP rolled-out city-wide WiFi infrastructure by using existing infrastructure[10].
- **Open procurement standards** - Mexico's Digital Agency for Public Innovation and Ministry of Administration and Finance has expanded opportunities for businesses run by female entrepreneurs, micro, small and medium enterprises (MSMEs) and/or cooperatives[11].

However, putting the right normative frameworks in place is only the start. Cities that want to use technologies in a more inclusive way should engage with their residents through public participation and co-creation. The majority of this discussion is covered in the next section by Activity #2.

Finally, local governments can work to diversify how technology is built for city government by identifying innovative means to develop and finance smart city solutions. Opportunities exist to finance smart city solutions that are developed by the community, nonprofits or NGOs rather than exclusively private actors. This can be accomplished through several means:

- Develop community-based financing including participatory budgeting
- Create programs that sponsor local entrepreneurship and and pre-accelerators
- Support community-led data and technology development
- Create sustainable public private partnerships (P3s)

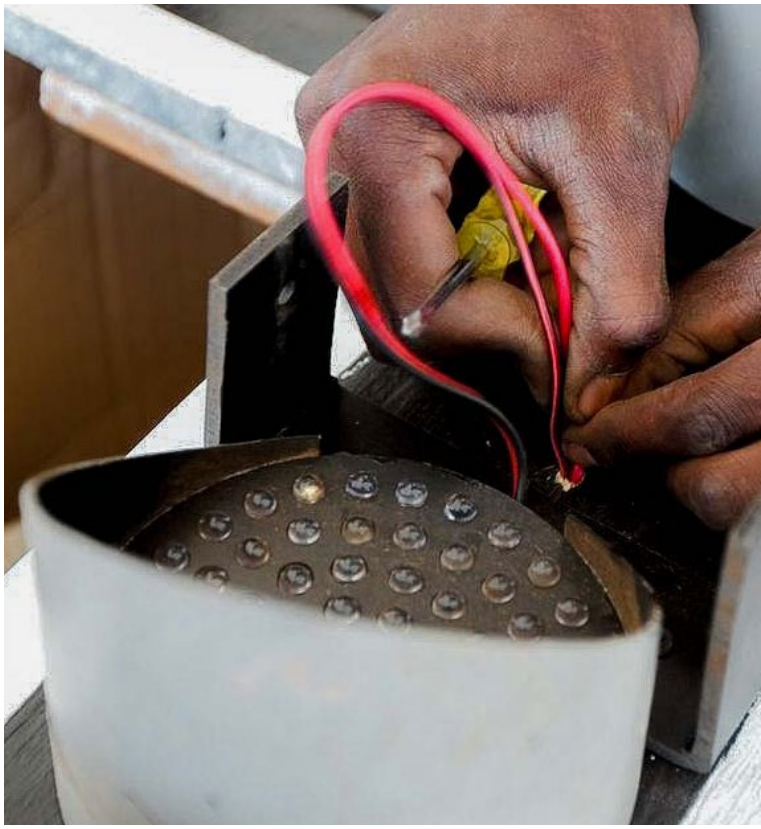
The most successful smart city approaches are those that rely on an ecosystem of partnerships. However, when cities do engage in partnerships with the private sector, it is important that they appropriately balance risk and control with opportunities in order to achieve the best outcome for the public.

Goal #1: Create the conditions for public oversight of smart city technology, services and infrastructure

In order to build people-centred smart cities, local governments must reshape how decisions about technology are made. For the purposes of this playbook, **digital governance** refers to the ability of an organization to exercise jurisdiction over the development and use of technology and data that impacts its business operations and mission. In the case of local governments, digital governance is a framework for establishing accountability, roles, and decision-making authority for an organization's digital presence[12]. In smart cities, the result of good digital governance is an improved ability of a local government and its citizens to control how data and technology is developed, evaluated, purchased and used in service of the public. There are many legal and regulatory tools within local government that can help establish digital governance.

Digital governance

Digital governance is an emerging topic that continues to respond to changes in technology. Digital governance focuses on key areas of **digital transformation** where local governments can introduce controls, regulation, and increase opportunities for transparency and public oversight. While there are several possibilities for how these tools may change and evolve in the near future, we provide the minimum activities that you should consider to create the conditions for public oversight of smart city technology, services and infrastructure. The components listed below represent some, but not all, of the activities that can be captured by a strong approach to digital governance:



The UN Secretary General's Roadmap for Digital Cooperation released in June 2020 highlights

digital inclusion and digital human rights as key pillars of what it calls

'digital cooperation'

1. Open standards - Open standards are standards made available to the general public and are developed (or approved) and maintained via a collaborative and consensus driven process. They facilitate interoperability and data exchange among different products or services and are intended for widespread adoption[13].

Smart cities rely on technology and data but few cities publish useful information about how these technologies work, or make the data they create publicly accessible. Open standards attempt to bridge that gap by providing technical information about a digital system to the public. Open standards can emphasise openness through the accessibility of the specification, the openness of the drafting process, and even the ownership of rights in the standard itself. For example, Digital Public Trust for Places and Routines (DTPR) is an open source project developed by a coalition including Boston's Office of New Urban Mechanics that is working towards developing a set of open communication standards for digital transparency in public spaces.

The goal of an open standard as it relates to people-centred smart cities is to publish information about technologies publicly so that they are understood and can even be modified by the community. There are a wide variety of definitions of open standards globally[14]. The ITU includes in its definition other elements of open standards, including that the standard was developed through a collaborative process and that access to technology is publicly available at a reasonable price.

Many cities have adopted open standards. For example, the EU's bIoTope project is working to create an open standard for Internet of Things (IoT) technology. Barcelona's Ethical Digital Standards provides standards for open source software. The city of Montevideo adopted the Red Hat OpenShift Container platform to unlock data transmission between city departments and third parties. The Future City Foundation leverages open standards provided by the FIWARE foundation to enable interoperability and data transmission across multi sector partnerships. Additionally, CityJSON and CityGML are open standards for digital twins (virtual 3D models) of urban environments.

BOX 1.1

Digital public trust for places and routines (DTPR)] Summarise: https://dtpr.helpfulplaces.com

DTPR, "Digital Transparency in the Public Realm", is an open-source standard for increasing the transparency of various forms of digital technology in public spaces. Since 2019 and in collaboration with a number of cities, work has been done to prototype a set of open communication standards. Different icons represent different technologies being used and their potential implications to the public, along with QR codes that allow the public to access more information. With partners such as Digital Public Square, Normative, and Glia, DTPR's efforts are perhaps most notable in the city of Boston, where its icons have begun to appear in public spaces. These symbols make it clear to residents at a glance where different technologies are applied, for what reasons, and with what potential accountability and feedback standards. While, for instance, this strategy still requires individuals to take an interest, understanding what the various symbols mean or downloading relevant QR codes, the strength of this project is that it allows for different technologies to be instantly identifiable, clearly distinct in the everyday chaos of, say, a city street. These icons are also meant to serve as part of a wider standard, with cities across the world adopting them, allowing for a wider consciousness of technology and its implications in our daily lives.

2. Data ownership - Data is a critical asset for governments to evaluate their services and understand their communities. As such, it is important for local governments to establish public ownership over data assets generated by technologies they procure and the services they provide.

Data that is generated and collected by public services should be owned by the public. **Data sovereignty** means that data is subject to the laws and regulations of the geographic location where that data is collected and processed. For the purpose of city governments gaining more autonomy over the data generated by their technology procurements, it is appropriate to adopt contract language that specifies data ownership by the local entity, and licences use of that data to vendors for acceptable uses[15]. However, scholars and practitioners continue to debate over the relevance of data ownership in the context of 'big data', where data emerges from networks and derives its value from network effects. There are several emerging models that attempt to tackle how public ownership of data is evolving:

Open data - Where an organization classifies data as publicly accessible, and creates a mechanism for the public to conveniently access it. In the last decade, cities and national governments around the world have adopted open data practises, and established open data platforms[16]. However, many open data initiatives sometimes fail to provide value to residents. For open data initiatives to be successful, they must provide quality, updated information, be able to withstand changes in administration, be followed by a robust awareness and digital literacy campaign, and be well staffed and funded. Regions and economic districts can also set up open data platforms, such as the Gauteng City-Region Observatory (GCRO).

Data marketplaces - When an organization creates a platform for data that is both public and monetised for certain stakeholders. In this model, a regional government can set up a platform that allows for data exchange, including offering data at a cost to some stakeholders. For example, In 2013, the City of Copenhagen, and the Copenhagen Region created City Data Exchange, a marketplace for the exchange of public, and private sector data. However, the exchange ultimately failed, in part due to challenges with data ethics, reluctance of actors to share data, and an immature data market.

Data trusts - Where organizations that collect and hold data permit a group of independent trustees to make decisions about how it is used and shared for an agreed purpose. Data trusts can be advantageous for local governments because they can make control over data more representative and equitable. Data trusts can also link public and commercial data, for example Shared Streets creates data standards for micro mobility by combining public and private data sources. The Open Data Institute provides several resources and research regarding the success and feasibility of data trusts[17].

Data cooperatives - Where individuals pool their data and share the value it creates. Data cooperatives are typically organized around a key issue such as mobility, public health research, or economic development. Participating individuals or organizations are voluntary, and utilise data under a shared governance model. For example, the Africa Regional Data Cube leveraged satellite data to help the governments of Ghana, Kenya, Sierra Leone, Senegal, and Tanzania address issues in poverty, agriculture, and deforestation. New York University's GovLab provides a wealth of resources for establishing data cooperatives, and global examples.

Data commons - Where individuals pool their data and the public can access it. Data commons are distinct from Data cooperatives because they are an open knowledge repository that combines data from public datasets. More specifically, they bring together data with cloud computing infrastructure for managing, analysing and sharing data. Data commons are typical in research communities, for example the UK Biobank which provides voluntary medical data from half a million research participants. Other open source data commons include OpenStreetMap and Mapillary. However, use of these tools often requires effort in data cleaning and quality checks.

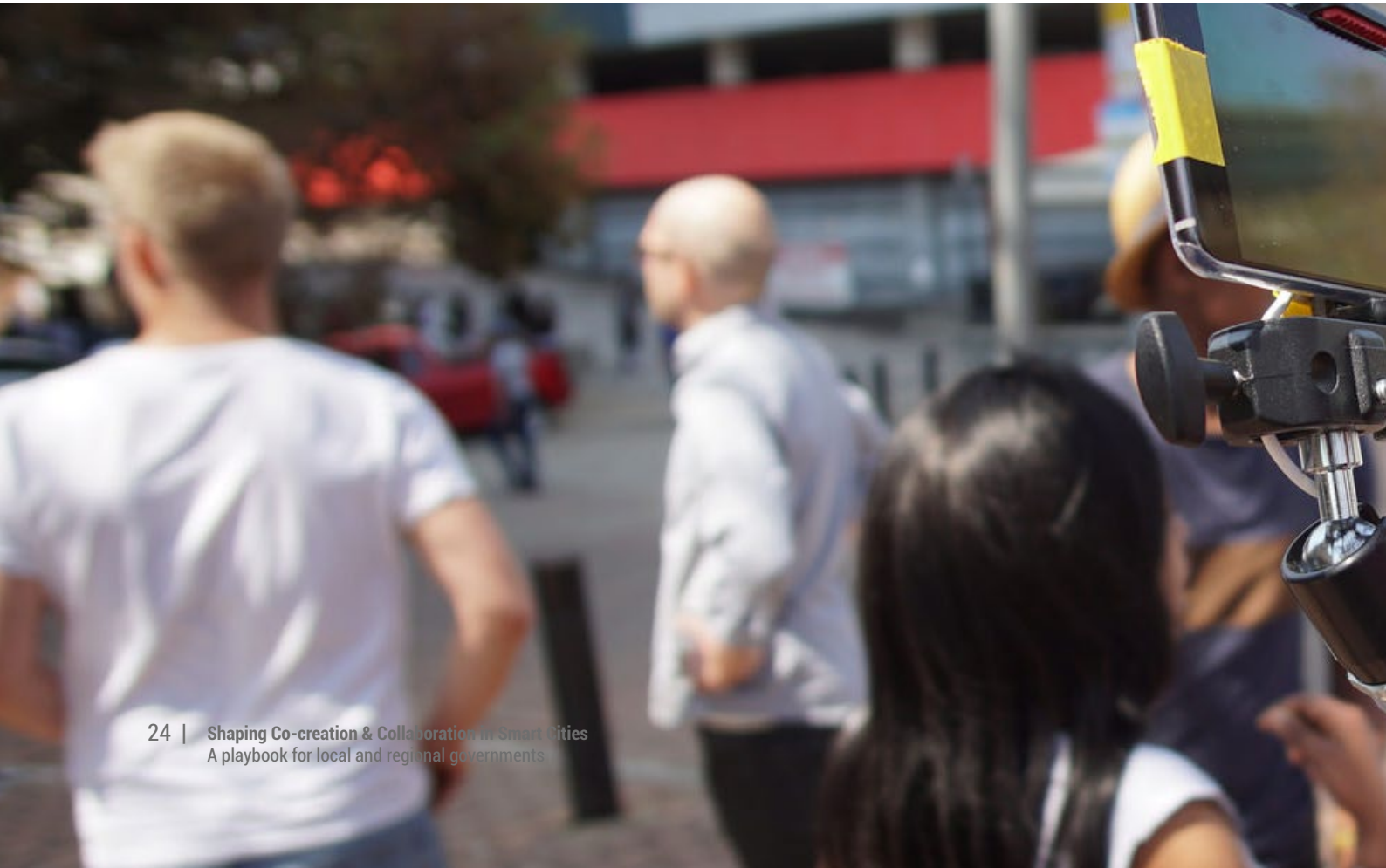
Additionally, emerging models such as collective transparency, data coalitions for collective bargaining, and the DECODE consortium that is developing tools to give residents full autonomy over government held data, are important developments for policy officials to be aware of.

3. Interoperability - This refers to the ability of multiple technology systems to exchange information and to use the information that has been exchanged.

Interoperability is important for local governments to consider when procuring new technology or when different departments provide services that overlap. Digital services can easily lead to frustration when people have to create multiple accounts with different services across local governments, or repeatedly provide the same data. Interoperability helps create the conditions for easier use of digital services by ensuring that digital services can exchange information within the existing ecosystem of platforms and software within the city. For example, the City of Barcelona has created free standards to encourage interoperability of tools developed by vendors, city staff and community members. Interoperability is also important for allowing local governments to 'plug and play' different solutions and services as new technologies and solution providers arise.

Interoperability is relevant to many aspects of digital services. Open & Agile Smart Cities offers a set of ten Minimal Interoperability Mechanisms (MIMs) adopted by the network's partners and the European Commission. These mechanisms include standards for content management, artificial intelligence, security and data management among several others. The MIMs are intended to provide the technical foundation for procurement and deployment of urban data platforms and end-to-end solutions regardless of geographic location.

Additionally, the UN Global Partnership for Sustainable Development Data provides a practitioner's guide to developing interoperability of data, and the UNDP offers a guide for developing interoperability in e-government.



4. 'Dig Once' to leverage existing assets or build new infrastructure - Dig once policies ensure the strategic development of connectivity infrastructure.

Connectivity and digital infrastructure are necessary to power the 21st century society and economy. However, building and maintaining such infrastructure is a complex effort requiring collaboration and consensus across several sectors including civil society, public and private actors. Furthermore, as connectivity technologies evolve, cities must be prepared to adapt regulation, permitting and construction management to accommodate a variety of technology needs, such as broadband, fibre, 5G, Wi-Fi and the Internet of Things (IoT). A 'dig once' policy ensures that connectivity infrastructure is delivered strategically, minimising the disruption created by having to support multiple construction efforts and community engagement processes each time technology changes.

'Dig once' policies target three key areas, according to the G20 Global Smart Cities Alliance[18]:

- **New builds and developments:** The policy should ensure alignment between public and private sector constructors, utility companies, and connectivity providers to install conduits during the construction phase.
- **Existing builds and other assets:** The policy reduces the need for multiple excavations by coordinating installations with planned street or highway maintenance, and other major infrastructure projects. By coordinating with various agencies, cities can facilitate the efficient installation of connectivity infrastructure.
- **Delivering multi-purpose connectivity:** A 'dig once' policy supports the rollout of different types of connectivity technology, including next-generation wireless connectivity (including 5G, IoT and new WiFi technologies).

5. Open procurement standards - Procurement standards refer to the rules that govern how a municipality purchases technology.

Cities have the opportunity to shape markets towards people-centred products and services, and defining the rules for how local governments buy technology is one of the most important contributions they can make to shaping smart city markets. Local governments can use procurement as a means to support local innovation, encourage the development of people-centred technology, and ensure that ethical principles and human rights standards are followed. Procurement processes should be transparent, accessible and user-friendly.

Among the 34 Organisation for Economic Co-operation and Development (OECD) countries, procurement accounts for 17 per cent of GDP[19], suggesting a tremendous opportunity for procurement to shape technological innovation. When governments purchase goods and services, they should consider how their procurement choices can influence markets to develop smart city solutions that better respond to the needs and lived experiences of residents. Contracting third-party services in domains like healthcare, for example, can significantly impact the experiences of vulnerable and marginalised groups. The International Institute for Sustainable Development and the International Learning Lab on Public Procurement and Human Rights offer best practices for procuring technology solutions that address people's needs and respect their rights. Procurement standards are also being developed by local governments for emerging technologies, such as artificial intelligence. The World Economic Forum, Data Ethics EU, and City of Amsterdam have all created guidelines for public procurement of AI.

Tools to operationalise digital governance

Smart cities require smart regulation. There are several tools that municipalities can use to operationalise digital governance. This section provides an overview of such tools, and examples of how municipalities have used each for the development of people-centred smart cities.

BOX 1.2

Building Toronto's digital infrastructure plan

The City of Toronto (CA) is on a journey to become a 'digital connected community', where people have trust and feel safe using digital technologies that can help the city deliver services and inform decision-making. To guide such a process, the government has developed a digital infrastructure plan, based on a set of principles developed in collaboration with the community and other stakeholders. The plan focuses on equality and inclusion; innovative public services; data-driven decision-making; social, economic and environmental benefits; privacy and security; democracy and transparency; and digital autonomy. Digital Infrastructure is defined by the plan as infrastructure that generates, shares and uses data in its operations. The digital infrastructure plan aims to ensure that the city staff, the residents and the private sector understand how such infrastructure is being developed and implemented, thus enhancing cooperation and transparency.

BOX 1.3

London's emerging technology charter

Through the 2021 Mayoral Manifesto, London (UK) set ethical guidelines for data-enabled technology in its Emerging Technology Charter with four key principles: 1) be open, 2) respect diversity, 3) be trustworthy with people's data, 4) be sustainable. These principles apply to all technologies, but are not mandatory. Rather, it will be applied depending on the specific context and the public office that is developing and implementing the technology. The Charter acts as a guide to structure and inform discussions around the adoption and implementation of technology, within an agile governance framework to adapt to the fast pace of change in the technology landscape. The Charter's principles are departure points, in which tools and considerations are also provided to help operationalize the guidelines into the workstreams of different teams working in the public administration of London. The charter's resources are open source and available for consultation online, representing a model for building transparency and accessibility for other cities.

BOX 1.4

The SDG digital investment framework

The opportunity for digital technologies to propel the achievement of the Sustainable Development Goals (SDGs) has been repeatedly recognized by the international community. To better inform public investments in digital technologies and address the need for suppliers and vendors to adjust to meet the objectives of the SDGs, International Telecommunications Union (ITU) and Digital Impact Alliance have developed a framework to guide digital investment and priorities for information and communication technology services that support the national development goals of each country. The framework is composed of high-level objectives such as the SDG targets, with use cases to illustrate the steps required to achieve the objectives and workflow processes that help to deliver each use case. It includes building blocks of information and communication technologies (ICT), the software components that are reusable and enable workflows and use cases, across multiple sectors and programmes. Taking a whole-of-government approach strengthens the SDGs across different sectors and breaks silos to integrate the digital infrastructure architecture, enhancing governments capability of planning long-term while scaling impact. Some other examples of a "whole-of-government" approach include India's national identification system - Aadhaar, and Rwanda's Vision 2020 strategy, focusing on digital payments, mobile penetration and internet access.

BOX 1.5

E-Burkina Project: Leveraging digital services for public administration in Burkina Faso

In 2017, with the digitization of government services being one of Burkina Faso's priorities in its National Plan for Economic and Social Development (PNDES), the country established the e-Burkina project with the support of the World Bank. The goal of the project is to reform public administration, expand the digital infrastructure of the government, connect public agencies, increase access to information and deliver better services through digital channels. The platform manages data across government organizations and the community, aiming to foster digital inclusion in the rural areas of Burkina Faso by combining digital and analog tools to reach the population. Supplementing digital tools with in-person or analogue approaches is a crucial approach to ensure the benefits of such initiatives and reach populations without access to technology. Rural areas account for 80 per cent of the total population in Burkina Faso, whose economy is primarily agriculture-based. The application of ICT in Burkina Faso also includes other dimensions. The use of digital tools to collect evidence and data to support mitigation plans for climate change adaptation is crucial as the rural areas are predominant in Burkina Faso. The country is vulnerable to climate change impacts and sees in ICT the tools needed to better plan for mitigating such risks. Another approach taken by the government with ICT involves simple ways of making data and information available to people and the private sector, for its potential to increase public trust in the administration, driving transparency and accountability, while stimulating business activities.

Procurement

Procurement processes are different in different regional contexts. In some cases such as Vietnam and Myanmar, national governments have procurement strategies that touch all levels of government[20]. The Smart Africa initiative has several recommendations for digital economy planning and procurement in African countries[21], but notes that in the developing context, more centralisation of procurement guidance from the national level is necessary. Agile Cities is an initiative that works to provide open standards for procurement processes that are more flexible and effective. The Open Contracting Partnership also provides cities with support for following global open procurement principles.

Different cities have different values for how to adapt procurement processes for digital transformation. For example, the City of Amsterdam has a strong focus on the potential negative impacts of artificial intelligence, and has developed procurement standards exclusively for the development and deployment of algorithmic technology. Singapore has instead adopted a procurement process that is more inclusive of small businesses. Singapore's GovTech initiative introduces new ways to partner with the government, including co-development of technology with industry partners and dynamic contracting. Other cities like Pittsburgh and San Antonio have adopted 'agile procurement' models that function as 'laboratories' where start-ups can co-develop technology solutions to civic challenges in collaboration with the city.

Municipal codes & ordinances

Some cities have turned towards municipal codes as the primary avenue to enforce their digital government principles. While not all cities have developed these powers, typically such codes take the form of smart city municipal codes, building codes for smart urban development or tackle a specific human rights issue regarding the deployment of technology in public space.

For example, the City of Somerville in the US has adopted an ordinance that outlines a public process for the oversight of surveillance technology that requires city departments to publish surveillance technology impact reports and develop specific surveillance use policies. In other cases, cities leverage executive orders and ordinances to outright ban certain technologies they perceive as detrimental to human rights. More than ten U.S. cities have banned the use of facial recognition technology, for example[22].

In other contexts, cities are negotiating with federal legislation impacting the use of surveillance technologies in public space. For example, the European Union's bill on artificial intelligence places restrictions on the use of facial recognition technologies in public places for law enforcement, but some cities feel the legislation is not comprehensive. In response, Barcelona, London, Amsterdam and New York, have launched the Urban AI Observatory, which aims to build evidence-based criteria for use of artificial intelligence in cities.

Some cities seek to be proactive by using ordinances and municipal codes to set the rules of engagement for emerging technologies like intelligent traffic systems. For example, São Paulo's Transportation Office issued an ordinance that establishes a communication protocol that must be adopted by any intelligent transportation system (ITS). The city also issued an executive order that regulates the use of urban mobility infrastructure for economic activities via software platforms that provide individual transportation[23].

Other tools exist that focus more on regulating urban design and the built environment for more sustainable and equitable outcomes. In 2018, the Smart Cities Council of Australia and New Zealand partnered with Green Building Council Australia to develop the Code for Smart Communities, which is a plug-and-play toolkit for smart urban planning that promotes sustainable and liveable outcomes.

Public right of way regulations & permitting

Public spaces, including streets, sidewalks, squares and parks are typically managed by local governments. Collectively, these types of infrastructure form the 'right of way' over which local governments have authority. Smart city technologies such as autonomous vehicles, smart street lights, drones, digital kiosks, e-scooters and even drones all require access to the public right of way for their use. Therefore, some cities have found an opportunity to introduce regulation of these technologies as they allocate permitting to acceptable uses and deployment of ICTs in public spaces.

GOAL #2 Build dynamic multi-sector partnerships opportunities to finance smart city solutions that are developed by the community, nonprofits or NGOs

How local governments build and administer partnerships shape opportunities for public involvement. In people-centred smart cities, local governments build inclusive partnerships across multiple sectors and through various financing mechanisms. Doing so encourages a diverse range of technology solutions that are more likely to be representative of diverse needs. Below are some examples of how municipalities can create inclusive and sustainable partnerships and financing opportunities.

Community-based financing and participatory budgeting

Community-based financing refers to grassroots financing and funding that is generated or controlled by the community. One vehicle for community-based financing is participatory budgeting where citizens are invited by public authorities to directly decide on how to spend part of the government's budget[24]. Participatory budgeting works by creating proposals and voting for those that will bring more collective benefits. Today, technology can make it easier to implement participatory budgeting and make the process accessible to citizens. The UN-Habitat Participatory Habitat Initiative works with local governments to implement participatory budgeting in various contexts. For example, the City of Chengdu collaborated with the UN to develop an online platform for participatory budgeting, which in January 2021 had been implemented in 73 communities, with 57,273 registered residents. An annual public fund was allocated which residents managed by proposing specific projects to be implemented in their communities[25]. Another example includes Sofia Chooses, a program established by Sofia municipality in Bulgaria, which encourages the direct participation of residents to facilitate urban development, including projects addressing sustainable development and climate change.

Communities can also self-organize to raise and allocate funding for digital infrastructure projects. This is particularly successful for last-mile communities that are rural, hard-to-reach or located in informal settlements. One example of community-based financing is Rhizomatica, a community-organized nonprofit that works to build free and open-source broadband networks in rural communities across Mexico[26]. In Rhizomatica's model, community members are trained in network installation and maintenance. As a result, participating communities pay less for equipment and installation (about one-sixth of the cost of a private connectivity provider for rural installation in the region).

Sustainable public private partnerships (P3s)

Sustainable public private partnership models are those that appropriately balance the tradeoffs between cost, risk, control and benefit across multi-sector partners. For example, a sustainable public private partnership model might involve a public authority building, owning and maintaining infrastructure, while a private partner delivers services and handles customer support. An alternative example is one where a public authority procures a private provider to develop a technology, but requires that service delivery remain open to public and private third party providers. Local governments and public authorities can create incentives in these kinds of partnerships for private actors to guarantee successful phasing projects. For example, a private contractor may be more likely to consider life-cycle costing during the construction phase of a project when it is also responsible for ongoing maintenance of the asset.

Local governments can facilitate public private partnerships in four main ways:

1) by facilitating access to key infrastructure assets such as streets, sidewalks, utility poles and real estate;

2) by facilitating access to customers;

3) by making data about infrastructure available to private sector partners; and

4) by streamlining and publicising essential local processes such as permitting or inspections. Sustainable public private partnerships balance the requirements of various partners and establish institutional frameworks for:

   - Credible cost benefit analyses
   - Achieving optimal risk allocation
   - Transparency on impact to budgets
   - Safeguarding citizen's welfare
   - Advancing sustainable development[27]

Ultimately, the burden falls on the public authority to design sustainable levers of cost, control and risk in a public private partnership that provides the private sector with the right incentives to invest, innovate and build optimised solutions while maximising benefit to the community in the long term.

03

ACTIVITY 2:

Ground smart city infrastructure and services in human rights

SDG 17.
New Urban Agenda 91, 92, 156

Core values

1 Human rights

Value 1: Human rights are critical inputs to public policy and public service provision.

2 Privacy

Value 2: City services should incorporate principles such as privacy, equal access, freedom of expression and representation in government into locally controlled digital platforms, infrastructures and services.

3 Participation

Value 3: Local governments should create open and participatory opportunities for residents to shape the development and use of smart city technology.

Introduction

Because technology shapes how people access and share information, services, and goods in cities, it hastransformed how people experience urban environments and therefore, how people exercise their human rights[28]. Most local governments view technology as a tool to advance smarter public services and better engage residents. However, in some cases the use of technology in smart cities has deepened inequality, for example through the use of facial recognition in public space or artificial intelligence in **automated decision-making**. This is especially true for marginalised groups including women, LGBTQIA + communities, refugees and persons on the move, the elderly, and others who have been left behind. For these reasons, it is important for people-centred smart cities to unlock and expand opportunities for everyone to help drive technology development, evaluation and deployment processes in cities.

People-centred smart cities simultaneously establish public commitments to transparency, privacy and inclusion across digital services and digital infrastructure administered by the local government, and create open, participatory and transparent opportunities for residents to shape the development and use of smart city technology. **Such commitments invite the public to hold local governments accountable, build trust with residents, and invite the private sector to develop relevant solutions.** But how can local governments accomplish these goals? This involves addressing three key areas:

1. **How cities make public commitments to transparency, privacy and inclusion that are actionable and that they can be held accountable to.** Work with residents to establish and prioritise principles that guide the city's use of data and technology.

2. **How cities can be better at involving residents in their technology projects.** Use both non-digital as well as digital means to inform and involve people in procurements and strategic planning of technology initiatives.

3. **How cities can use digital platforms and tools to improve public participation in general.** This requires rethinking how digital technologies are used to unlock planning and participation.

Activity 2 covers what local governments can do to get a head start in these three key areas. Aside from working to increase transparency and privacy in the use of smart city technologies, local governments can also create open, participatory and transparent opportunities for residents to shape the development and use of smart city technology. This can include working to democratise the ways in which smart city technologies are funded, prioritised and chosen. Cities can also leverage procurement and open standards to foster local innovation and solution-building, or focus budget expenditures on leveraging technology to develop new modes of public participation that help residents more clearly express their needs.

GOAL #1 Establish public commitments to transparency, privacy and inclusion across city digital services and digital infrastructure

People-centred smart cities should set out guiding principles for transparency, privacy and inclusion as they pertain to smart city technology. These principles should be built from community consensus through a participatory process. The process of development of these principles will look different for each community, and should be tailored to and facilitated by the local culture and urban realities. For example, the City of Toronto's digital infrastructure plan[29] establishes principles including digital autonomy, equity & inclusion, and democracy & transparency. The City of Los Angeles's digital bill of rights, focuses on balancing innovation with ethics[30], while Tunisia's commitments under the Open Government Partnership[31] emphasise transparency, public participation and the digitisation of administrative services. What all of these have in common is that they are *public commitments* to the vision these communities have for smart city technologies. However, each has varying degrees of enforcement. Some can take the shape of policies which are less enforceable, or ordinances and municipal codes, which are highly enforceable. Below are eight steps you can take to launch your organization's public commitments to smart city transparency, privacy and inclusion.

Globally, 72%

of households in urban areas had access to the internet in the home

almost twice as much as in rural areas (nearly 38%)

Step 1: Obtain leadership buy-in

Leadership involvement is typically critical to the success of a municipal project. In today's world, cities that are proactive about human rights in smart cities are often eligible for resources from various programmes, national governments or international donors. Several programmes currently exist to provide support to leadership. For example, the Hague Academy for Local Governance offers the Citizen Participation and Inclusive Governance Programme[32] to strengthen the capacity of public administration staff to include citizen participation in public policy development. Some programmes target specific countries such as the Swedish International Centre for Local Democracy[33] with training opportunities that support more equitable and inclusive governance in Botswana, Kenya, Namibia, South Africa and Zambia. In Lisbon, the programme SOMOS[34] promotes democratic citizenship and human rights at the local level. Other examples include the Global Initiative for Inclusive ICTs which hosts the DARE Academy (Digital Accessibility Rights Education) for local governments, organizations, researchers and policy-makers[35]. In the U.S, the What Works Cities certification[36] recognises U.S. local governments using data and evidence in their decision-making process.

Step 2: Establish a team

To ensure continuity of initiatives, establish dedicated staff that represent multiple departments within the organization. Several departments may be relevant for setting up public commitments to transparency, privacy and inclusion in digital services. These can include departments spanning: information & technology, human resources, diversity, equity & inclusion, cybersecurity, data, innovation, sustainability or government & public affairs.

Step 3
Create up-front opportunities for public input

Public consultation should happen at the beginning, not the end of this process and put special efforts into engaging those voices that are less heard. Municipalities can host community engagement events, virtual forums or leverage digital public participation platforms or other platforms to capture community concerns regarding smart city technologies. When engaging residents, there are several recommended best practises[37], and it is important to clearly articulate how their input will be integrated into the document. Section 09 of *Centering People in Smart Cities: A playbook for regional and local governments* provides a detailed section on how to build meaningful public participation in smart cities.

Step 4
Draft the principles, commitments, or guidelines

Once input is gathered from the public at large, you can begin to draft public commitments in the form of principles, guidelines or another appropriate format. Most cities centre human rights goals within various aspects of technology in the form of core values, or principles that guide the procurement, development and use of technology by the municipality. Below are common themes that are typically addressed in a **digital bill of rights** or comparable document:

- Universal and equal access to the Internet, and digital literacy
- Privacy, data protection and security
- Transparency, accountability, and non-discrimination of data, content and algorithms
- Participatory democracy, diversity and inclusion
- Open and ethical digital service standards[38]

Step 5
Unlock your draft for review by experts

After a draft has been developed that combines known community concerns with the expertise within your organization, you may want to obtain external feedback by independent subject matter experts. These experts may direct your attention to emerging research topics, opportunities, or constraints not foreseen by your stakeholders. You may organize informal meetings, establish advisory committees, task forces, or focus groups that will help you finalise your draft.

Step 6
Publish and share your commitments

Publish your commitments publicly in an accessible format. The commitments should be machine readable, and accessible in both digital and physical formats. You can host supplementary community engagement activities to educate and inform residents of the new policy.

Step 7
Build off your foundational commitment to human rights

Once your commitments are published, you can begin to develop programs, policy and activities that help your city departments operationalise and comply with them. For example, the City of Seattle's privacy programme provides toolkits for city departments to operationalise their privacy principles by conducting mandatory Privacy Impact Assessments[39]. You can also identify opportunities within international, national and local policy frameworks, to build a foundation for human rights in smart cities.

The São Paulo City Hall, in Brazil, provides guidelines for designing digital services with accessibility and inclusion criteria. The National League of Cities helps city leaders with information on how to bridge the digital divide with its Digital Equity Playbook. The City of Barcelona has published, among other works, a policy framework for considering artificial intelligence ethics in algorithmic decision systems. The City of Portland (USA) established a dedicated community engagement plan to ensure the population was given space to contribute in their surveillance policy development.

Step 8
It is a living document

Don't leave your commitments on a shelf. Smart city technology is always evolving, and so too are the human rights issues associated with it. In order to avoid the risk of your commitments losing relevance, set up a structure to regularly review and revise the commitments. You can do this either internally, or by hosting public gatherings to revisit and discuss the document regularly over a given period of time.

GOAL #2 Transform residents from consumers to active participants in the development, evaluation and decision-making of smart city technology

Residents should be engaged when it comes to decision-making about the role technology will play in the community. Section 10 of *Centering People in Smart Cities* covers public participation in depth, but broadly residents can be engaged in four major ways:

- **As drivers:** Where residents drive the decision-making process by actively setting budgets, setting strategic goals and defining the use of smart city technologies. To achieve this role, local governments must support a decision-making process with an institutional means of execution (such as financing, procurement, policy, and deployment or delivery).
- **As democratic participants:** Where residents are included in the decision-making process, influence project goals and desired outcomes and provide feedback on the use of smart city technologies.
- **As co-creators:** Where residents participate in helping local governments build technology or infrastructure, create new uses for data and ICTs or co-develop policies and strategy.
- **As ICT users:** Where residents participate in online platforms and digital infrastructure including open data, 311 platforms, augmented reality (AR) applications and sensor data collection primarily for the purpose of obtaining information, conducting analysis or providing feedback to local government.

Residents and technology development

Local governments can also leverage procurement and open standards to foster local innovation and solution-building through:

- **Programming:** by establishing civic technology programmes, hackathons and other activities that encourage public solution-building to smart city challenges. Such activities should prioritise unserved and underserved communities.
- **Procurement:** by lowering barriers to local businesses and local start-ups' participation and creating standards that encourage interoperability of technology solutions and public oversight.

Many municipalities have embraced local entrepreneurship and developed programmes that provide support to local start-ups and small businesses in the area of smart cities and civic innovation. These programmes typically adopt a variation on a model of economic development where challenges are issued to start-ups in settings that offer a mix of seed funding and expertise. These 'incubators' or 'start-up in residence' programmes can be financed by local governments or a mix of public and private partners with opportunities for successful participants to be awarded procurement contracts with the municipal entity. Local governments have both developed accelerators which 'accelerate' growth of an existing company, or incubators which instead 'incubate' disruptive ideas into sustainable business models.

BOX 2.1

Accelerating smart cities in Dubai

The Dubai Smart City Accelerator is operated by the startup bootcamp "Smart City Dubai" to support the development of innovative, technology-based solutions that address cities' most pressing issues such as congestion, energy and waste management. The accelerator focuses on the impact of smart technologies, which integrate digital solutions into building infrastructure, transportation, planning, and several other aspects of urban life. The accelerator offers an intensive six-month programme to provide mentorship from industry experts, working spaces, seed funding and an entry point to a network of investors and partners.

There are several notable examples in this space. Digital Dubai in partnership with Dubai Silicon Oasis developed the Dubai Smart City Accelerator which pairs smart city start-ups with mentorship, access to workspace and seed funding. Recently in the UK, UP Ventures partnered with think tank Connected Places Catapult to launch the UK Smart City Innovation Testbed. The accelerator focuses on using technology to adapt to a post-COVID environment. Likewise, the Depa Accelerator Program acts as an incubator and catalyst for smart city start-ups in Bangkok, Thailand.

Residents and technology evaluation

The role residents should play in technology evaluation is to provide their lived experiences or expertise in a subject matter to help local governments make effective decisions about technology adoption and deployment. Doing this up front can help save time, and avoid the costly termination of projects that are not well understood or considered acceptable by the public. For an example, the City of Toronto terminated its partnership with Sidewalk Labs for the redevelopment of Quayside when the collection, ownership and use of data was not deemed acceptable by the public[40].

Public oversight can be developed in both structural and decentralised ways. Some examples include establishing citizen steward programs, creating citizen's assemblies to evaluate risk thresholds for a particular technology, or allowing public commentary and annotation of policy drafts. Some local and national governments establish transparent and public advisory committees that provide oversight regarding digital governance plans and policies. For example, Vietnam established the National Committee of e-government that includes ministers of science and technology, planning, education, health, industry and agriculture. An alternative approach is to use digital tools to involve residents digitally in decision-making. For example, the City of Toronto provides several ways for residents to inform their digital infrastructure plan including public consultations, 'drop-in' discussion sessions, and an online feedback tool. The online and open source tool Your Priorities that allows residents to participate in policy making, has been adopted in cities and countries around the world including Better Reykjavik, Cities for People in Trikala, and 'I Choose Malta.'

BOX 2.2

Using participatory democracy for a "Better Reikjavik"

As part of its efforts to strengthen participatory democracy, Reykjavik's platform "Better Reykjavik" provides the public with an open online consultation forum, where individuals can provide feedback and suggest ideas for projects in the city. Through the "My District" initiative, Reykjavik residents have used the platform as a tool for participatory budgeting since 2012, with over 18m eurosgranted by citizens to a total of 787 projects. This collaboration with residents included a co-creation process for its Reykjavik Education Policy, in which participation from the community was crowdsourced using the "Better Reykjavik" platform. Teachers, parents and students and other stakeholders contributed to define skills and ways for the education system to foster such skills, using online and offline meetings, organized through the platform. The draft plan was approved in 2018 to become a policy document, with the implementation initiated afterwards and called "Let Our Dreams Come True", with funding from the Development and Innovation Fund.

Residents and technology decision-making

The use of technology in smart cities should be deliberated, and city leaders should understand that technology always comes with tradeoffs, and may not always be the appropriate approach to solve an urban problem. Technologies can reflect or exacerbate existing racial or economic inequalities rather than improve urban life, and are often capable of collecting data and information that require certain privacy protections to be in place. The deployment and management of these technologies using contracts with third parties can be problematic if there is not sufficient oversight and awareness of how these contractors operate, or roles and responsibilities have not been clarified. For all these reasons, it is critical to involve residents in the decision-making process about whether and how to proceed with technology-based smart city initiatives, such as streetlights, smart water metres, autonomous vehicles, or public safety enhancements.

In *Making Smart Decisions about Smart Cities*[41], the American Civil Liberties Union (ACLU) recommends holding public hearings to discuss smart city technology and forming citizen working groups to evaluate and decide on new proposals. Additionally, cities can establish a public use policy for each smart city initiative. The public use policy, drafted in collaboration with the community, would specify the acceptable uses for a smart city technology and the data it generates, among other details. In recent years, the field of automated decision-making has advanced in this space. Some cities have begun to create **public algorithm registers**, which document use cases for existing or potential deployment of automated decision-making and publicly share this information online. Software companies like Saidot.ai are developing tools to help local governments build customised registries. The City of Amsterdam launched its register in 2020.

BOX 2.3

City of Amsterdam algorithm register: https://algoritmeregister.amsterdam.nl

In cities around the world, different sorts of algorithms are likely to play an ever increasing role in various processes of governing. The power of algorithms to improve urban services is now widely accepted, with uses ranging from facial recognition in law enforcement to the production of urban plans and zoning. In many cases however, reliance on algorithms and other forms of AI has limited transparency, where due to either censorship, or a lack of understanding of how a complex algorithm actually works, "black boxes" are created. Amsterdam's city government has decided to make an effort to increase the transparency of the variety of algorithms it uses. To this end it has produced, along with the city of Helsinki, an online "algorithm register". What is particularly interesting about this effort, is its approach towards providing oversight and information to the wider public. The algorithms listed are presented in an easily-readable format, with categories listing how the algorithm itself works, what levels of human oversight exist, what efforts have been made to avoid discrimination, and what potential risks exist (including what is being done to address them). With its clear summaries of the various algorithms used by the city, as well as on-site surveys and spaces for user comments, Amsterdam has given its residents a means of understanding and contributing to the use of artificial intelligence in their community. Due to the simplicity of the project, this approach can be easily adaptable to any city where algorithms play a role.

GOAL #3 Leverage digital tools and platforms to enhance participation

One problem many cities face is that a small and unrepresentative share of the population often makes critical decisions about local services, land use, or the use of technology. Increasingly, digital tools like social media, websites and digital platforms, have expanded the potential reach of local governments to residents. There are several examples of how local governments involve residents in actual decision-making about technology and other local services or activities through innovative means. However, the success of digital tools and platforms for enhancing public participation hinges on three key features:

- Broad public awareness and adoption of the digital tool or platform
- Adoption, training and use of the platform across government departments, and public utilities
- Feedback loops for information sharing between the platform and low-technology or offline forms of engagement.

Local governments seeking to enhance the use of digital tools for public participation should carefully consider these features before spending time and money rolling out a public participation tool or platform. Likewise, when receiving data about community feedback from the tool, city officials should appropriately contextualise this information in terms of representation of the overall population.

Collective intelligence & crowdsourcing

The proliferation of smartphones and social media has led to developers creating new modes of communication and capturing the sentiments of broad swaths of the population. For very large cities, and ideally, cities where a large proportion of the population has access to a smartphone or computer, it may be informative for local governments to use interactive online platforms to gather feedback from the community, and push information out to residents at a large scale.

For example, the platform Ushahidi is driving a number of collective intelligence processes in cities based on responsive wireless or SMS-based crowdsourcing and mapping. Irys allows the public to search for open construction projects and provide feedback to developers. Local governments can push notifications about new projects directly to residents who opt-in to communications for their neighbourhood. Other platforms like Zencity can passively track the sentiment of the public regarding key topics on social media. Local officials can use the platform to search for keywords related to their projects and receive a comprehensive sentiment analysis of that topic or issue.

The success of platforms like these relies in part on broad adoption of the app by the community. Therefore, deployment of community intelligence platforms should be accompanied by a robust information campaign that encourages residents to download the tool. Local governments should also analyse what proportion of the population may be excluded from feedback based on Internet access, access to digital devices, key demographics and abilities. The UNDP has developed a report compiling best practices for leveraging collective intelligence towards achieving the SDGs[42].

Public participation platforms

Online platforms that facilitate public participation, otherwise known as **e-participation**, are growing in sophistication, ranging from virtual town halls to complete online voting. These platforms expand public participation by making it more convenient online. e-participation activities can include public notification, consultation, participatory policy-making, voting and even incentivising activities using digital currency on the blockchain.

Perhaps the most popular example of virtual public participation is the e-Estonia platform, where 99 per cent of government services are offered online, residents can pay taxes, receive prescriptions, and bank all under a single e-residency identification which is accessible transnationally. e-Estonia offers a toolkit to familiarise participants with the platform.

Regarding participatory policy making and consultation, cities can choose from a variety of platforms including both open source and paid options. For example, the open source platform Your Priorities, helps to connect citizens and government in order to give residents more influence on policy and budgets in order to build greater trust between residents and government. As the software that powers Your Priorities is open source, community developers have expanded its features and several

Table 1: Evaluation of Public Participation Platforms

People-Centred Smart Cities pillars	Reflections for social inclusion in digital technologies	Considerations
Community	Reflection 1: Access and inclusivity and intended use for public participation in shaping public spaces and local environments. Reflection 2: Transparency in purpose and architecture, and non-discriminattion of design and content.	• Does the use of the tool promote skills development, political awareness, and confidence? • Does the tool offer interactive functionalities such as feedback, comments, suggestions, voting system. • Does the tool make information publicly available on how the technology, algorithm, or automated decision-making features work, impact decision-making processes, and affect the user? • Has the tool been tested in different scenarios and user groups to ensure it does not discriminate or promote bias in its use?
Digital Equity	Reflection 3: Access to devices and connectivity	• Does the tool support offline and online mobilisation? • Does the tool require access to the Internet or other infrastructure to be used?
Capacity	Reflection 4: Skills and knowledge	• Is the team developing the tool diverse and multidisciplinary? • Does the developer team formation consider gender balance? • Is the assessment of skills needs, and procurement capacity required to operate the tool well understood?
Infrastructure	Reflection 5: Adaptation, diversity of contexts and interoperability of infrastructure and architecture.	• Is the tool open source? • Does the tool require identification to be used? • Is the digital solution anchored on a specific mandate and principles?
Security	Reflection 6: Protection of personal safety, digital confidentiality and security of data provision	• Is the tool clear about what data is being collected? • Does the tool clearly state how data will be collected and used? • Is the tool secure for end users?

versions of it are now in use by cities globally. Other open-source examples of participatory platforms include Pol.is, Consul, Decidim, and Objective 8.

Other non-open source examples include OpenGov, mySidewalk, Bang the Table, and CitizenLab. The nonprofit organization People Powered has created a useful guide which rates different digital public participation platforms at https://www.peoplepowered.org/digital-participation-platforms.

Leveraging ICTs for interaction between citizens, public administration and politicians has become a popular mode of public participation for local governments. However, studies of e-participation have consistently shown that setting up platforms is not enough to spark meaningful public participation[43]. Over-reliance on this medium risks excluding those living and working in informal settlements and slums and other less digitally literate or connected groups, as well as those residents who for one reason or another prefer not to be active online. Improving e-participation outcomes requires situating technology in the context of participants, their needs, desires, lived experiences, and roles and responsibilities as civic actors.

BOX 2.4

Crowdsourcing visibility of sexual harassment: Cairo's HarassMap https://harassmap.org/en/

HarassMap is a volunteer-run initiative which began in Egypt in 2010 with the goal of mapping out where sexual harassment occurs - with anyone allowed to anonymously mark the locations of, and describe, relevant incidents. HarassMap is largely a Cairo initiative to this day, with the vast majority of data points found in and around the city. The map of data points produced collectively by its users produces a sort of "heat map" of sexual harassment in Egypt, showcasing the extent of the problem and hot-spots of activity. It also allows users to mark and describe interventions to sexual harassment, showing users that both sexual harassment and intervening in sexual harrassment are quite common. With limited official response to this problem and with victims' discussion relatively taboo, crowdsourcing with victims able to post anonymously, allows data collection at a greater scale. HarassMap has also produced valuable research on sexual harassment in Egypt. HarassMap has worked with educational institutions and non-governmental organizations (NGOs), and organized workshops and campaigns against sexual harassment across Egypt. HarassMap has served as a blueprint for projects worldwide, and showcases a situation in which a crowdsourcing platform can set the stage for real social change.

BOX 2.5

Pol.is: Open source machine learning for democratic consensus in Taiwan

Governments often struggle to build policies that address the opportunities and challenges posed by digital technology. As technology continues to transform and shape daily life, it becomes increasingly important for local governments to foster dialogue with residents to ensure that policy-making meets their needs. In 2015, rideshare companies like Uber emerged in Taiwan, posing many challenges to the regulatory and policy norms that had been established with taxi drivers in the city. In an attempt to address the issue, the government and the civic technology group g0v, known as "gov zero", launched the open public engagement platform VTaiwan based on an open source system for survey research and machine learning data analysis, named Pol.is. The tool enabled thousands of ideas to be submitted in response to the issues related to rideshare regulation, which could then be supported by other participants through a voting feature. Areas of consensus were then identified and included in the next phase of discussions that resulted in a draft bill sent to parliament with clear proposals for new regulations. The resolution of rideshare regulation through the VTaiwan platform is considered a successful example of a digital tool used for public deliberation. However, success for platforms like these depends on strong political commitment and stakeholder engagement.

BOX 2.6

Decidim: Enabling virtual democracy

Decidim, which means "let's decide" or "we decide" in Catalan, is an open-source digital infrastructure toolbox for participatory democracy. Initially developed by the city of Barcelona with the objective of strengthening the capacity of individuals to contribute to public decision-making within the government, Decidim is now used in hundreds of locations and contexts extending beyond government, including civil society, and community organisations.

Decidim provides an open-source platform for local governments to support public participation, strategic planning, consultation with residents, and participatory budgeting. Because it is open source, it has been customised and adapted by many cities for their own use. For example, Veracruz has used the platform to create opportunities for residents to propose projects and provide feedback on proposals for urban development. Helsinki has built "OmaStadi", off the Decidim backbone, that provides participatory budgeting services to residents. Kakogawa has used the platform primarily as a place for idea-generation and collaboration on proposals with residents.

Decidim's documentation provides guidance to developers for installing the platform, and customising it accordingly. The platform also comes with a Social Contract, which provides core principles which Decidim community members are required to follow. These principles include themes like traceability, accountability, equal opportunity, and open content. Decidim is an example of a digital public good, where a city can develop an open-source tool with the appropriate documentation so that it can be adopted by any other municipality.

BOX 2.7

Gamifying service calls using 311SA in San Antonio

The City of San Antonio (USA) expanded its civic engagement channels to include the mobile application 311SA, which gamifies the process of reporting city service issues to the local government. Where previously residents had to call a hotline and wait in a queue for their case to be heard, now users of the mobile application can "flag" issues on a map using various colours that correlate to the severity and status of the case. Residents can report any concerns related to city services, including aggressive animals, graffiti, streetlight malfunctions, pothole repair locations or garbage issues such as damaged carts or lack of garbage pick ups. Users can flag their issues and provide information either publicly or anonymously. Overall, 311SA is considered a social network for civic engagement because its features make reporting issues to the city fun through features like upvoting, photos, and competition for most submitted issues on a leaderboard. Most voted concerns appear in the app's feed and users receive badges and points based on the leaderboard, which encourages non-anonymous submissions and ownership of the initiatives and efforts towards community improvement.

Gamification

Technology has also expanded the accessibility of planning processes to residents, making them more fun, user-friendly and visual. **Gamification** in smart cities refers to the application of typical elements of game playing to urban planning processes and feedback loops with local governments. Gamification can lower the barrier to participation and increase engagement by making decision-making processes more engaging and exciting, and accessible to youth[44]. For example, StreetComplete is an application that gamifies contributions to OpenStreetMap to improve its accuracy.

Other examples include the City of San Antonio which partnered with local startup CityFlag to develop a mobile application for 311, the city's primary customer service line. The app, 311SA awards points to citizens for flagging issues to the city. The use of 311SA increased the volume of 311 requests, and offered an opportunity for residents to directly communicate with city officials. Similarly, UN-Habitat's Block by Block programme leverages the popular video game Minecraft as a visualisation tool for children and the public to design development proposals that are then translated from minecraft into viable architectural plans.

Leveraging open data for civic participation

Open data is a crucial resource for civic engagement. By unlocking non-sensitive data sets, local governments can empower residents and businesses to inform their own decision-making and develop their own tools, such as mobile applications, crowdsourced mapping or dashboards. The importance of open data for civic participation is great, and as a result it has been internationally supported. The World Council on City Data founded in 2014, led the development and implementation of three international standards on city data that have been published by the International organization for Standardisation (ISO). The standards include data requirements for smart cities, sustainable cities and resilient cities. Local governments can join the programme and become certified in each standard.

Community engagement activities can also centre around the use of a specified data set, such as the municipality's budget, smart streetlight sensor data or permitting data. For example, the non-profit Kathmandu Living Labs in Nepal has launched several open data projects including an earthquake data portal. The non-profit also trains local residents in using open source tools in order to improve their own communities. Mexico's Mejora tu Escuela platform provides open data about school performance to assist parents in decision-making about schools. And Uruguay's A Tu Servico provides a searchable open data platform for healthcare information.

Municipalities can also conduct engagement activities to learn what data sets are of value to their community and prioritise their availability and accessibility on open data platforms. For example, the Detroit Community Technology Project partnered with the City of Detroit to develop community-driven guidelines for equitable open data. Advocacy groups also organize important platforms that flag important community issues local and national governments often should address. For example, GeoChicas is an initiative that aims to close the gender gap in the OpenStreetMap community through collaborative and participatory projects in Latin America.

These projects focus on improving how open data is provided in order to make it more accessible to the needs of diverse groups.

BOX 2.8

Geo-Chicas: Closing the gender divide in the OpenStreetMap community

Geochicas is a feminist mapping collective, which originated in 2016 with the objective of bridging the gender divide and lack of diversity in the OpenStreetMap community, where only 3 per cent of collaborators are women in Latin America and Spanish speaking countries. Geo-Chicas aims to increase the number of female mappers, to create a network for women as a safe space for dialogue and support, particularly as it relates to leadership roles in mapping and georeferencing projects. Peer support has encouraged colleagues in this area to submit more papers to conferences and participation in international events is also used to communicate the project to a broader audience. The initiatives undertaken by Geo-Chicas include a map of femicides, an online event to co-create a map of establishments that provide aid to victims of gender-based violence in Latin America and an analysis of the gender divide in street names. Broadly, the inclusion efforts of this group have led to technology projects that respond to problems as defined from womens' perspectives, highlighting the material importance of inclusive technology-building.

BOX 2.9

Kathmandu living labs

The social enterprise and civic-tech company Kathmandu Living Labs was founded in 2013 to support mapping communities in Nepal and Asia using OpenStreetMap, ICT and applying evidence-based approaches in the implementation of disaster recovery projects. Following the 2015 Gorkha earthquake, the company worked with the government of Nepal to develop a post-disaster mobile data collection system, which helped assess estimated damages to buildings and reconstruction costs. An extensive survey with data collected door-to-door was conducted in over 760 thousand buildings, and included both building damage data as well as socio-economic information, later stored online in the Earthquake Data Portal, which is available in Nepalesi and English. The open source portal allows data to be visualised and downloaded by users, including the original survey applied to the residents and a visualisation library that allows users to dynamically explore the data.

04

ACTIVITY 3:

Provide digital public goods that are open, transparent, accessible and interoperable

SDG 16, 16.10.
New Urban Agenda 92, 156, 160

Core Values

1 Interoperability

Value 1: Digital public goods provide increased public oversight, accessibility and interoperability over data and digital infrastructure.

2 Trust

Value 2: Central to the implementation of digital public goods are robust human rights and governance frameworks to enhance trust in technology and data use, while ensuring inclusion.

3 Accessibility

Value 3: Because digital public goods are free and universally accessible, they can support innovation, economic development and workforce development.

Introduction

Public goods are services or commodities that benefit everyone, and are typically offered by taxing governments to the general public for free. **Digital public goods (DPGs)** are basically the digital extension of public goods and require some governments to rethink how their digital services can be considered public infrastructure. The COVID-19 pandemic also highlighted the value of digital public goods, where small teams were able to rapidly build digital public infrastructure that was widely adopted. For example, the University of Oslo developed an open source health information management system that was quickly adopted by 73 low and middle-income countries including Sri Lanka, where it was used early on in the pandemic for COVID-19 surveillance[45].

The Digital Public Goods Alliance (DPGA) and the UN Secretary-General's Roadmap for Digital Cooperation defines digital public goods as: 'open source software, open data, open AI models, open standards and open content that adhere to privacy and other applicable laws and best practises, do no harm, and help attain the SDGs[46,47].' Governments across the world have begun to build and deploy digital public goods. The Digital Public Good Alliance estimates that there are currently 84 active digital public goods that help to achieve various aspects of the Sustainable Development Goals in 247 countries[48]. This suggests that governments have begun to identify intersections between technology, governance and infrastructure that can be classified as digital public goods. Increasingly common tools that can be digital public goods include:

- **Open software -** digital tools and platforms whose source code is made publicly available under an open licence.
- **Open data -** data that is made publicly accessible through an online portal or similar format.
- **Open AI models -** a tool or algorithm, which is based on a certain data set through which it can arrive at a decision. Open AI models offer data sets, tools and algorithms that provide AI to the public for free.
- **Open standards -** standards made available to the general public and are developed (or approved) and maintained via a collaborative and consensus driven process[49].
- **Open content -** digital media, images, documents or data that are made publicly available for free.

What specifically characterises a digital public good? Broadly, they should easily interface with existing and future technologies, and their original source code is made freely available and may be redistributed and modified[50]. By offering products and services that are interoperable and open source, cities can avoid vendor lock-in and collaborate more directly with residents and other stakeholders. Open data can also spur innovations among citizens since data is an important resource for fueling innovations[51]. To this end, some organizations like Open & Agile Smart Cities offer a set of technical specifications that allows cities and communities to replicate and scale digital public goods[52]. Digital public goods should also address accessibility issues like language or skills barriers, affordability, lack of internet connectivity, and lack of compatibility with assistive technology.

This section will cover the basic standards for digital public goods, and governance structures for evaluating and developing them.

GOAL #1 Understand and adopt the Digital Public Good Standard (DPGS)

The Digital Public Goods Standard is a set of specifications and guidelines created by the Digital Public Goods Alliance that can be used to determine whether a digital solution conforms to the definition of a digital public good. The standards align with the UN Secretary-General's Digital Cooperation Roadmap's definition of a digital public good and several SDGs. The standards are available on Github, and individuals representing organizations can publicly endorse them.

9 Indicators of a digital public good

According to the Alliance, there are a set of nine indicators that can be used to evaluate digital public goods. For local governments, these standards can be communicated to any developer of a digital public good, including the public, city staff, universities and vendors. The nine indicators are available in detail on the Digital Public Goods Alliance github, but are summarised here:

1. **Relevance to sustainable development goals -** All projects must indicate the Sustainable Development Goals (SDGs) they are relevant to, and provide supporting links/documentation to support their relevance.

2. **Use of approved open licences -** Projects must demonstrate the use of an approved open licence. Open licences grant permission to access, re-use and redistribute a work with few or no restrictions. These are important for digital public goods as they should be modifiable to suit specific needs and contexts.

3. **Clear ownership -** Projects should clearly define and document ownership of all its components, through copyright, trademark or otherwise. This is important so that the project can be easily repurposed without potential exposure to legal risks.

4. **Platform independence -** Projects should be able to function without dependency on other proprietary systems. If that is not the case, they should document those dependencies and seek to reduce them by providing interoperable, open alternatives. Doing so maximises the ability of the project to be adapted by other users in different contexts.

5. **Documentation -** The project should be extensively documented so that it can be easily adopted in different environments. Documentation includes all relevant/compatible apps, software, or hardware required to access the content, and instructions regarding how to use it.

6. **Mechanism for extracting data and content -** It is critical that non-sensitive (not personally identifiable) data and content can be exported from the system in different formats. This ensures that users can obtain important insights from the platform, software or tool.

7. **Adherence to privacy and applicable laws -** The project should be able to demonstrate that it complies with relevant national, international and domestic privacy laws.

8. **Adherence to standards & best practises -** The project should adhere to known best practices, for example the Principles for Digital Development.

9. **Do no harm by design -** Projects should be able to demonstrate that they will 'do no harm' as a result of how they are designed. At a minimum, this includes ensuring data privacy and security, detecting and moderating inappropriate or illegal content, and having a mechanism for users and contributors, including minors to protect themselves against abuse.

Governance for DPGs

The most common challenge with digital public goods is ensuring their sustainability and maintaining software over the long term[53]. Fundamentally, adequate funding and transparent governance are required to transition a digital public good from inception to long term usability at scale. The Digital Impact Alliance has identified five key factors that are necessary to build digital public goods that are sustainable:

Fiscal home: A host entity to hold intellectual property, execute legal contracts, and receive funding. This legal entity must be able to meet the audit requirements of multilateral donors, a bar that can be far higher than what many small nonprofits typically encounter.

A primary maintainer: A primary maintainer takes responsibility for facilitating community management, product roadmaps, community governance, etc., all on behalf of the project's many stakeholders.

Dedicated product team: Consistent staffing ensures a continuity of quality and efficiency while reducing costs by as much as 40 per cent. A core product team typically comprises a product owner, community manager, technical architect and one or more software engineers.

Access to core funding: Stable and secure funding for a baseline budget to maintain core product development is foundational for maintaining quality with assurance of ongoing support. Core funds are likely to include a mix of grants and generated revenue, ideally through public-private partnerships.

Connection to a community of practice: Collaborating with others solving similar challenges leads to better products through knowledge sharing as well as reduced duplication of effort and greater interoperability between products.

GOAL #2 **Evaluate what services your municipality already provides as a digital public good, and identify opportunities to make them conform to the Digital Public Good Standards. Identify new opportunities to develop digital public goods**

There's no need to reinvent the wheel, and in many cases local governments are already using digital public goods without necessarily achieving all the standards indicated above. The first step municipalities can take towards building an ecosystem of digital public goods is to examine their existing digital services and determine which ones can plausibly conform to the Digital Public Good Standards with minimal extra effort. To assist with this process and help you identify new opportunities see the examples below from cities around the world who have deployed digital public goods in each category.

BOX 2.10

Towards a digital rights governance framework

Digital technologies influence change at a fast pace in society, and enhanced models of governance are needed to manage opportunities and risks driven by technology. Emerging technologies affect people and communities worldwide, sometimes in unforeseen or unintended ways, but nonetheless harmful. To support people-centred digital strategies, UN-Habitat, the Cities Coalition for Digital Rights and other partners, have developed a Digital Rights Governance Framework which outlines how cities can uphold a human rights-based approach in their digital transformation journey.

The framework provides guidance in the form of foundations, structures, and tools, which can be customised based on each city's local context. Implementation of the Framework is supported by a Digital Helpdesk, a platform where cities can access a repository of resources, consult with experts on digital rights and serve as a space for advocacy and public deliberation. As part of the technical support provided by UN-Habitat and the Cities Coalition for Digital Rights, an implementation team can work closely with the cities to co-create local digital rights governance frameworks and build capacity.

BOX 3.1

Open software: YamaYama Nigeria helping citizens fight for healthier environments

Developed at a hackathon in 2013, and based on a model of :actionable data:, YamaYama used the open source software #GreenAlert to help citizens in Nigeria check if the garbage dumps in their neighbourhoods are operating under proper licence conditions. If found to be illegal, citizens can alert the authorities. The open source software, originally called #GreenAlert, was later repackaged as #AlertMe, supporting georeferencing and mapping of the garbage dumps, with the possibility for the community to organise petitions and demand actions from regulatory agencies. The software code is open source and datasets are available through Nigeria's open source database openAfrica. The main requirement is that all data on openAfrica must be actionable, or "data that helps people to change the world".

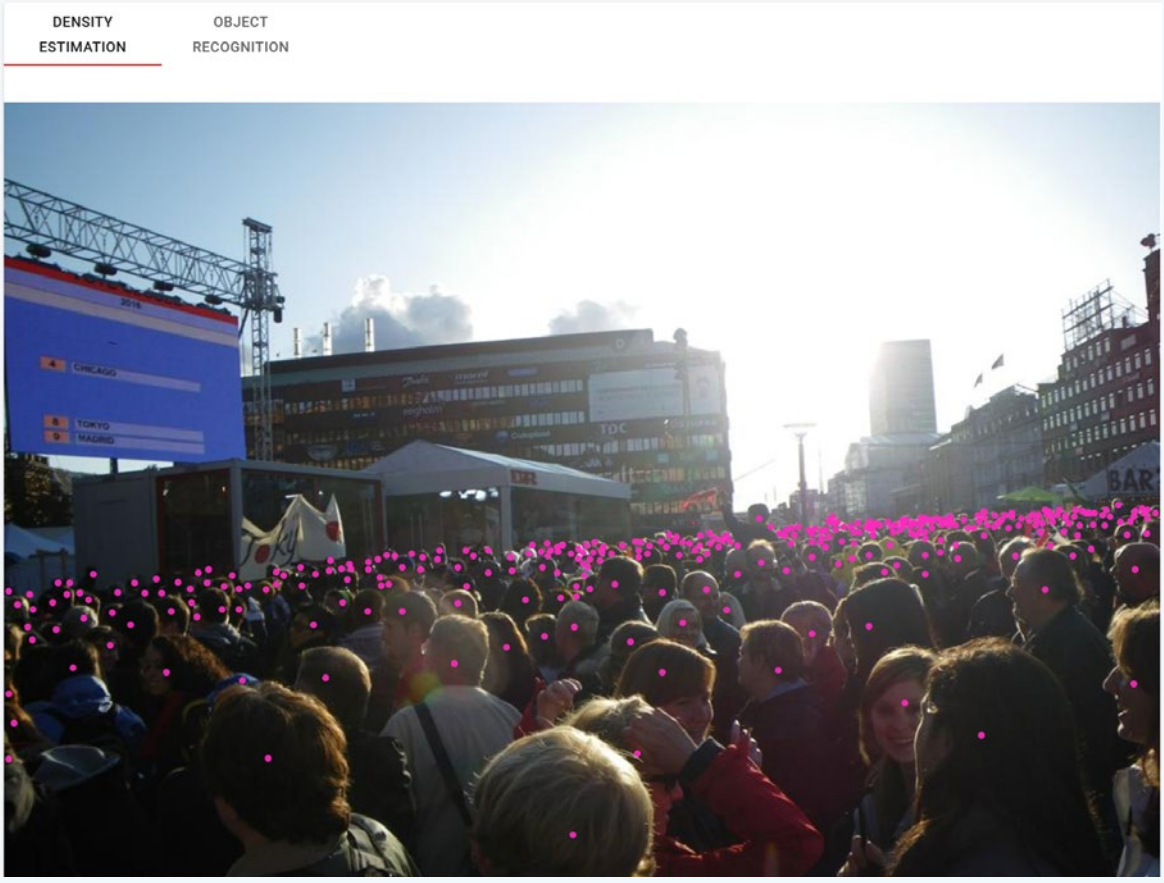
BOX 3.2

Open data: Buenos Aires open data governance portal

The open data plan of the city of Buenos Aires started one year ahead of the launch of the city's open data portal in 2012. In recognizing the need for innovative approaches to develop new policies, the government initially approved a decree to support guidelines for transparency, collaboration and citizen participation. With the legal foundations in place, it then began to identify and collect datasets from different departments, a process that was supported by guidelines helping different areas and teams convert existing data to open formats. Collaboration across different teams and stakeholders was crucial for the government to implement the open data portal. It also included expanding the knowledge of open data architecture and tools needed for the city staff through training programmes and making use of social tools such as hackathons to foster the development of innovative solutions for the needs of the city and its residents.

BOX 3.3

Open AI models: Amsterdam's public eye



Public eye is a system for crowd management in the city of Amsterdam, made available through GitHub as an open source software based on deep learning. The system collects data using cameras installed in certain locations of the city to identify the number of pedestrians per area. The software is fully open source, accessible on github and documented with a statement from the City of Amsterdam that provides detailed information to the public about the use of the system. To ensure privacy, images are not stored nor shown, and any data passing through the system is anonymized. Crowd monitoring is a pressing issue in cities as population rates grow and urbanisation expands. Open software such as Public Eye can be utilised by other cities and organisations, and contribute to the exchange of open infrastructure that respects privacy and security principles.

BOX 3.4

Open standards: OSLO - Open Standards for linked organisations in the region of Flanders (Belgium)

The "once only" principle in open governance states that data should be provided only once by users and partners and then reused, to avoid requesting the same data multiple times. This means the architecture of the government's data system must be interoperable, and capable of exchanging data sets across different organizations. Interoperability helps to break data silos and prevents additional costs associated with the handling and transforming of datasets to fit different information systems used by different departments.

The government of the Region of Flanders provides over 800 products and services in connection with different software vendors. In 2012, OSLO (Open Standards for Linked Organizations) began as a public-private partnership with the objective of providing a methodology for practical insights and political support for adapting data's language. Semantic interoperability, the capacity to exchange data between organizations without the need of translation, helps organizations reduce costs and comply with the "once-only" principle. Lessons learned from the OSLO project reinforces how crucial cooperation across different partners and government agencies is for the successful implementation of interoperable standards. This is particularly relevant where stakeholders involved rely on consensus and agreement to develop interoperable standards.

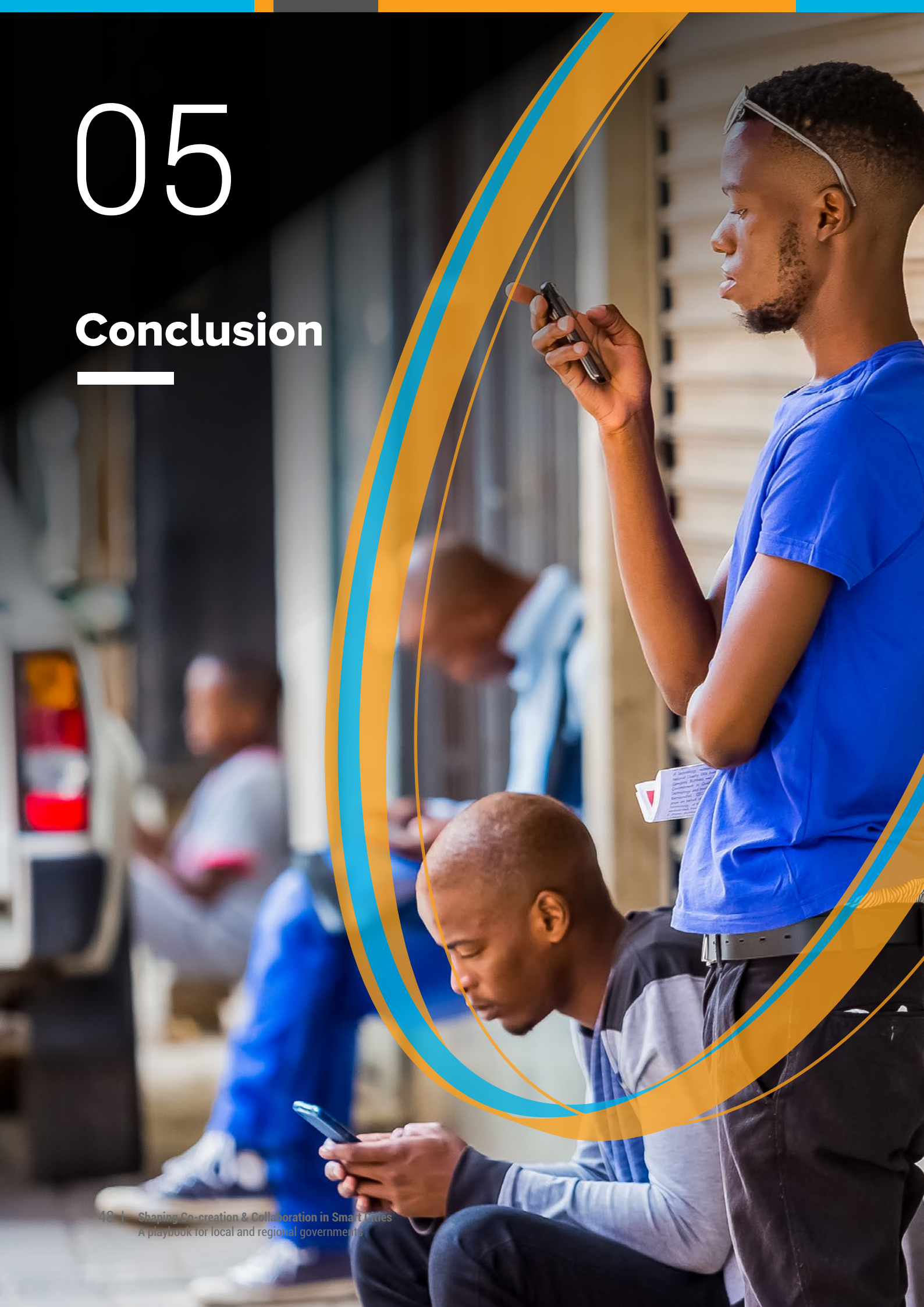
BOX 3.5

Open content: Global digital library - free quality resources in underserved languages

With the goal to provide free quality access to early grade reading resources, the Global Book Alliance has developed the Global Digital Library, focusing on educational resources, especially in underserved languages around the world. For the Global Digital Library, 'underserved' languages refer to those languages for which there is a shortage of reading instruction books, storybooks and other educational resources including games and learning materials. The library currently offers over 6,500 books in 93 languages digitally. These resources are available to households as well as governmental organisations, schools, and local publishers. The platform is open source, built collaboratively by different stakeholders and managed by The Norwegian Agency for Development Cooperation (Norad).

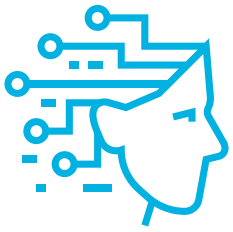
05

Conclusion



Building smart cities with and for the community is a critical pillar of people-centred smart cities. This playbook charted a set of activities local governments can perform in order to achieve specific goals that use technology in new ways to increase community participation, and leverage the existing legal and regulatory toolkit local governments already possess towards building greater public awareness and oversight of smart city technology.

Specifically, cities that want to build people-centred smart cities should strive to:



1. Achieve autonomy over the development and use of smart city technology;

2. Make commitments to integrating digital human rights into digital services and infrastructure across the organization; and,

3. Establish a new generation of services that are open, accessible, transparent and interoperable

We believe these three activities can help local governments shift from using reactive to disruptive technologies, towards proactively shaping the conditions for their use in collaboration with the communities they serve. This is critical as we continue to progress towards a more digital society.

The COVID-19 pandemic changed the way people live, work and play in cities. It also demonstrated in cities around the world that citizens demand robust digital services, and value those that strive to protect their privacy. Furthermore, it has become clear with the widening **digital divide** in recent years that many residents stand to be left apart from the digital transition, and therefore lack convenient and affordable access to important services offered by governments online, and the opportunity to shape them through participatory processes.

Meanwhile, new technologies powering government systems continue to introduce changes to the speed and efficiency with which local government operates, but if left unchecked, can also further bias and discrimination against marginalised communities. **For all these reasons, technology is deeply interconnected with the future of life in cities.** Local governments should take steps now to build a strong foundation of policies, plans and systems that enable them to better monitor and manage technology's role in society, and place people at the centre of decision-making about its use.

Endnotes

1 https://unhabitat.org/un-system-wide-strategy-on-sustainable-urban-development https://unsceb.org/united-nations-system-wide-strategy-sustainable-urban-development

2 Measuring Digital Development: Facts and Figures 2020, International Telecommunication Union Development Sector (ITU).

3 UN Human Rights & Social Inclusion Unit

4 The UN Hub for Human Rights and Digital Technology.

5 Wylie, Bianca, 'Why We Need Digital Rights: Not Everything About Us Should Be For Sale,' Financial Post, 2019.

6 More specifically, the term 'public' in digital public good refers to the economic definition of a public good. Two characteristics of public goods are: 1) non-rivalry, meaning that one person's use of a good doesn't preclude or limit utility of that good for someone else; and 2) non-excludability, meaning that it is impossible, or very costly, to exclude someone from using the good. Likewise, digital public infrastructure is the backbone of digital public good delivery. Digital public infrastructure not necessarily non-excludable.

7 Digital Public Goods Alliance, website, Accessed 1/20/21.

8 https://www.cgdev.org/sites/default/files/Africa-Data-Consensus.pdf

9 https://www.sanantonio.gov/Portals/0/Files/EmployeeInformation/ADs/AD7-12.pdf

10 https://www.itu.int/net4/wsis/forum/2020/Files/outcomes/draft/WSISStocktakingSuccessStories2020_DRAFT.pdf

11 https://www.open-contracting.org/implement/lift/

12 Welchman, Lisa. 'Managing Chaos: Digital Governance by Design,' 2015.

13 'Definition of Open Standard', ITU-T.

14 Global Open Data Standards Directory - Johns Hopkins & McGill University

15 John Hopkins University's GovEx lab provides templates for data ownership contract language in procurements: https://labs.centerforgov.org/data-governance/data-ownership/

16 https://www.stateofopendata.od4d.net/chapters/regions/introduction.html

17 Data Trusts: Lessons from Three Pilots, Open Data Institute.

18 'Dig Once Model Policy,' G20 Global Smart Cities Alliance, 2021.

19 Concept Note: International Learning Lab on Public Procurement and Human Rights https://www.hrprocurementlab.org/resources/learning-lab/

20 Government at a Glance Southeast Asia 2019, '6.3 Procurement for ICT Projects.' https://www.oecd-ilibrary.org/sites/2ca6a8ca-en/index.html?itemId=/content/component/2ca6a8ca-en

21 https://digitalimpactalliance.org/wp-content/uploads/2020/10/SmartAfrica-DIAL_DigitalEconomyInAfrica2020-v7_ENG.pdf

22 https://www.banfacialrecognition.com/map/

23 https://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=8664544

24 UN-Habitat, 'Participatory-Habitat Initiative', 2020.

25 'Digitization of Chengdu Participatory Budgeting: Community Support Fund e-Platform,' UN Department of Economic and Social Affairs.

26 https://www.rhizomatica.org

27 'Public-Private Partnerships and the 2030 Agenda for Sustainable Development: Fit for purpose?'
Jomo KS, Anis Chowdhury, Krishnan Sharma, Daniel Platz. United Nations Department of Economic and Social Affairs.

28 The UN Hub for Human Rights and Digital Technology.

29 City of Toronto Digital Infrastructure Plan, City of Toronto, 2021.

30 Digital Bill of Rights, City of Los Angeles, 2019.

31 Action Plan for the Open Government Partnership (2021-2023), OGP Tunisia.

32 https://thehagueacademy.com/course/citizen-participation-inclusive-governance/

33 https://icld.se/en/international-programmes/the-programmes/inclusive-political-leadership-3/

34 https://www.uclg-cisdp.org/sites/default/files/En_%20Ficha%20Somos%20OCI.pdf

35 https://g3ict.org/dare_academy/webinar-series

36 https://whatworkscities.bloomberg.org/news/

37 Community Engagement Guidelines for Peacebuilding, United Nations, 2020.

38 Cities Coalition for Digital Rights Declaration

39 Privacy Impact Assessments, Privacy Program at the City of Seattle

40 Stewart, Matthew. 'The Deceptive Platform Utopianism of Google's Sidewalk Labs,' Failed Architecture, 2019.

41 ACLU of Northern California, 'Making Smart Decisions about Smart Cities,' 2017.

42 'Collective Intelligence for Sustainable Development: Getting Smarter Together,'
United Nations Development Accelerator Lab, 2021.

43 United Nations Department of Economic and Social Affairs, 'United Nations e-government Survey 2020',
pp. 132, (United Nations, 2020)

44 Hassan, Lobna et al. 'Gameful civic engagement: A review of the literature on gamification of e-participation,'
Government Information Quarterly, 2020.

45 'Innovating DHIS2 Tracker and Apps for COVID-19 Surveillance in Sri Lanka' DHIS2.

46 Digital Public Goods Alliance, Available at https://digitalpublicgoods.net/about/, (Accessed 1/20/21)

47 More specifically, the term 'public' in digital public good (DPG) refers to the economic definition of a public good. Two characteristics of public goods are: 1) non-rivalry, meaning that one person's use of a good doesn't preclude or limit utility of that good for someone else; and 2) non-excludability, meaning that it is impossible, or very costly, to exclude someone from using the good. Likewise, Digital public infrastructure (DPI) is the backbone of digital public good delivery. DPIs are not necessarily non-excludable.

48 https://digitalpublicgoods.net/map/

49 Open standards definition, ITU.

50 For a more extensive definition of Open Source, see: https://opensource.org/osd

51 ITU-T (2020) 'Framework of open data in smart cities', Recommendation database,(See Y.4461), and ITU-T, (2018) 'Requirements for the interoperability of smart city platform' Recommendation database, (See Y.4200)

52 Open & Agile Smart Cities, 'Minimal Interoperability Mechanisms,' (2020)

53 5 Things Digital Public Good Software Projects Need to Scale, Digital Impact Alliance.

Terms & Definitions

Accelerator
A fixed-term, cohort-based program offered by a foundation, venture capital firm, non-profit organization, NGO or government entity that includes resources for startup businesses such as mentorship, guidance, seed funding and educational components.

Automated decision-making
The process of making a decision by automated means without any human involvement.

AI models
A program or algorithm that relies on a set of data to recognize patterns and make predictions or decisions.

Civic technology
A technology that informs citizens, connects them with each other, and creates engagement with their government in order to collaborate and make decisions for the public good.

Community-based financing
Financing models that are either driven by the community, or where citizens are invited by public authorities to directly decide on how to spend part of the government's budget, such as participatory budgeting.

Data sovereignty
When data is subject to the laws and regulations of the geographic location where that data is collected and processed.

Digital bill of rights
A document proclaiming the extent of endowed freedoms for citizens and residents pertaining to human rights including accessiblity, privacy and non-discrimination as they apply to data and digital services.

Digital divide
The gap between those who have access to Internet connectivity, digital literacy skills and Internet-enabled devices and those who do not. While every community is different, the digital divide consistently reflects and amplifies existing social, economic and cultural inequalities such as gender, age, race, income, and ability. Access is multidimensional and includes the physical, spatial, cultural, demographic and socioeconomic conditions of accessibility.

Digital governance
Refers to the ability of an organization to exercise jurisdiction over the development and use of technology that impacts its business operations and mission.

Digital governance plan
A strategic plan where local governments can introduce controls, regulation, and policies for digital transformation that increase opportunities for transparency and public oversight.

Digital human rights
Digital human rights are human rights as they exist in online and digital spaces. Digital technologies have the potential to advocate, defend and exercise human rights, but they can also be used to suppress, limit and violate human rights. Existing human rights treaties were signed in a pre-digital era, but online violations can today lead to offline abuses and, as highlighted by the UN Secretary-General, human rights exist online as they do offline and have to be respected in full. Of particular concern to the UN are data protection and privacy, digital identity, and surveillance technologies, including facial recognition and online harassment. In these areas, technlogies are increasingly being used to violate and erode human rights, deepen inequalities and exacerbate existing discrimination, especially of people who are already vulnerable or left behind.

Digital public goods
Open source software, open data, open AI models, open standards and open content that adhere to privacy and other applicable laws and best practices, do no harm, and help attain the SDGs.

Digital transformation
Digital transformation marks a rethinking of how an organization uses technology, people, and processes in pursuit of new business models and new revenue streams, driven by changes in customer expectations around products and services.

E-participation
Fostering civic engagement and open, participatory governance through Information and information and communications technologies.

Gamification
The process of adding games or game-like elements to a product, activity or tool so as to encourage participation.

Information communication technology (ICT)
All communication technologies, including the Internet, wireless networks, cell phones, computers, software, middleware such as video-conferencing, social networking, and other media applications and services enabling users to access, retrieve, store, transmit, and process information in a digital form.

Interoperability
Refers to the ability of multiple technology systems to exchange information and to use the information that has been exchanged.

Open standards
Standards that are made available to the general public and are developed (or approved) and maintained via a collaborative and consensus driven process. Open standards facilitate interoperability and data exchange among different products or services and are intended for widespread adoption.

Participatory budgeting
A democratic process in which community members directly decide how to spend part of a public budget.

People-centred smart city
A multi stakeholder approach to digital transformation that realises sustainability, inclusivity, prosperity and human rights for the benefit of all.

Public algorithm registries
A publicly accessible overview of the artificial intelligence systems and algorithms used by a government agency.

Activity 1 Policy Resource Kit: Creating and operationalizing digital governance

Activity 1 provides recommendations for how local governments can create conditions for public oversight of smart city technology and structure partnerships in such a way that can support smart city solutions created by diverse partners including residents, nonprofits and NGOs. People-centred smart cities should take a strong approach to digital governance, which refers to the ability of an organization to exercise jurisdiction over the development and use of technology that impacts its business operations and mission. Doing so fosters transparency and accountability, increasing public trust in local government as a result.

Below are sample policies and tools that local governments have developed and/or adopted to both establish digital governance and operationalise it.

Digital governance

Open standards - They are standards made available to the general public and are developed (or approved) and maintained via a collaborative and consensus driven process. They facilitate interoperability and data exchange among different products or services and are intended for widespread adoption. Below are three examples of open standards adopted for three different use cases, digital transformation, internet of things, and mobility.

- Barcelona Ethical Digital Standards Policy Toolkit
- IEEEStandard for an Architectural Framework for the Internet of Things (IoT)
- Open Mobility Foundation Mobility Data Standard (MDS)

Data ownership - Data is a critical asset for governments to evaluate their services and understand their communities. As such, it is important for local governments to establish public ownership over data assets generated by technologies they procure and the services they provide. Below are templates and examples of how data ownership rules can be specified by a local government in procurements, or data sharing agreements.

- GovEx Labs Data Ownership and Usage Terms for Government Contracts
- Interlocal Data Sharing Agreement

Interoperability - This refers to the ability of multiple technology systems to exchange information and to use the information that has been exchanged.

- Barcelona Interoperability, Free Standards and Formats
- Open & Agile Smart Cities Minimal Interoperability Mechanisms (MIMs)
- UNDP e-government Interoperability Guide

Procurement standards - Procurement standards are the rules that govern how a municipality purchases technology. How local governments make decisions about purchasing can shape markets for smart city technology and establish important rules that increase privacy, transparency and ethical outcomes. Below are examples of procurement standards local governments have adopted and/or developed.

- City of Amsterdam Algorithm Contract Terms
- Digital Impact Alliance Procurement of Digital Technology Framework

Operationalizing digital governance

Ordinances, codes and directives

- City of Somerville Municipal Code Article III - Public Oversight of Surveillance Technology
- City of Cambridge Chapter 2.113 Privatisation of City Services
- Smart Cities Council of Australia Code for Smart Communities
- Government of Canada Directive on Automated Decision-Making
- European Commission Digital Services Act

Digital governance plans

- Toronto Digital Infrastructure Plan
- UK Emerging Technology Charter
- Smart LA 2028

Activity 2 Policy Resource Kit: Building public trust and transparency

Activity 2 covers what local governments can do to increase transparency and inclusion in smart cities by creating open, participatory and transparent opportunities for residents to shape the development and use of smart city technology. Specifically, this section examines how cities make public commitments to transparency, privacy and inclusion that they can be held accountable to, how cities can involve residents in their technology projects, and how cities can use digital platforms and tools to improve public participation in general. There are several examples of cities that have made public commitments to privacy, transparency and digital rights in the form of public policies. Other cities have taken this work a step further by developing new ways to engage residents in the process of decision-making about technology use and deployment.

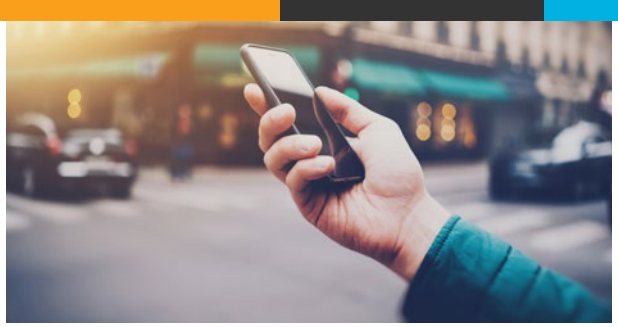
This resource kit provides sample policies and tools that can help local governments better integrate the public in decision-making about technology in smart cities, and define clear objectives to be held accountable to, particularly as it relates to privacy and procurement of smart city technologies.

Policies and tools for building transparency & accountability in smart cities

What to consider when building digital governance that supports digital rights:
Digital Rights Governance Framework, Cities Coalition for Digital Rights

Examples of how to establish public commitments to transparency and privacy in smart cities:
- India DataSmart Cities Strategy
- Singapore Personal Data Protection Act
- City of Seattle Privacy Principles
- City of Portland Smart Cities Priorities Framework

Establishing a transparent process for evaluating smart city technologies:
- Making Smart Decisions about Smart Cities, ACLU
- Oakland Ordinance establishing Privacy Advisory Committee
- City of New York Algorithmic Accountability Bill



Activity 3 Policy Resource Kit: Creating transparent, accessible and interoperable digital public goods

Activity 3 addresses how to build and maintain digital public goods. Digital public goods can include open source software, open data, open AI models, open standards and open content that adhere to privacy and other applicable laws and standards. By offering products and services that are interoperable and open source, cities can avoid vendor lock-in and collaborate more directly with residents and other stakeholders. Open data can also spur innovations among citizens since data is an important resource for fueling innovations. Digital public goods should also address accessibility issues like language or skills barriers, affordability, lack of Internet connectivity, and lack of compatibility with assistive technology.

There are several technical specifications currently available that allow cities and communities to replicate and scale digital public goods. This resource kit provides a list of these specifications, and tools for operationalizing them.

Digital public goods standards
Global standards for digital public goods:

- Digital Public Good Standard - Digital Public Goods Alliance
- Licences and Standards - Open Source Initiative

Open source standards for software:
- OSI Approved Licence - Open Source Initiative

Open source standards for content and web publishing:
- Creative Commons Licence - Creative Commons

Open source standards for data:
- Open Data Commons Licence - Open Knowledge Foundation

Governance of digital public goods
- Minimal Interoperability Mechanisms - Open & Agile Smart Cities
- Principles for Digital Development - Digital Impact Alliance
- Creating a Civic Stack - New America
- Digital Public Goods Map - Digital Public Goods Alliance

www.unhabitat.org

UN HABITAT
FOR A BETTER URBAN FUTURE

UNITED NATIONS HUMAN SETTLEMENTS PROGRAMME
P.O. Box 30030, Nairobi 00100, Kenya
T: +254-20-76263120
E: infohabitat@unhabitat.org

UN-HABITAT
@un-habitat

IMPLEMENTING THE NEW URBAN AGENDA

11 SUSTAINABLE CITIES AND COMMUNITIES