Centering People in Smart Cities

A playbook for local and regional governments

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Foreword

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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 impact. 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 testbeds 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.

01

Introduction to
the playbook

This playbook was produced for UN Habitat's People-Centered Smart Cities Flagship Programme which works to ensure that deployment of technology contributes to sustainability, inclusivity, prosperity and human rights in cities.

The programme supports national and local governments with digital transformation, applying a multi-level governance strategy to help build skills and capabilities to develop, procure and effectively use digital technologies in a way that ensures no one is left behind.

The People-Centered Smart Cities framework presented in this playbook aligns with the New Urban Agenda *Shared Vision #11* of "cities for all", referring to the equal use and enjoyment of cities and human settlements, seeking to promote inclusivity and ensuring that all inhabitants, of present and future generations, without discrimination of any kind, are able to inhabit and produce just, safe, healthy, accessible, affordable, resilient and sustainable cities and human settlements. By creating a framework that centers people in smart city development, the delivery of policies and programmes can be more inclusive and responsive to their needs. **The goal of the playbook is to provide local governments with knowledge, tools, and resources that support putting people at the center of digital transformation.** Readers will learn the history of smart city development (Chapter 02), key players in the smart city ecosystem (Chapter 03), and key UN frameworks that support the use of ICTs for equitable and sustainable outcomes in cities (Chapter 04).

The remainder of the document breaks down the components of a people-centered smart city, and what activities and resources are needed to build it. Readers will find a suite of tools organized into five pillars of recommended actions, activities and resources compiled from international best practices. Each pillar consists of core values and recommended actions, which when taken together, help local governments develop smart cities for people that are more inclusive, safe, and sustainable. The five pillars are: Community, Digital Equity, Infrastructure, Security and Capacity.
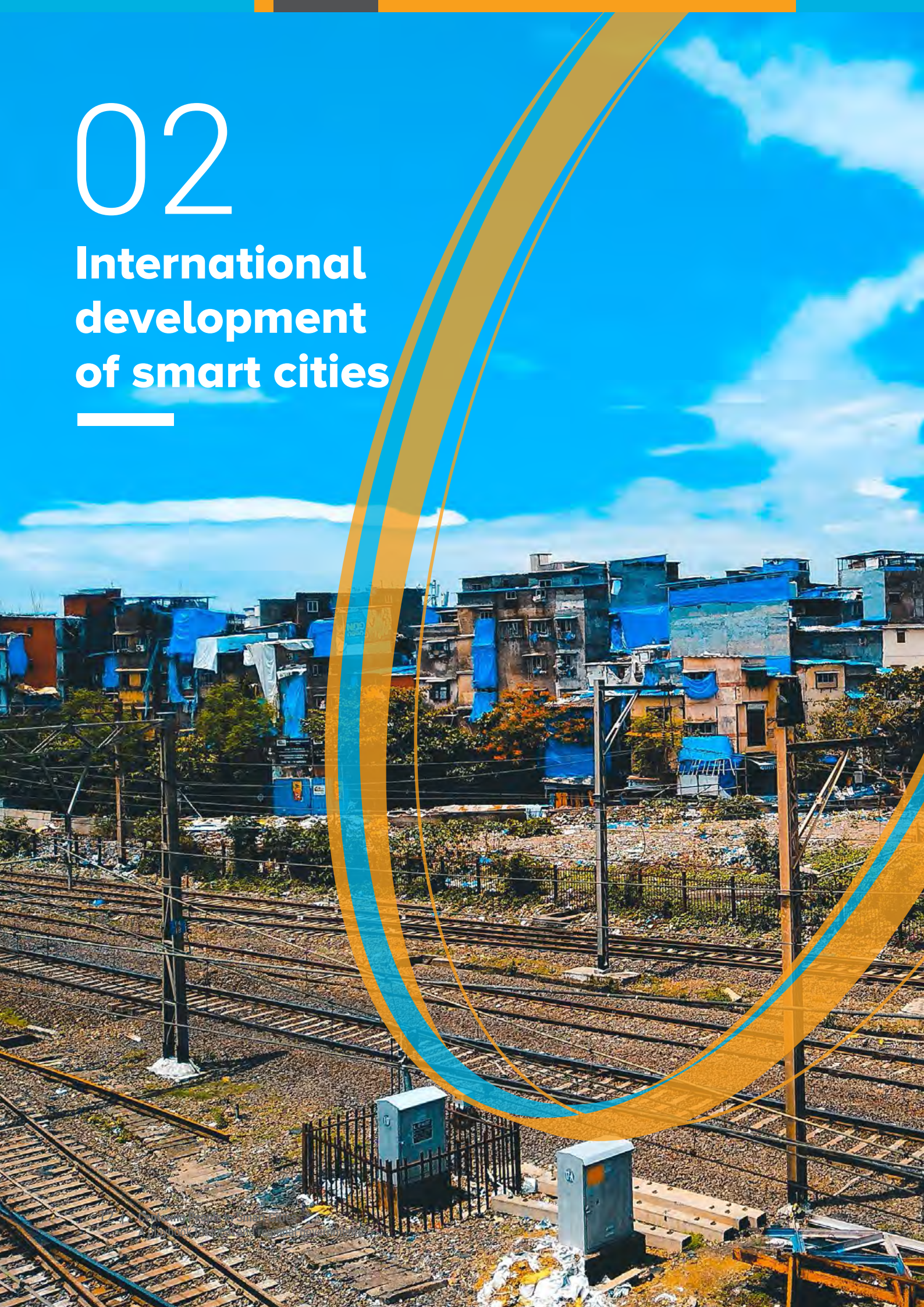
Each of the five pillars are elaborated in more detail in UN-Habitat's a series of people-centered smart cities playbooks that outline a step-by-step process that cities can take in their journey to become people-centered smart cities, including policy-making, community engagement, procurement and finance.

02

International development of smart cities

A brief history of smart cities

Technology has been integrated into nearly all aspects of public and private life, promising opportunities to optimise key components of human settlements including mobility, energy, water, healthcare, education, housing, public services, public space, public administration, the environment and physical infrastructure.

In "smart cities" these aspects of living are enhanced with technologies that aim for optimization, efficiency and convenience. Smart city technologies can generate new streams of data that feed intelligence platforms running analytics to gain greater behavioral and performance insights. Estimates of global spending on the smart cities market ranges from USD 820.7 billion[4] to USD 2.5 trillion by 2026[5] .

Where did smart cities come from? There are several models of smart city evolution that use various terms and timelines. Based on our research, UN Habitat sees four "phases" of smart city development. These phases have sometimes been called the "researcher's smart city", the "marketer's smart city", the "citizen's smart city", and the "consumer's smart city[6]".

Technology played a major role in how people envisioned cities after World War II[7]. The birth of the Internet in the 1960s, and growing use of computers in the 1970s led to a rise in the use of computing technology to measure and quantify urban parameters, which can be traced back to the cybernetic movement of the 1950s that popularised the analysis of complex systems using computers[8]. Researchers of the time focused on "city science," and building new technology primarily to understand the dynamics of cities, studying it as you would a living organism[9]. From the 1980s onwards, researchers began to explore the use of computation as tools for urban planning[10], giving rise to the "researcher's smart city."

As the availability of data about cities increased, a new generation of planners began to focus on optimising urban processes such as transportation and urban design[11]. About this time, some of the first private sector mentions of the smart city emerged, as market opportunities for smart cities became increasingly clear. Though the term "smart city" appears in the literature as early as the 1990s[12] it entered mainstream consciousness when IBM initiated the "Smarter Cities Challenge" in 2010. Under the Smarter Cities Challenge, IBM targeted technology offerings to local governments and developers of urban infrastructure, proposing that computational solutions would serve to optimise city infrastructure. Several companies followed suit, marking the second phase of smart cities, "the marketer's smart city." In this wave, large technology companies drove the definition and application of smart city technology, centering on a narrative of optimization, big data, and cost reduction, focusing primarily on large scale digital infrastructure.

The third phase emerged from criticism of the second. From the mid 2010s, residents, academics and public authorities started sensing that the use of technology in smart cities lacked clear objectives and was driven primarily by private sector interests. These groups sought to tip the scale of smart city projects towards more public control[13]. In order to do so, the "smart city" definition needed to include themes like public participation, education, public health, **data governance** and digital inclusion. These concepts centered more on government services rather than infrastructure and emphasised technology's role in enhancing citizen engagement through crowdsourcing, **open data**, citizen science, **civic technology** and social media. Collectively, these trends marked the third phase, the "citizen's smart city."

Meanwhile, the simultaneous growth of the technology sector including hubs like Silicon Valley in California, and Shenzhen in China popularised start-up culture in the late 2000s, and tech companies started to leverage cities as platforms to create their own markets. Many of these companies disrupted old business models, regulatory structures and systems, by cutting out traditional institutions and leveraging digital platforms to deliver services directly to consumers. Start-ups used the digital connectivity and infrastructure of cities as platforms for providing consumer services like taxis, food delivery and accommodation. The fourth phase, the "consumer smart city," significantly challenged the norms of how local governments' operate, forcing cities to rethink regulation of the public right of way, hyperlocal data gathering and taxation among other issues.

More recently, academics, critics, local government officials and civil society alike have called for a more just and equitable approach to smart city development centering on public participation and co-creation, building local government capacity and achieving tangible outcomes for everyone regardless of their citizenship, race or socioeconomic status[14][15]." According to these interpretations, the role of technology should be to transform residents from being passive consumers to active contributors to the development and use of technology in urban environments.

Specifically, critics are calling for more public control[16] and ownership of data in smart cities understanding the power that comes with the ability to access and control information[17]. This debate reached a critical turning point in 2019 when Sidewalk Labs, a subsidiary of Alphabet (the parent company of Google), was widely criticised for co-opting the public participation process from the City of Toronto for a master-planned redevelopment of an industrial waterfront property into a "smart" community[18]. Concerns over data ownership and privacy were central to the public outcry that resulted in the shuttering of the project.

Emerging public awareness of surveillance technology and bias in algorithmic decision-making, particularly in the wake of COVID-19 has also challenged the traditional smart city framework[19]. Some prominent writers and researchers have recently shed light on failures of large technology companies to address ethics in artificial intelligence[20] and surveillance technologies such as facial recognition[21], noting the impending threat these technologies may have on human autonomy, their implicit biases leading to racial and gender discrimination and their unchecked use in public space.

Towards people-centered smart cities

We call this next evolution of the smart city "the people-centered smart city". People-centered smart cities leverage data, technology and services for common good, delivering the inclusive and sustainable cities that are needed in the 21st century. However, the backdrop of today's smart city is complex for many national and local governments. The privatization of public infrastructure can reduce public oversight and equitable use of technologies while dwindling trust in public institutions[22][23] challenges governments' capabilities. Meanwhile, many cities have become testbeds for new, untested and sometimes unregulated technologies, forcing local authorities to respond to disruptive trends instead of proactively shaping life in cities. As a result, many cities are constantly "catching-up" to today's technology industries.
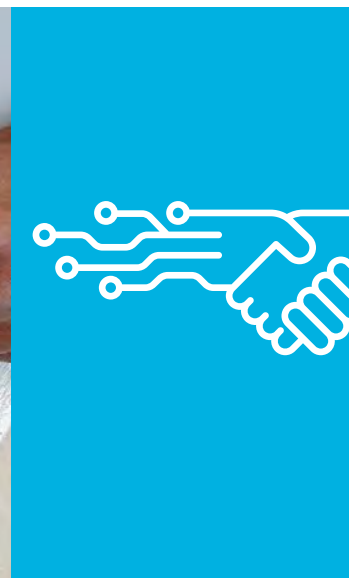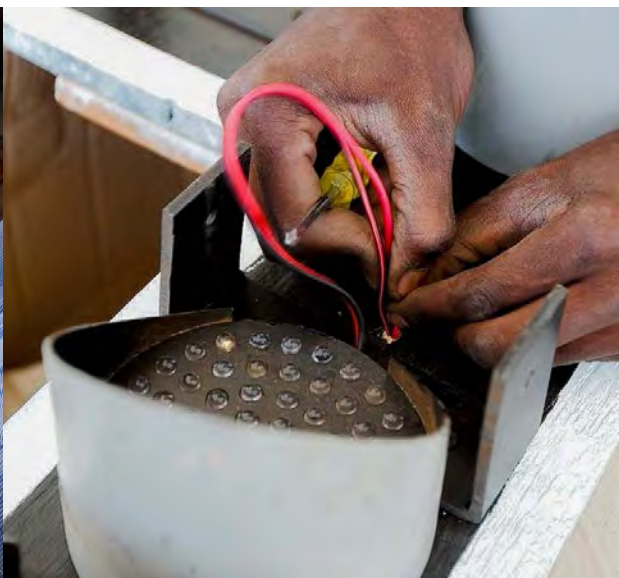
The UN Secretary General's Roadmap for Digital Cooperation released in June 2020 highlights
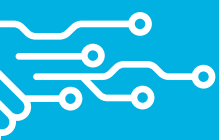
digital inclusion and digital human rights as key pillars of what it calls **'digital cooperation'**

Massive amounts of data created by smart city technologies have sparked a global dialogue about **cybersecurity**, privacy and surveillance, requiring local governments to upgrade their digital infrastructure and assess their ability to secure data and guarantee human rights in the digital era. **The Internet of Things (IoT)** has created new opportunities for digitizing infrastructure like streetlights and energy meters, but has also introduced new cybersecurity vulnerabilities that cities must build capacity to deal with. The resulting large investments in new layers of digital infrastructure can put additional strain on municipal budgets, where unplanned expenditures can result in under-used or misallocated digital services.

As cities work to digitize their services and offer new ways to connect to residents online, a persistent **digital divide** prevents equitable access, hampering economic and educational outcomes for low-income and marginalised communities. All the while, global crises like climate change call for more efficient inter-governmental coordination and the rapid development of innovations that reduce cities' carbon footprint and improve their resilience.

Cities are at the forefront of these challenges and bear much of the responsibility to make sure everyone has the opportunity to participate fully in a digital society. To guarantee this, local governments need to consider the impact technology has on access to services and life in cities (the New Urban Agenda commitments 66, 91, 92, 151, 156-159). At the same time, national governments must support and empower local authorities with policies, recommendations and resources to address these digital challenges and opportunities. Smart cities should focus on people's needs, engage a diverse and wide range of stakeholders, reduce barriers to participation and evaluate digital services and infrastructure from a human rights perspective.

To accomplish this, local governments need a new approach to smart cities that better defines how technology can improve quality of life[24]. People-centered smart cities work to champion this approach by:

Empowering people (community): *Centering smart city activities on people's needs by grounding smart city infrastructure and services in a commitment to human rights, and maximising community participation, representation, transparency and control. Smart cities should provide* **digital public goods** *that are open, transparent, accessible and interoperable.*

Making access to technology equitable (digital equity): *Building a foundation of universal access to affordable internet, digital skills and digital devices.*

Responsibly managing data & digital infrastructure (infrastructure): *Improving the convenience and accessibility of services through digitalization and by creating a framework that sets standards and responsibilities for effectiveness, accountability and inclusivity.*

Building trust by securing digital assets (security): *Safeguard public trust by putting cybersecurity measures in place that protect data and infrastructure.*

Building multi-stakeholder capacity (capacity): *Collaborate with diverse stakeholders to build smart city projects, infrastructure and services. Expand the capacity of city staff for digital transformation. Evaluate the need for technology and address equity, environmental justice and social justice in smart city initiatives.*

Collectively, these elements form the people-centered smart cities framework developed by UN-Habitat, help local governments take a **multi-stakeholder approach to digital transformation that realises sustainability, inclusivity, prosperity and human rights for the benefit of all.**

UN Frameworks supporting People Centered Smart Cities

Because people-centered smart cities involve leveraging digital transformation for sustainable and equitable outcomes, there is a constellation of UN frameworks, initiatives, and activities that currently support the actions recommended in this report that help address the smart city issues outlined in the previous section.

Broadly, the goals of a people-centered smart city are aligned with SDG 11 which calls for human settlements to be inclusive, safe, resilient and sustainable, and to enhance capacity for participatory, integrated and sustainable human settlement planning and management in all countries by 2030. Additionally, the 41st session of the UN Human Rights Council adopted a 2019 resolution on New and emerging digital technologies and human rights that recognises that digital technologies have the potential to facilitate efforts to accelerate human progress, and ensure that no one is left behind in the achievement of the SDGs.

New Urban Agenda

The New Urban Agenda represents a shared vision for a better and more sustainable future in which all people have equal rights and access to the benefits and opportunities that cities can offer. The New Urban Agenda makes several commitments to advancing the role ICTs play in improving service delivery and participatory outcomes. Its call-to-action includes a commitment to adopting a "smart-city approach that makes use of opportunities from digitalization…and technologies (paragraph 66)," thus providing options that enable cities to boost sustainable economic growth and improve service delivery. Important commitments addressed in this playbook that are part of the people-centered smart city framework include:

- Partnering with communities, civil society, and the private sector to develop and manage basic services and infrastructure that ensure the public interest is preserved and accountability mechanisms are clearly defined (New Urban Agenda, paragraph 91)

- Using ICTs and data to support platforms for cooperation and consultation that are open to all (New Urban Agenda, paragraph 92)

- Digitalization of accounting processes and records to produce results-based approaches and build medium to long term administrative and technical capacity (New Urban Agenda, paragraph 151)

- Promoting the development of ICT policy and e-governance strategies to make ICTs more accessible to marginalised groups, and enable their participation (New Urban Agenda, paragraph 156)

- Managing data effectively to support research and innovation (New Urban Agenda, paragraph 157)

- Strengthening data collection methods that respect privacy and human rights and support the evaluation of progress towards SDGs (New Urban Agenda, paragraph, 158)

- Enhancing evidence-based governance using data (New Urban Agenda, paragraph, 159)

- Using e-governance and technological tools to develop open participatory data platforms that enable knowledge transfer between governments and people (New Urban Agenda, paragraph, 160)

The UN Secretary-General and the High Commissioner for Human Rights

In 2020, the UN Secretary-General launched two landmark initiatives that respond directly to the evolving digital era – *A Call to Action for Human Rights*, and a *Roadmap for Digital Cooperation*. Each features **digital human rights** as crucial to a fair, safe and dignified future for humanity. An online Hub for Human Rights and Digital Technology was launched to compile reports, analysis, and recommendations from the United Nations human rights mechanisms that seek to address human rights issues in the digital age.

In addition to the hub, the Office of the High Commissioner for Human Rights (OHCHR) is developing system-wide guidance for human rights due diligence in the United Nations' use of new technologies to ensure compliance with human rights principles and standards. Further guidance on how human rights standards apply in the digital age is also being developed, including through the Human Rights Council, the special procedures and treaty bodies, OHCHR and other stakeholders.

The Connect 2030 Agenda and the International Telecommunications Union

The "Connect 2030 Agenda for Global Telecommunication/ICT Development" focuses on how technological advances will contribute to accelerate the achievement of the United Nations Sustainable Development Goals (SDGs) by 2030. It sets targets for enabling access to ICTs for all, bridging the digital divide, managing risks from the rapid growth of ICTs, enabling innovation, and strengthening cooperation among ITU membership and all stakeholders.

ITU also acknowledges the growing need to achieve sustainability in smart cities by opting to use the term "smart sustainable cities[25]." ITU-D and its digital capacity development activities already work to build digital capacity by helping residents become competent digital citizens through facilitating informed leadership in digital transformation, boosting digital literacy, and developing knowledge resources.

The Key Performance Indicators (KPIs) for Smart Sustainable Cities initiative developed by the United Nations' United for Smart Sustainable Cities (U4SSC), co-led by ITU, UN-Habitat and UNECE, also evaluates the contribution of ICTs to smart sustainable cities in accordance with the targets and parameters set in the Sustainable Development Goals (SDGs).

UN-Habitat

The Declaration of the first UN-Habitat Assembly (2019) sets the direction for innovation that supports better quality of life in cities and communities. Specifically, the declaration identifies the need for "capacity-building and enhanced access to data and information, with due respect for privacy, and the use of environmentally sound technologies and effective participatory partnership". Likewise, the UN Habitat Strategic Plan (2020-2023) endorsed by member states calls for turning "smart city plans and the use of frontier technologies in urban planning, design and regeneration in.to people-centred opportunities, rather than technology-led endeavours (85)".

03

Where local governments sit in the smart city ecosystem

There are many players in the smart city ecosystem, and all of them play an important role.

Taking a people-centered smart city approach requires coordinating with multiple levels of government and integrating across multiple stakeholders including social entrepreneurs, community advocacy groups, local activists, communities and the private sector. It also recognises the different governance configurations in different parts of the world acknowledging that some local authorities have more responsibilities, decision making capacity, and power than others. This approach embraces the role each stakeholder plays in the development of smart city technologies, initiatives and policies[26].

Public sector and multi-level governance

Traditionally, the role of the public sector in smart city development has been as the customer, regulator and "market fixer," mostly intervening to correct the shortcomings of the market when it fails to provide equitable services. In a people-centered smart city the public sector's role in developing smart city infrastructure includes driving innovation by identifying participatory models that allow greater stewardship of outcomes benefiting the public[27]. National governments can provide overarching leadership and key messages on the value of people-centered smart cities to include prosperity and growth, and finance major infrastructure that provides critical funding to support local governments in smart city endeavors. Meanwhile, regional governments can form regional plans, which can have strategic advantage for small or rural local governments that seek to attract resources to a designated region, and for sprawling megacities that consume smaller jurisdictions or fuse with other large cities in a region[28].

Local governments should be the primary stewards of community engagement that drives improved services and connectivity for residents. They can also leverage procurement standards, local ordinances, municipal codes and policy for people-centered outcomes and make important local by-laws and develop strategies that support the transformative potential of a smart city strategy.

First nations and tribal groups also have an important role to play in smart cities. The **digital sovereignty** of these groups is important for educational attainment, achieving economic development goals and enacting sovereignty[29]. Owning and operating ICT infrastructure also supports Native Nations' sovereignty by concentrating wealth, power and data within their communities rather than relying on an external provider[30].

Social entrepreneurs, community advocacy groups and local communities

A key aspect of the people-centered approach is the role that residents and community groups play as participants, collaborators and co-creators of smart city activities. Community groups that aren't organized around a particular issue are also important stakeholders in a people-centered smart city. Women, older people, school children, refugees and people on the move are all important stakeholders that should be engaged in a people-centered strategy. These groups can self-organize to ensure that their perspectives are captured and develop their own solutions to smart city challenges[31]. For example, they can form local alliances and advocacy groups for key themes in people-centered smart cities such as privacy, digital rights or digital inclusion. Often these groups provide important contextual information and galvanise public support for smart city initiatives and approaches.

Businesses and the private sector

In a traditional smart city approach, the private sector is seen as the primary driver of innovation, technology development and delivery. A people-centered smart city approach emphasises the collaborative role private sector actors can play as partners with governments and communities. The private sector can provide substantial investment in infrastructure and services, often through a public private partnership (P3)[32]. They can also provide consulting services to support the development of digital infrastructure, and develop innovative solutions and approaches to problems articulated in participatory processes. Small businesses, local companies and start-ups can support local innovative approaches to using emerging technology.

Civil society

Civil society plays multiple roles in smart city development. Nonprofits seeking to satisfy a public-service mission typically work to improve access to ICTs, or advocate for critical issues in equitable smart city development within their communities. Nonprofits and NGOs are critical partners for local governments seeking to develop a localised plan for building people-centered approaches to smart cities, as they have intimate knowledge of the communities they serve.

Academia

Schools, universities, colleges, and research organizations can offer facilities, personnel and technical expertise about the digital divide to local governments. Research organizations and institutions like universities are instrumental partners for local governments that seek scientific expertise, research and support in the technology and urban planning domains. Academia can collaborate with local governments work with academic institutions to establish smart city research centers, devoted to studying urban dynamics[33], digital human rights[34] or developing new participatory approaches[35].

International community

International organizations, such as the United Nations, can lead the global efforts to align smart cities with universal values in order to facilitate a people-centric transition. The Sustainable Development Goals provide a comprehensive blueprint for defining the key elements and metrics of a **people centered smart city**. The international community also provides the ideal venue for connecting local, regional and international actors, and facilitating knowledge exchange and dissemination[36]. The international community also plays an important role in providing guidance for establishing interoperability of technology and elevating local best practices to the international level[37].

Community Pillar

Digital Equity Pillar

People Centered
Smart Cities

Infrastructure Pillar

UN Habitat has compiled best practices from government, the private sector and civil society into five pillars of people-centered smart cities.
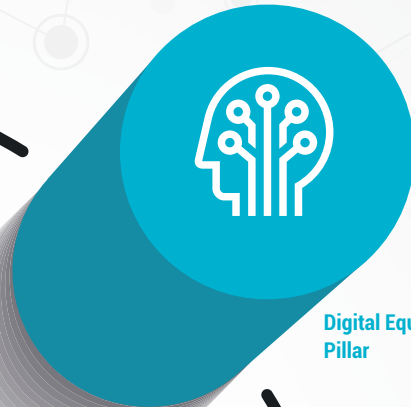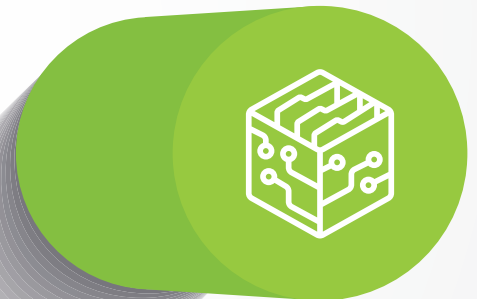
Security Pillar

Capacity Pillar

The Community Pillar

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

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

The Digital Equity Pillar

This pillar addresses how to build equitable access to ICTs with a focus on internet connectivity, digital skills, and digital devices.

- **Activity 4:** Build a foundation of universal access to affordable internet, digital skills and digital devices.

The Infrastructure Pillar

This pillar addresses how to drive inclusive digital transformation by developing systems, processes and policies for managing data and digital services.

- **Activity 5:** Improve the convenience and accessibility of services by digitizing them.
- **Activity 6:** Create a data governance framework that sets standards and responsibilities for effectiveness, accountability and inclusivity.

The Security Pillar

This pillar addresses how local governments and national governments can work in unison to achieve secure smart city assets including data and infrastructure in order to improve public trust.

- **Activity 7:** Safeguard public trust by protecting smart city assets.

The Capacity Pillar

This pillar addresses how to develop multi-stakeholder partnerships and build organizational capacity that better facilitates people-centered smart cities.

- **Activity 8:** Collaborate with diverse stakeholders to build smart city projects, infrastructure and services.
- **Activity 9:** Expand the capacity of city staff for digital transformation.
- **Activity 10:** Evaluate the need for technology and address equity, environmental justice and social justice in smart city initiatives.

04
The 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.

SDG 8, 16. New Urban Agenda 91.

Core values

- Human rights should be protected in digital spaces, and cities should work to ensure transparency and public oversight over smart city technology use.

- Partnerships with the private sector should balance risk and control in order to achieve optimal outcomes for people.

- Governments should procure smart city technology when a demonstrated public need is clear or expressed through public participatory processes.

What's at stake?

Strong private sector initiative and investment in smart cities has created new opportunities for digital transformation, but also compromised public authorities' oversight of digital infrastructure and the data it generates. As a result, many cities find themselves reacting to smart city technologies, rather than actively shaping the conditions for their development and use.

Background

Local governments need to shift from being reactive to disruptive technologies, towards proactively shaping the conditions for their use and ensuring that they are used to deliver positive outcomes for urban residents. Globally, cities struggle with tight budgets and are increasingly reliant on competitive funding from national governments, private sector actors or international organizations to implement the technologies and services they need. Large amounts of capital can be necessary to finance smart city innovations at scale, including infrastructure for addressing pressing challenges like the digital divide, digital payments or big data management. Sometimes technology companies that want to work with cities with limited budgets will offer free pilots, but these often require dedicated municipal staff time, and can be attached to large requisite contracts at scale, or don't progress beyond the testing phase.

Taking an inclusive approach to **digital governance** can help create the conditions necessary for public oversight and control of smart city technology, services and infrastructure. Digital governance should align the use of ICTs with the laws, policies, needs and interests of people subject to a local, regional or national governing body. In an effective digital governance 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 positively impacts residents. Cities need to take a strategic approach to digital governance, setting out their approaches in a digital framework, plan or strategy. This can include:

- Adopting open standards
- Ensuring shared data ownership
- Ensuring interoperability of solutions
- Preventing **vendor lock-In**
- Creating procurement standards

For example, the City of Barcelona developed a policy on **technological sovereignty** as part of their 2017-2020 Digital Barcelona Plan[38] that sets **open standards** for

technology development and use. In 2021, the City of London released an Emerging Technology Charter[39], and the City of Toronto released a Digital Infrastructure Plan[40]. While these plans reflect unique local contexts, they all work to set forth policies, plans and standards for emerging technology.

Resources

- Ethical Standard Digital Standards Policy Toolkit, City of Barcelona.
- Guidelines for AI Procurement, World Economic Forum.
- Public Private Partnerships Reference Guide, OECD.
- Algorithmic Accountability for the Public Sector, Ada Lovelace Institute
- Emerging Technology Charter, City of London

BOX 6.1

Barcelona digital city plan

In an attempt to lead more democratic applications of technology for cities and citizens, the city of Barcelona presented a strategy to deliver agile digital services, accomplish technological sovereignty and a process to migrate to free and open softwares and open standards, using data in a responsible and ethical way, in its 2017-2020 digital Barcelona plan. The focus of the plan approved by Barcelona city council is to develop the expertise to manage the city using digital solutions that can establish long-term legacies for the city and promote the common good. The plan involves designing public services as 'digital services by default' driven by citizens' needs and experiences, and focuses on open standards and interoperability structures that minimise the need to rely on vendors and providers, while promoting innovation. The strategy presented by the Barcelona city council digital plan is centered around:

- Promoting the development of skills and capabilities in agile and user-centred methodologies
- Free and open source software
- Interoperability of services and systems
- The use of open standards and open architecture

With these principles, the guide addresses different aspects of democratic and inclusive digital governance for people. For example, under the free and open source software principle, digital infrastructure should prioritise non-discrimination, be continously adaptive, and lead to greater autonomy over digital tools by the municipality. The same applies to interoperable systems, which should foster greater integration between citizens, the city and other stakeholders to gain competitive advantage, reduce costs and allow access to information without the restrictions or barriers that proprietary software often implies.

The guide is a detailed example of tangible approaches that local governments can take, and offers practical insights including information on procurement of free software, legal frameworks, conditions for open standards and cost estimates. It also considers new approaches to relationships with stakeholders such as the community and private sector providers, which provide support in the changing landscape of smart city development.

BOX 6.2

Case study: UK government's data ethics and AI guidance landscape

Data, and the usage of data have become inseparable from public sector work. Noting the importance of regulating the procurement and application of data-driven initiatives, the UK Government and its relevant bodies developed multiple normative guidelines for public servants working within the sector. From ethics frameworks to procurement processes, the guidelines enable public bodies to adopt data-driven systems in a way that works for everyone in society. As well, the guides look to help inform and empower buyers in the public sector, so that they can evaluate suppliers in detail, and procure needed technology for the benefits of citizens. At present, the list of documents include, but are not limited to:

1. Data Ethics Framework
2. A guide to using AI in the public sector
3. AI procurement guidelines
4. UKSA Self-assessment

With these tools in hand, the government will be able to address public-private, data-driven partnerships in a more practical, streamlined manner. The tools also provide an example of topics and frameworks that a city should have clarity around when considering the application and procurement of technology. Ultimately, the implementation of technology should be based on the demands of the city and the needs of its citizens. To this end, practical guidelines that tackle the normative scope of digitization will anchor the implementation process, so as to provide more transparency, accountability, and efficiency.

ACTIVITY 2:
GROUND SMART CITY INFRASTRUCTURE AND SERVICES IN HUMAN RIGHTS BY MAXIMISING TRANSPARENCY THROUGH PUBLIC PARTICIPATION AND REPRESENTATION.

SDG 17. New Urban Agenda 91, 92, 156.

Core values

- Human rights are critical inputs to public policy and public service provision.

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

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

What's at stake?

People are left behind when digital services disregard human rights, which can perpetuate discrimination for marginalised groups.

Background

Digital technologies provide new means to advocate for, defend, and exercise human rights[41]. Because technology shapes how people access and share information, services, and goods in cities, they have deeply transformed the "public square." For many cities, digital technologies now permeate services, infrastructure and civic engagement processes. In many cases the use of technology in smart cities has eroded social protections, deepened inequalities and exacerbated existing discrimination, for example through the use of facial recognition 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 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[42].

In 2020, the Secretary-General launched two initiatives that responded directly to the evolving digital era: A Call to Action for Human Rights, and a Roadmap for Digital Cooperation. The Digital Cooperation Roadmap identifies key frontiers of digital rights[43] for governments including data protection and privacy, digital identity, surveillance technology and online harassment. To protect human rights in a digital environment, national and local governments can consider incorporating human rights principles such as privacy, security and freedom of expression into locally controlled digital platforms, infrastructures and services[44]. Effective due diligence is required to ensure that technology products, policies, practices and terms of service conform to human rights principles and standards.

Recognising the need for such a human rights framework, some governments are exploring a "**digital bill of rights**", similar to a social contract for digital technology. Since 2018, the European Union's General Data Protection Regulation, or GDPR, requires companies to adapt their data policies to respect the digital rights of EU citizens. Similarly, California's Consumer Privacy Act (CCPA), and the recent Proposition 24, offer data-based digital rights to California residents.

Aside from working to guarantee digital human rights in 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 decided. 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.

BOX 6.3

Case study: Citizen's voice for digital rights in Tirana, Albania[45]

Citizen's voice for digital rights in Tirana, Albania was an event hosted in December 2020 with the residents of Tirana. The forum engaged the public in discussion of digital rights in relation to the local population, with topics ranging from digital literacy and democracy to digital privacy, security, and accessibility. Afterwards, a conversation was held to shed light on public opinion of the intersection between digital rights and their livelihoods.

The last section of the event focused on ongoing dialogue and participation about digital rights. Local officials spoke on ways of furthering digital engagement in Tirana, best practices from around the world, and concrete steps that can be built upon the conversation.

This event highlights the need to engage local residents in discussion of digital rights, especially in our increasingly digitizing world. Resident input is invaluable with regards to the facilitation of digital services by local authorities. These intimate events can help local governments better understand the needs of residents, which will better frame the development of digital rights to achieve quality of life outcomes for people.

BOX 6.4

Case study: Decide Madrid[46]

Decide Madrid is a participatory platform for community engagement with city projects. In 2015, Madrid city council launched the decide Madrid platform, based on the open-source software Consult, to improve public confidence in the local government. The platform aims to ensure transparent government proceedings while engaging the public in the policymaking and spending processes and engages residents in four ways:

- Participatory budgeting: residents can create, vote for, and support district-level and city-wide project spending proposals.
- Proposals: residents can propose and support new legislations that fall within the city council jurisdiction
- Consultations: residents can provide their opinions and vote on council proceedings
- Debate: residents can engage in deliberation, which will provide Madrid with access to public opinion.

Resources

- Digital Rights Declaration, the Cities Coalition for Digital Rights
- Access Now
- Center for Democracy and Technology
- United Nations Office of the Secretary General's Envoy on Technology

ACTIVITY 3:
PROVIDE DIGITAL PUBLIC GOODS THAT ARE OPEN, ACCESSIBLE AND INTEROPERABLE.

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

Core values

- Digital public goods provide increased public oversight, accessibility and interoperability over data and digital infrastructure.

- 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.

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

What's at stake?

Infrastructure and digital assets that are not in the public's control are limited in terms of oversight, accessibility and interoperability. Digital public goods are built from open standards that ensure adherence to the SDGs.

Background

Capturing the full value of advances in digital technology will depend on investment in a new generation of digital public infrastructure. The Digital Public Goods Alliance (DPGA) 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 practices, do no harm, and help attain the SDGs[4748]." There are endless ways to build digital public goods in smart cities, but four key areas have seen the greatest activity recently: the data commons, fintech (financial technology), digital identity, "networked publics" (i.e., crowdsourcing, ride-share, or citizen science) and participatory urban design[49]. Key areas for digital public good delivery include:

- Open software
- Open data
- Open AI models
- Open standards
- Open content

Digital public goods need to be interoperable (in the sense that they can easily interface with existing and future technologies) and open source (meaning that the original source code used to make the product 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 groups 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.

Globally there are many examples of cities developing digital public goods. Some examples include: Decide Madrid, a participatory platform for community engagement with city projects; Digital Matatus, a **crowdsourced** tool for the spatial mapping of informal bus routes supported by the City of Nairobi and Columbia University[53]; the COVID-19 Open Data Hub, an open-source site for raw COVID-19 data offered by the City of San Antonio; and the Mobility Data Specification (MDS), an open source data standard to enable communication between mobility companies and cities, developed by the City of Los Angeles.

BOX 6.5

Case study: Digital matatus[54]

Digital matatus is a crowdsourced tool for the spatial mapping of informal bus routes. It is a collaborative effort between Kenyan and American universities, alongside the involvement of the Nairobi tech sector. Using mobile routing applications, the project captured transit data for Nairobi so as to design a new transit map for the city. The open source database can be accessed, modified, and reused by anyone.

Due to Nairobi's inconsistent and unreliable transit data, digital matatus developed a standard protocol and methodology to create a route map in conjunction with a general transit feed specification (GTFS) compatible data structure. Designated students rode matatus routes and collected data with mobile devices. Afterwards, data was cleaned and formatted into GTFS. This free and accessible dataset enabled the tech community to develop five mobile applications that provide transit routing information to the general public.

Transparent and accessible open source databases will help promote free flow of information and ideas, which will be crucial for the creative technological development within a community. By enabling the availability of digital public goods, local governments can ensure that the data will ultimately benefit the public.

BOX 6.6

Case study: The Mobility Data Specification (MDS)[55]

The mobility data specification (MDS) is an open source data standard to enable communication between mobility companies and cities, developed by the city of Los Angeles. Due to increasing private black-box interface and the potential for lock-in and dependency on privatization, the city took control of its curbs by creating an interface that was then contributed to the open mobility foundation.

MDS can help cities better facilitate transportation in the public right of way. The digital tool standardises data-sharing and communication between local governments and mobility providers in the private sector, including bike sharing and e-scooter companies. It helps cities better manage vehicle operations and related policies with the public in mind. MDS also provides the private sector with a framework that can be reused in new market sectors.

This open-source, freely accessible platform enables cities to access needed data to better understand the usage patterns and tools that will help improve mobility services for public good. MDS contains a set of application programming interfaces (APIs) that allow data to transit securely between cities and providers. The data is generated by vehicles and does not capture a user's personal information.

Resources

- The Digital Public Goods Standard, Digital Public Goods Alliance
- Minimal Interoperability Mechanisms, Open & Agile Smart Cities
- Principles for Digital Development
- Licenses and Standards, Open Source Initiative

05

The Digital Equity Pillar

This pillar addresses how to build equitable access to ICTs with a focus on internet connectivity, digital skills, and digital devices

ACTIVITY 4:
BUILD A FOUNDATION OF UNIVERSAL ACCESS TO AFFORDABLE INTERNET, DIGITAL SKILLS AND DIGITAL DEVICES.

SDG 8.2, 10, 10.3, 10.4. New Urban Agenda 156.

Core values

- Meaningful participation in today's digital age requires a high-speed broadband connection to the Internet.

- Bridging the digital divide requires tackling access to connectivity, skills and devices.

- Hyperconnectivity is not the same as digital inclusion. Connectivity is a vehicle for increasing access to ICTs, but digital inclusion is about opening doors, increasing knowledge and broadening horizons to help communities become more proactive, engaged, and aware.

What's at stake?

Residents cannot participate in digital society if they do not have access to convenient, affordable internet, digital skills and devices. Without robust, affordable, sustainable and inclusive Internet connectivity, participation in digital society and access to digital services are systemically exclusive.

Background

This pillar is the foundation of a people-centered smart city. Residents cannot participate in digital society if they do not have access to convenient, affordable internet, digital skills and devices. The disconnected largely belong to historically disadvantaged communities. While every community is different, the digital divide amplifies existing social, economic and cultural inequalities such as gender, age, race, income and ability. Broadly, people impacted most by the digital divide include: women and girls, children and youth, older people, urban and rural poor, marginalised or minority communities, persons

with disabilities, refugees and persons on the move, and indigenous communities.

Globally, international organizations including the United Nations have recognised how internet connectivity can directly impact education, equity, innovation and economic development.

The Sustainable Development Goals (2015), The New Urban Agenda (2016), The Connect 2030 Agenda (2018) and the UN Secretary General's Roadmap for Digital Cooperation (2020) all consider digital connectivity and digital inclusion to be crucial considerations in order to achieve sustainable development. ITU-D and its digital capacity development activities have already been leading the way in building digital capacity across the board.

The first step towards establishing a plan to reduce or eliminate the digital divide is to study the contours of the problem locally. Using data, local governments can build an evidence-based assessment of their community's digital divide in order to attract and develop the necessary resources to tackle it. A methodology for how to do this is presented in UN-Habitat's *Assessing the Digital Divide: Understanding Internet Connectivity and Digital Inclusion.*

Local governments can also take on digital inclusion efforts, which refers to the activities required to ensure that all communities have access to ICTs. Digital inclusion activities can include building affordable, robust broadband Internet service; providing Internet-enabled devices that meet users' needs; providing access to digital literacy training; and creating applications and online content designed to enable participation and collaboration[56]. When it comes to taking action to address the digital divide, local governments can follow the model outlined in UN-Habitat's *Addressing the Digital Divide: Taking Action towards Digital Inclusion.*

Resources

- [Assessing the Digital Divide: Understanding Internet Connectivity and Digital Inclusion](#)
- [Addressing the Digital Divide: Taking Action towards Digital Inclusion](#)
- [Measuring Digital Development- Facts & Figures 2020](#), International Telecommunication Union Development Sector.

Case study: New York city's internet masterplan

40 percent of New York City households lack either home or mobile broadband internet, and 1.5 million residents lack both. To address these issues, New York City developed an internet masterplan with a strong equity focus.

A major focus of the masterplan is investment in broadband infrastructure in poorly connected neighborhoods. Guided by the city in cooperation with private vendors, new internet networks will specifically target the city's 'internet deserts'. Some developments will provide free wi-fi access, others will charge an affordable price for connectivity. Under the plan, internet infrastructure is allowed to be shared by several providers, encouraging market competition in under-served areas. The city also encouraged partnerships with private organizations that maintain the broadband infrastructure.

To encourage sustainable community network initiatives, the city introduced the universal solicitation for broadband (USB), a program that invites companies in the telecommunications industry to submit sustainable local broadband solutions. Under the USB, private partner companies were selected based on their adherence to the core privacy principles outlined in the masterplan: equity, performance, affordability, privacy, choice.

After a year from the project start, the city provided more than 300 public housing buildings with new broadband infrastructure. Besides infrastructure investments, NYC has also conducted digital literacy training and distributed equipment to school students in struggling areas. This multi-pronged approach to digital equity addresses the three main target areas of the digital divide: digital literacy, access to devices and connectivity.
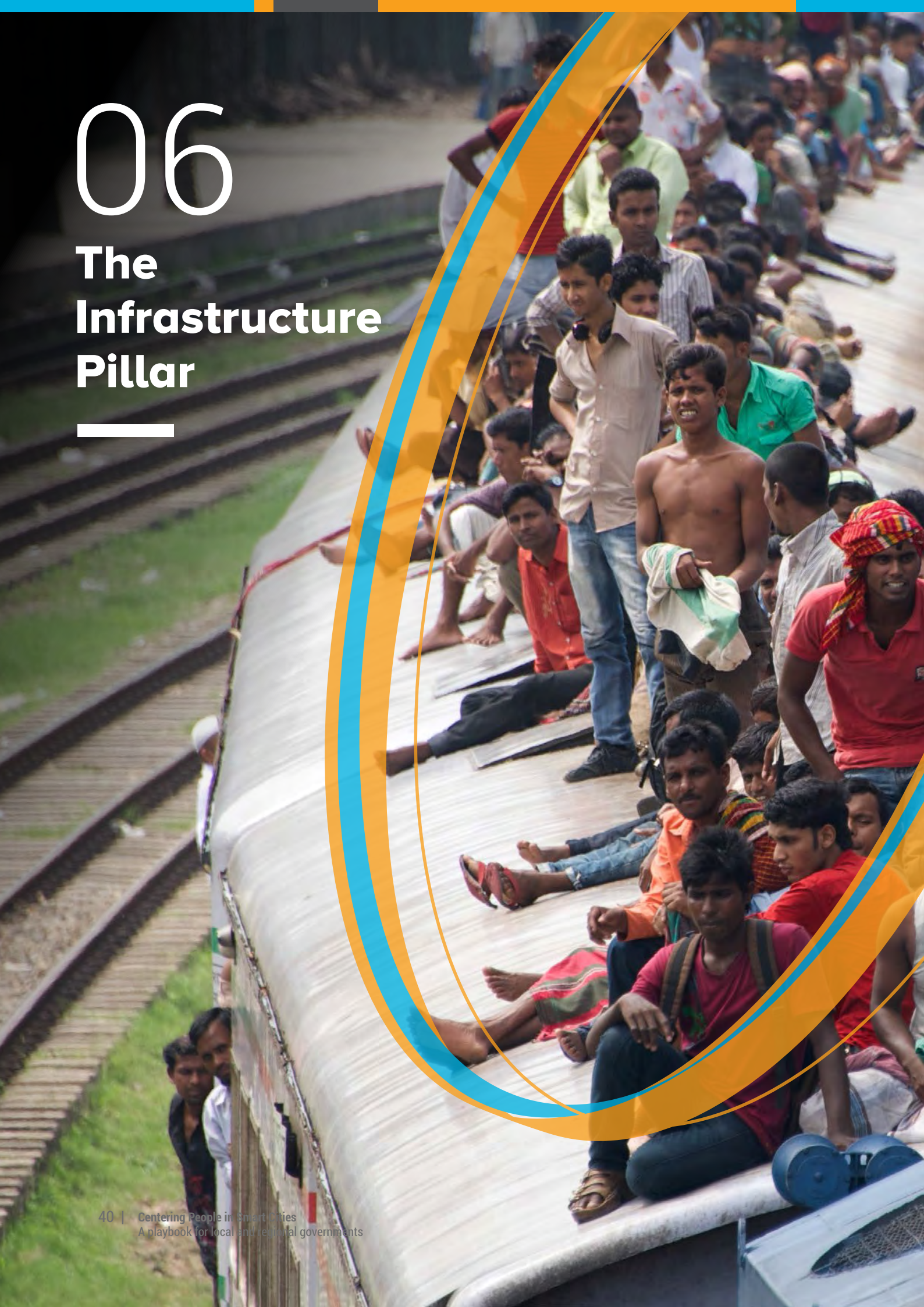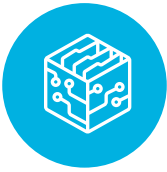
06

The
Infrastructure
Pillar

This pillar addresses how to drive inclusive digital transformation by developing systems, processes and policies for managing data and digital services.

ACTIVITY 5:
IMPROVE THE CONVENIENCE AND ACCESSIBILITY OF SERVICES BY DIGITISING THEM.

SDG 5, 5.B., 10, 10.2. New Urban Agenda 66, 151.

Core Values

- **Digitization** of public services can build public trust by increasing the accessibility, convenience and efficiency of basic services.

- Modular, interoperable and open source platforms can address core public sector challenges in key areas like digital payments, digital identity and digital data exchange.

- When digitizing a service, local governments should pay special attention to the many ways different types of people find, access, and use a service, by prioritising user-centered design and digital equity.

- Privacy and security must be prioritised when developing digital government platforms.

What's at stake?

The digitization of public services represents an opportunity to reimagine government operations and public administration for the 21st century. By placing people at the centre of the digitization process and prioritising privacy and security, local governments can improve the accessibility and utility of basic public services using digital infrastructure.

Background

The COVID-19 pandemic has accelerated the demand for technology solutions that improve the convenience and resilience of government services, while protecting and preserving privacy and security. Unfortunately,

governments around the world struggle to finance, procure, develop and maintain such high-quality digital infrastructure. This has resulted in gaps in service provision that can erode economic health and public well-being.

Digitizing services helps governments improve service delivery. Digitization involves using technology to reimagine how the public interacts with services like parking payments, tax payments, permit applications, multi-modal transportation, tele-health and even self-monitoring energy consumption. Sometimes, it involves automating processes like case management, which can significantly boost productivity by reducing backlogs and freeing up resources for other priorities. The Digital Government Mapping Project recognises three critical government functions that can be improved through digitization:

- Digital payments
- Digital identity
- Digital data Exchange

Collectively these three areas, and the services they underpin represent a **civic technology stack**, and targeting digitization to these three key areas is a good starting point for governments looking to develop comprehensive digital services. Governments are also evaluating use cases for emerging technologies such as blockchain for services requiring verified transactions including voting, contract management, personal records management and banking[57].

Digitization presents exciting opportunities, but can also introduce concerns about privacy, ethics and security. The process can also create more confusion if there is a lack of buy-in from leadership or employees, or coordination issues regarding contracts, staff and

data accessibility. When digitizing public services governments should prioritise transparency, privacy, ethical design and digital equity taking into account multiple lived experiences, and ensuring that digitization efforts are aligned with efforts to achieve SDGs. This can be accomplished by taking a multi-stakeholder governance approach to leveraging open source tools, interoperable platforms and user-centered design for service development and delivery.

There are a growing number of success stories where governments are beginning to pioneer new models for how to deliver digital services while protecting citizens' data. Platforms like IndiaStack or Estonia's X-Road system offer transparent, open-source approaches to handling digital identity and technology development. Other efforts such as UNDP's Building Blocks prioritises the needs of specific marginalised groups including underbanked refugees. Some governments focus on safely sharing data across stakeholders to improve service delivery, for example Germany's construction of shared digital infrastructure to standardised electronic medical records, or San Antonio's coordination of data sharing across public institutions at the local level.

BOX 8.1

Case study: Kaduna State, Nigeria's "Eyes & Ears Project"[58]

In 2015, Kaduna State, Nigeria implemented the "Eyes and Ears Project" to combat overspending and under-delivered government infrastructure projects. The "Eyes and Ears" initiative enables everyday citizens to effectively monitor and evaluate public fund allocation. Citizens are encouraged to report progress and problems in government infrastructure projects through a variety of different tools, including phone hotlines, social media, the project's smartphone app and SMS. This initiative not only enables public participation, but has helped expand the government's capacity in tracking all projects and program developments.

To incentivise citizen engagement, the project has a dedicated, easy to use mobile app that is available on all software devices. Citizens can choose to remain anonymous when reporting and are able to upload photographic evidence if need be. The initiative highlights two key lessons. First, digital services, e.g. mobile apps, need to be user-friendly by design, easy to navigate, and compatible with all smart devices. Second, despite the digitalizing of key infrastructures, there is still the need to provide multiple participatory routes to ensure inclusive participation for those who lack access to smart devices.

BOX 8.2

Case study: Digital villages project in Germany[59]

In association with the German Ministry of Internal Affairs and IESE, The Fraunhofer Institute helped digitalize local government services in several rural German villages with the input of residents. The conception and prototype phases included deliberation with local residents and stakeholders. This digital platform provides solutions for the supply of communications assistance, mobility solutions, e-Gov services, and other resources.

Mobile applications and other user-friendly apps were further devised by teams with continuous input from the local community. In addition to boosting local economic activities through the digitalization of vendor services, residents can more easily contribute to the community, such as making suggestions that are directly passed to the responsible administration.

The digital village project relies upon a unique ecosystem, whereby all parts of the society are involved in the digitalization of their communities. A key lesson from this project is the importance of asking for resident feedback on early prototypes, so that the design of the technology is user-friendly and can best address resident needs.

Resources

- Digital Services Playbook, U.S. Digital Service.
- Digital Service Standards, City of Barcelona.
- Agile Government Handbook, Agile Government Leadership.
- Digital Public Goods Standard, Digital Public Goods Alliance.
- 10 Principles for Building a Digital Government Stack, New America

ACTIVITY 6:
CREATE A DATA GOVERNANCE FRAMEWORK THAT SETS STANDARDS AND RESPONSIBILITIES FOR EFFECTIVENESS, ACCOUNTABILITY AND INCLUSIVITY.

SDG 16, 16.6. New Urban Agenda 157, 158, 159.

Core Values

- Users should be placed at the centre of public data architecture that gives individuals more autonomy over the government's use of sensitive personal information.

- Data collected indiscriminately and without public consent presents human rights risks.

- Local governments should make provisions to own data collected or generated by technologies and make non-sensitive data assets accessible to the public by convenient means.

- Data collection should be based on public interests defined through participatory public processes.

What's at stake?

Without proper governance, mismanaged data introduces expensive operational redundancies, security risks, privacy risks and creates a faulty foundation for investment, policy and programming based on limited or inaccurate information.

Background

Data is the lifeblood of smart cities and what we choose to collect data about shapes our values.

By collecting high quality data and analysing it scientifically, local governments stand a better chance to develop evidence-based policy and data-driven programming that addresses the real needs of residents. Data can be collected by emerging technologies to better understand environmental quality, develop evidence-based programs and policies, optimise traffic conditions or enhance public participatory processes. But without clear standards for data management, local governments risk exposing themselves to expensive subscription access to data, building data silos, and wasting staff time on dealing with inefficiencies in data workstreams. IBM recently estimated that the cost of poor data management in the U.S. in 2016 was $3.1 trillion USD, annually.

When it comes to data governance, local governments face a few fundamental challenges:

- **Lack of data privacy legislation at the national or regional level.** Without clear legal frameworks for data governance at higher levels of government, local governments are not necessarily incentivised to regulate the technologies they encounter or procure.

- **Losing control of data in procurements.** If local governments lack technological expertise or capacity, they sometimes relinquish their ability to own, access and share data during contract negotiations with vendors.

- **Lack of awareness of privacy and how data is used and generated by emerging technology.** Without this knowledge, cities struggle to establish when to "say no" to technologies that collect new forms of data in public space that could potentially be harmful or excessive.

- **Lack of infrastructure.** Cities often don't have the capacity to build or support digital infrastructure that they own and maintain, where data could be stored, managed and shared securely. This leads to outsourcing these fundamental aspects of data governance.

- **Challenges negotiating data sharing agreements.** Data sharing agreements require addressing barriers to trust and participation across organizations, which can be a lengthy process.

- **Bias in methods of data collection and analysis.** How cities collect data is often subject to bias particularly regarding survey methodology that is not inclusive and fails to address accessibility, equity and the needs of persons with disabilities.

The process of collecting, cleaning, integrating, and analysing data requires extensive capital investment, organizational culture change, interagency collaboration and long-range vision. In the face of these complex organizational and technical challenges, cities have started developing strategic plans and data governance policies to guide the development of more open, data-driven city government[60]. Public datasets unlocked by open data **platforms**[61] can be used as tools for helping communities build technology skills and for **crowdsourcing** innovation. When sharing data with other organizations, cities can leverage the expertise of a multi stakeholder network, and create cost-savings through better service coordination.

Data that is collected indiscriminately and without public consent is a violation of the right to privacy that erodes public trust[62]. How cities collect data significantly affects how they make decisions about budget allocations, programs and policies. Data collected through surveys should address issues of accessibility and equity. Data emerging from new surveillance tools like facial recognition should be critically evaluated for bias and discrimination.

Case study: Regional data governance coordination in Morocco[63]

Morocco has emerged as a regional leader in digital governance practices by actively updating its data protection and interoperability policies, promoting internet penetration, and actively cooperating with the neighboring EU states.

To update its data protection policies, Morocco collaborated with the Delegation of the European Union to Morocco on a study that examined the differences between the Moroccan data protection framework and the EU general data protection regulation. In 2018, the Moroccan data protection authority conducted a series of seminars aimed at updating the country's data protection network. Aligning the data protection network with the neighboring EU promoted further international cooperation and business activity between Morocco and the EU.

Since 2010, Morocco has also been actively enhancing its interoperability standards. The government first highlighted the need for better data interoperability in the 2010 e-Morocco strategy, and subsequently provided common data management standards in 2011 for government websites. In 2012 the government introduced a data interoperability framework for the public sector and built a common data interoperability platform in 2016.

Case study: The city of Seattle privacy principles[64]

As cities engage with digital technologies, they seek a balance between ubiquitous data collection and secured privacy of their citizens. Seattle has emerged as a pioneer in privacy policy by introducing and adopting principles. The six principles are the following:

- Consider individual privacy risks before collecting any information
- Collect only the information that is required for a given project, and keep the information as long as it is useful to the project.
- Notify subjects of the way the city uses their information and ask for consent whenever possible
- Secure computer resources from threats and prevent any unauthorized distribution of the information collected
- When working with outside partners, follow the federal law about information disclosure and make the external partners agree to privacy requirements
- When needed, make corrections to any inaccurate information collected.

These six principles are to be followed in any municipal project requiring data collection. Besides, Seattle appointed a Chief Privacy Officer as well as hired a privacy advisory committee performing audit and monthly checks of all projects that involve data collection.

Resources

- [A Data Driven Public Sector: Enabling the strategic use of data for productive, inclusive, and trustworthy governance](#), OECD.
- [Digital Defence Playbook](#), Our Data Bodies.
- [What Works Cities Certification](#), What Works Cities
- [A Commons Approach to Smart City Data Governance,](#) New America
- [Global Policy Roadmap](#), G20 Smart Cities Alliance
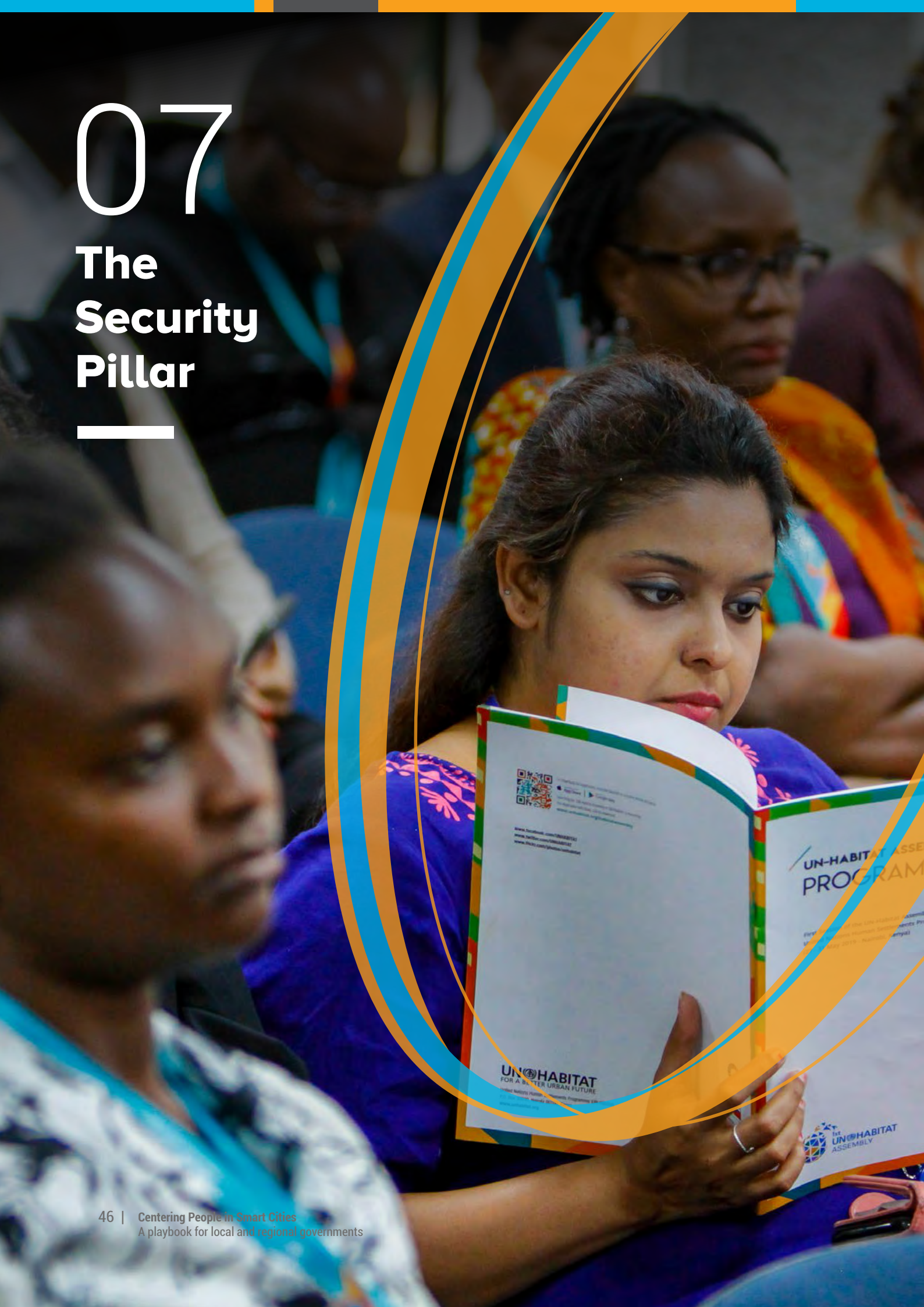- [Data Governance Lab](#), Future City Canada

07

The Security Pillar

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This pillar addresses how local governments and national governments can work in unison to achieve secure smart city assets including data and infrastructure in order to improve public trust.

ACTIVITY 7:
SAFEGUARD PUBLIC TRUST BY PROTECTING SMART CITY ASSETS.

SDG 16, 16.6. New Urban Agenda 157.

Core values

- Consensus about the appropriate use of data and smart city technology should be developed iteratively, and through the participation of many stakeholders.

- Residents should have clear oversight of the use of technology, particularly in public space, by local governments.

- Local governments need to adopt comprehensive regulations, implement solid cybersecurity strategies and protocols, develop organizational risk-awareness, and leverage the appropriate tools to address the security issues generated by emerging smart city technologies.

What's at stake?

Trust in public institutions is declining in many parts of the world, in part due to lack of transparency, unsecured digital infrastructure, and limited opportunities for community representation and participation.

Background

Only 45% of citizens in OECD countries trusted their government in 2019[65]. In a digital world, building public trust requires transparency, meaningful public participation and meaningful consent in addition to a growing need for cybersecurity measures that protect data and infrastructure. Generally, ethics can be considered a reflection of society's collective moral understanding[66]. However, local governments cannot always codify ethics directly into their policies. Moreover, public perceptions around technology are diverse both within and between societies, and can change over time. Recently, advances in technology such as facial recognition and AI have pushed ethics questions to the forefront of public discourse, challenging the limits of existing law, or highlighting the absence of regulation altogether.

Cybersecurity is a critical factor in the resilience of **e-government** and digital services for cities. Unprotected data can be accessed and exploited by attackers to obtain sensitive public and private information, exposing local governments to the risk of fraud, ransom, and theft. A recent report sanctioned by the Africa CyberSecurity Conference estimated that the continent lost about $3.7 billion dollars to cybercrime in 2017[67]. Local governments need to adopt comprehensive regulations, implement solid cybersecurity strategies and protocols, develop organizational risk-awareness, and leverage the appropriate tools to address the security issues generated by emerging smart city technologies. Cybersecurity is not just a technical issue, and likewise a cybersecurity strategy must be part of a multidisciplinary approach, with solutions in place at the educational, legal, management and technical levels.

BOX 9.1

Case study: E-Estonia[68]

e-Estonia is a successful example of a multi-stakeholder approach to digital transformation led by the government, the private sector and the population. At the beginning of its journey, Estonia faced challenges associated with the digital divide and did not have a data collection and governance strategy. It credits much of its success to the population, who was open to adopting new digital solutions, and to the fact that technology has helped to optimise resources and maximise efficiency.

The local government measures success of digital transformation using several indicators including the electronic identification for all users (almost 98% of the population), years of working time saved thanks to data exchange (844 years every year) and healthcare outcomes (99% of patients in the country have digital records). The principles of the Estonian e-governance strategy include:

- Integrity - data information and communication are fully accountable
- Interconnectivity - all services and data are interoperable and available for access
- Transparency - citizens can verify their personal information and how it is used

For the future, Estonia plans to digitize all basic services, providing citizens with a good user experience to access e-services automatically and without disruption. The availability of digital solutions also aims to build competitive advantage for the country, developing the capacity of running business onlines, having real-time economic transactions and investing in digital resources for education and skills.

BOX 9.2

Using cybersecurity to protect digital inclusion assets in Mauritius

As internet connectivity increases and more people have access to the internet, there is a growing demand for more online security, privacy and trust to ensure online spaces are also safe spaces. While technology can enhance benefits to society, it can also perpetuate harmful human rights violations, raising the need for governance frameworks that manage digital spaces based on multi-stakeholder initiatives and transparency.

In the case of Mauritius, cybersecurity measures have been approached based on collaborative efforts including the most vulnerable stakeholders, as such inclusion is a key component of digital transformation. In 2017, Mauritius ranked first in Africa in terms of country's commitment to cybersecurity, and has since become a leader in the region, establishing the regional capacity building centre for Africa, which supports the formulation of cybersecurity legislation and collaborates with other countries to prevent cyber attacks and build capacity around this topic.

Resources

- Cybersecurity Challenges and the Way Forward for Developing Countries, Institute of Electrical and Electronics Engineers (IEEE).
- Playbook: Government as a Platform, ASH Center for Democratic Governance & Innovation, Harvard Kennedy School.
- E-Estonia Toolkit
- Cyber Accountability Model, G20 Smart Cities Alliance

08

The
Capacity
Pillar

This pillar addresses how to develop multi-stakeholder partnerships and build organizational capacity that better facilitates people-centered smart cities.

ACTIVITY 8:
COLLABORATE WITH DIVERSE STAKEHOLDERS TO BUILD SMART CITY PROJECTS, INFRASTRUCTURE AND SERVICES.

SDG 17. New Urban Agenda 91.

Core values

- People-centered smart city projects and initiatives should be inclusive of multiple stakeholders including representation from civil society and community organizations.

- Legal boundaries of authorities should be understood and respected in people-centered smart city partnerships.

- Partnerships should be "context-aware" and evaluated for their inclusiveness, resilience, and mutual benefit.

What's at stake?

Smart city infrastructure requires significant investment and ongoing maintenance which can be best achieved with partnerships that leverage multiple stakeholders, their resources, expertise and perspectives.

Background

The challenges faced by public authorities today require interdisciplinary expertise and sometimes multiple layers of financing. In smart cities, there is a strong need for innovative approaches with greater long term potential to tackle complexity, but such approaches can have a greater risk of failure. The UN defines multi stakeholder partnership as "An ongoing collaborative relationship among organizations from different stakeholder types aligning their interests around a common vision, combining their complementary resources and

competencies and sharing risk, to maximise value creation towards the Sustainable Development Goals and deliver benefit to each of the partners[69]."

The United Nations also makes the distinction between traditional development, which requires an ongoing flow of external resources in order to continue to improve lives, and transformative development, which aims to transform unsustainable situations to a sustainable ones[70]. In smart cities, the need is urgent for transformative development approaches that can tackle complex problems by integrating multiple layers of expertise, finance, authority and perspectives. Global partnerships and initiatives can play a key role in gathering the perspectives of all stakeholders and supporting the delivery of digital services through collective actions[71].

Smart city projects have been criticised for failing to mitigate some of the risk factors that come along in forming partnerships for high profile initiatives[72]. This is in part because the roles of business, government and civil society actors are not well understood, their levers of power are unbalanced, or their needs are not met. Each stakeholder in a partnership carries their own power levers, and has vested legal powers and constraints. These should be clearly understood in order to effectively outline the boundaries of each partners' activities. When forming multi stakeholder partnerships to achieve outcomes, be sure to ensure that four critical elements are in place: 1) trust and transparency, 2) power balance and equity, 3) mutual benefit, and 4) accountability and commitment. Creating a formal framework for a partnership, such as a partnership agreement, Memorandum of Understanding (MOU), or even a Data Sharing Agreement can help solidify partnerships.

BOX 10.1

Case study: Rwanda's Irembo e-services

Irembo is Rwanda's national online services platform and considered a major development in Rwanda's smart city strategy. Launched in 2015, Irembo is a government portal where citizens can access and request services within one single platform. It launched with 22 local government services and has so far digitized 98 public services. In Kinyarwanda, Irembo means "gateway", and through it, citizens can access services such as birth and marriage certificates, land registration, building permits and health insurance, among several other services.

The Rwandan government has established partnerships with other organizations to provide a network of kiosks, where citizens can use mobile money transfers, selling and topping-up of public transport cards, and Irembo services. Plans to implement more modern kiosks include solar-powered technologies and hotlines for reporting fraud.

The e-services available in the platform support transparency efforts in digital service delivery for citizens while it helps the government to better manage revenues, by tracking the transaction fees associated with the provision of services. Yet, in an evaluation conducted in 2018, the performance of Irembo services was rated only at 44.11% in terms of satisfaction level. Some of the challenges include infrastructure issues, network connection problems and lack of citizens' awareness about Irembo services. In 2020, the IremboGov 2.0 version, which counted with improvements from users and organizations, was announced.

Resources

- SDG Partnership Guidebook, United Nations.

ACTIVITY 9:
EXPAND THE CAPACITY OF CITY STAFF FOR DIGITAL TRANSFORMATION.

SDG 16, 16.7. New Urban Agenda 66, 151.

Core Values

- Investing in the digital capacity of city staff in addition to recruiting new talent enhances smart city efforts.

- Taking a more strategic approach to structuring technology leadership and digital literacy within the organization is critical for local governments to be able to adapt to the digital era.

- Leadership commitment at top levels is necessary for a successful digital transformation.

What's at stake?

Lack of skills for digital transformation can be an issue within public authorities just as much as with the public they serve. Effective transition to frontier technologies that benefit people cannot occur if public authorities don't invest in digital literacy resources for their own staff.

Background

The need for digital capacity building in the public sector is great. In order to achieve real and sustainable progress towards the SDGs, and to harness the opportunities presented by emerging technologies, local governments must invest in skills training and capacity building of their own staff. This issue is particularly challenging in developing countries that often lack access to digital infrastructure and resources. For example, it is estimated that there will be 230 million "digital jobs" in sub-Saharan Africa by 2030. These could generate nearly $120 billion in revenue, but require nearly 650 million training opportunities to also take place by 2030[73].

There are several types of capacity building strategies, but four main approaches are most widely used:

- **Demand-driven** - Offer training and capacity building services based on listening tours, and facilitated discussions with city staff.

- **Needs-based** - Deliver training and capacity building services based on a capacity needs assessment.

- **Holistic** - Design policies that incentivise or require training, and provide the necessary tools and resources for compliance.

- **External** - Work with an NGO or external certification program that requires certain benchmarks to be met and can provide resources and training to your local government to achieve programmatic goals[74].

Digital capacity training programs can focus on several topics including:

- Software such as GIS mapping, Microsoft or Adobe Suite
- User-centric or UX design
- Agile development
- Digital government services and digital tools
- Design thinking
- Coding
- Digital human rights and inclusion
- Cybersecurity

Local governments should look to external resources for support in building digital capacity and literacy training programs. The International Telecommunication Union (ITU) and the United Nations Development Programme (UNDP) for example, have launched a Joint Facility for Digital Capacity Development that provides support to those not currently served by existing digital capacity development resources, including a searchable database of existing international digital capacity training. In an effort to map existing international digital capacity needs and resources, UNDP is currently piloting a Digital Readiness Assessment with select governments that will help determine what digital capacity support they need. Additionally, the Cities Coalition for Digital Rights is developing a Digital Rights Helpdesk, that will provide local governments with actionable resources and support on topics in digital government and digital human rights.

Having leadership buy-in and strategically structuring technology leadership within the organization is also critical for local governments to be able to adapt to the digital era. Establishing dedicated offices, such as an office of Innovation, Smart Cities, Digital Inclusion or Digital Transformation is often a critical pathway to the success of smart city strategy in local government. Key roles such as a Chief Technology Officer or Chief Digital Officer, that are endowed with leadership capability are crucial to successful digital transformation at the organizational level.

Case study: Digital skills for public authorities in the EU[75]

CORA – connecting remote areas with digital infrastructure – was launched by EU partner states of the north sea region programme to address the rural digital divide and support local authorities' ability to keep pace with digital innovations. The goal of the programme was to enable local authorities to identify their common challenges and empower them to exchange experiences and test innovative solutions to create an advanced digital environment. To do so, CORA partners developed a model called SSE "systematic synergy enhancement model", which provides a comprehensive set of guiding measures towards digitalization in rural areas. It employs fixed and mobile digital hub concepts for providing in-place advice, technology demonstration and incubator spaces. Within the project, partners also launched the digital skills for public authorities course that offers information about digital skills for public authorities, the challenges public authorities face before and during the digital transformation of the administration and how to address them.

Case study: Amsterdam's Chief Technology Office

In 2014 the city of Amsterdam appointed its first Chief Technology Officer and now maintains an innovation office. The team is responsible for keeping track of the recent technologies and how to apply them to urban services. The office focuses on short-term pilot projects in collaboration with local tech businesses and start-ups. The office also maintains an open data portal with datasets related to the projects conducted.

To bring technical expertise, the office partners with local academic institutions. The Amsterdam data science is a joint initiative of the Amsterdam University of Applied Sciences, Vrije Universiteit (VU) Amsterdam, the University of Amsterdam (UvA) and the Dutch Research Institute of Mathematics and Computer Science. The innovation office now has 120 people working at the intersection of policy, technology and design.

BOX 10.4

Case study: The Government Digital Service (GDS) academy, UK

The government digital service (GDS) academy In the UK is designed to increase the capabilities of civil servants, upskill staff, ensure government services are delivered with user-centered design, and accelerate digital transformation across government.

Building from a previous digital training programme, the DWP digital academy, major challenges facing departments such as the slow development and adoption of new technologies and ensuring civil servants have the skills necessary to use them were cited. The GDS academy was developed to serve as a central pillar to help staff from different areas of government to incorporate digital, data and technology in their work. The training offered varies across needs and skills, including aspects of agile practices – such as emphasising multi-disciplinary teams to developing and piloting services and working across topics, behaviours, tools, techniques and technologies. Within four academies in London, Leeds, Manchester and Newcastle, staff are trained in the four pillars of digital: user-centric design, agile development, digital government services and digital tools . Additionally, they are taught wire framing, design thinking, coding and more before getting placed in actual projects at the end of the courses. Expansions of the GDS academy across the UK are planned, with aspirations of opening academies in more locations and providing a wider range of courses and programmes. Following the COVID-19 pandemic, the GDS developed a library of online training courses to support local authority staff and further encourage the adoption of digital skills.

BOX 10.5

Case study: Philippine regional inclusive innovation centres: solving community problems and bridging development gaps

From 2010-2017 the Philippines had undergone a fast growing economy, domestic market, middle class and stable wages, resulting in a manufacturing resurgence. However, due to high inflation and sluggish export growth, a manufacturing slowdown became evident in subsequent years. Since most of the regions in the Philippines are dependent on agriculture, fishing, and forestry, regional economic imbalances have continued to persist, along with poverty, unemployment, and underemployment. To address these issues, the Department of Trade and Industry in the Republic of the Philippines Regional established Regional Inclusive Innovations Centers (RIICs) to facilitate local innovation ecosystems.

RIICs are virtual or physical network hubs that aim to link government, academia, and industry to promote the pursuit of market-oriented research that attempts to directly address societal issues and industry needs through the development of new products and services. Currently, RIICs have been established in four pilot regions: Regions 5 (Bicol), 7 (Cebu), 10 (Cagayan De Oro), and 11 (Davao).

The RIICs will provide R&D, incubator and accelerator facilities where startups and companies can go for innovation and linkages creation services provided by both national and local government units and the private sector. They will also facilitate the convergence of different stakeholders in the innovation and entrepreneurship ecosystems such as government, industry, and education/academia, to not only address societal issues, but also build up capacities and produce new products and services.

Resources

- United Nations E-Government Survey 2020, United Nations Department of Economic and Social Affairs.
- Digital Maturity Self Assessment Toolkit, EU Intelligent Cities 100 Challenge
- ITU/UNDP Database for Digital Capacity, ITU/UNDP Joint Facility
- Smart Cities for City Officials, The University of Malmö

ACTIVITY 10:
EVALUATE THE NEED FOR TECHNOLOGY AND ADDRESS EQUITY, ENVIRONMENTAL AND SOCIAL INEQUALITY IN SMART CITY INITIATIVES.

SDG 10, 10.2, 13, 13.1. New Urban Agenda 66.

Core Values

- Smart city technology is not a solution, but rather a tool that can help local governments address complex social, economic and environmental challenges.

- Smart city technologies are most effective when evaluated using an equity lens, and for their ability to serve a clearly specified public interest.

- Residents should be involved in the determination of smart city goals, and the evaluation of a technology's ability to meet their own needs.

What's at stake?

In the past, smart city projects have sometimes focused on technology for technology's sake. A people-centered smart city approach leads with community-defined needs, and responds to urgent sustainability challenges.

Background

Technology is a tool, rather than a solution, that can help people and local governments tackle some of the greatest challenges facing humanity today. Smart city technology works best when it serves a clearly specified public interest, and is used as a tool to maximise quality of life outcomes for everyone. Therefore the "smartness" of a city should be assessed according to how well its technology responds to residents' needs. Building frameworks to evaluate smart city strategies is an emerging field[76], however emerging smart city indices[77] are beginning to assess "smartness" according to public perception of how well smart city technologies work for them.

Spending on smart city technology has increased year over year since 2010, but the public benefits of such investments are rarely measured directly. Globally, it is estimated that $124 billion USD has been spent on smart city initiatives as of 2020. Often, local governments will engage the private sector on "zero cost" smart city pilots, which leverage both city infrastructure and staff time for delivery without accounting for it, and can lead to vendor lock-in. Understanding the true costs of digital transformation[78] is critical to evaluating the success of any smart city effort. Smart city technology must be evaluated in context, clearly address a public need and respond to lived experiences of a diverse set of stakeholders. The ITU, UN-Habitat and UNECE recommends developing KPIs to evaluate smart cities across four dimensions[79]:

- **Economic:** The ability to generate income and employment for the livelihood of the inhabitants.

- **Social:** The ability to ensure that the welfare (safety, health, education) of the citizens can be equally delivered despite differences in class, race or gender.

- **Environmental:** The ability to protect future quality and reproducibility of natural resources.

- **Governance:** The ability to maintain social conditions of stability, democracy, participation, and justice.

Deploying smart city technology critically can make a real impact on some of humanity's most challenging problems such as climate change or inequality. For example, municipal-led digital inclusion efforts challenge the prioritization of internet connectivity provision to higher income communities, energy efficient LED smart street lighting can substantially reduce a city's energy consumption, and smart traffic management can reduce carbon emissions on roads. By evaluating technologies like these through an equity lens, a municipality can also determine not just how well the technology addresses a public need, but more specifically-- whose needs are addressed, prioritising those of marginalised groups.

BOX 10.6

Case study: The quantified community and neighbourhood labs[80]

Initially established in three neighbourhoods of New York city, quantified communities is a neighbourhood research informatics initiative, in which a network of neighbourhoods collects, measures and analyses data about the space and environment, as well as about the human behaviour of the community to better understand the relation between the built-up environment and social well-being.

Because quantified communities are established at the neighbourhood scale, citizens are engaged in the process and have the opportunity to participate, shifting the mainstream idea of top-down technology application to a human-centric perspective. At the very local level of neighbourhoods, the quantified communities also become more accessible and less complex instruments to experiment and explore data applications, but are especially important to promote citizen participation in defining challenges, interpreting data and contributing to the solution. It combines participatory processes, urban technology application and planning for policymaking.

Resources

- Equity Atlas Online Toolkit, Regional Equity Atlas.
- Y.4902/L.1602—Key Performance Indicators Related to the Sustainability Impacts of Information andCommunication Technology in Smart Sustainable Cities; ITU

09

Building people-centered smart cities

Revising a smart city approach to be more inclusive, or building a new smart city strategy from scratch isn't easy and there is no "one-size fits all" solution. However, here are seven key steps that local governments can take to think through a people-centered approach and achieve gains in each of the five pillars

Steps to building a people-centered smart city strategy:

1. Identify a leadership structure:
Obtain leadership support and buy-in for digital transformation. Establish key roles such as a Chief Technology Officer or Chief Digital Officer, that are endowed with leadership capability needed for successful digital transformation at the organizational level. You can align your efforts with an independent certification process, an executive order, or through the mayor, city manager or city council members depending on your form of government.

2. Build your capacity and position the plan:
Determine what financial, staffing, or infrastructural resources are required to be successful. Identify opportunities for existing staff to build the necessary digital literacy or technology skills. Show how your strategy is connected to other key local plans (such as economic development, education, community development plans) and relevant national policies and initiatives.

3. Create a standard for inclusive participation:
Establish standards for public participation processes that are transparent, inclusive, respect privacy, and demonstrate the results of participating.

4. Identify key partners:
Identify what national and local organizations can support your strategy including community organizations, local advocacy groups, potential P3 opportunities, NGOs, regional or national government programs and offices. Also be sure to look at who isn't around the table and who might need to be.

5. Build a digital equity framework:
Everyone cannot fully participate in, or benefit from digital transformation without having equitable access to ICTs. Early in your strategy, work towards establishing a digital inclusion plan for inclusive access to connectivity, digital skills and devices.

6. Build a management and operations ecosystem:
Establish how your people-centered programmes will be managed and supported through digital infrastructure. This includes identifying finance strategies, building Information technology systems including data platforms and cybersecurity architecture, identifying supportive legal frameworks at the regional and national level and identifying opportunities to operationalise human rights through municipal code, ordinances, policies and procurement.

7. Create a plan for data:
Data is a critical asset in a people-centered smart city, that should be owned and accessible by the public. Establish an IT plan for data, complemented by an interoperable smart city platform, in addition to a Data Governance Policy, Open Data Policy, Privacy Policy or a Digital Bill of Rights.

8. Build programme design and implementation:
Begin to identify key programme offerings, pilot projects and other initiatives that will be supported by all the items identified in steps 1-7. These offerings should directly address needs expressed by communities as identified through public participatory processes.

9. Create an evaluation framework:
Decide how you will measure success using Key Performance Indicators (KPIs) and create a strategy for collecting data about your progress. If using surveys, be sure to include a representative sample of the population, use inclusive survey language, and take steps to address the digital divide by surveying people in person.

10. Pilot and pivot:
Test your smart city technologies in the wild. Begin with deployments or programming at a small scale or with focus groups, identify lessons learned and refine your approach before scaling. If the approach was not successful, identify the reasons why and make the necessary pivot.

10

Participation, co-creation and empowerment in the people-centered smart city

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A diverse range of people's needs should inform the development of smart cities. The 2030 Agenda for Sustainable Development highlights the importance of participatory processes for democratic governance and sustainable smart cities, particularly in Sustainable Development Goal (SDG) target 16.7, which calls for ensuring "responsive, inclusive, participatory and representative decision-making at all levels".

A diverse range of people's needs should inform the development of smart cities. The 2030 Agenda for Sustainable Development highlights the importance of participatory processes for democratic governance and sustainable smart cities, particularly in Sustainable Development Goal (SDG) target 16.7, which calls for ensuring "responsive, inclusive, participatory and representative decision-making at all levels".

In traditional smart city models, local governments have either failed to meaningfully engage residents (especially marginalised groups and those living in poorer communities), outsourced community engagement to the private sector, or placed too much emphasis on the role technology plays in the participation process. E-participation, or leveraging ICT for interaction between citizens, public administration and politicians[81], has become a popular mode of public participation for local governments. However, evaluations of e-participation initiatives have consistently shown that setting up platforms for e-participation is not enough to stimulate meaningful public participation[82]. Technology alone cannot increase civic engagement and participation and over-reliance on this medium risks excluding those living and working in informal settlements and slums and other less digitally literate groups. Improving E-participation outcomes requires situating technology in the context of participants, their needs, desires, lived experiences, and roles and responsibilities as civic actors.

Broadly, the United Nations recognises three main categories of digital public participation[83]:

- **E-information:** enabling participation by providing citizens with public information and access to information without or upon demand

- **E-consultation:** engaging citizens in contributions to and deliberation on public policies and services

- **E-decision-making:** empowering citizens through co-design of policy option and co-production of service components and delivery modalities

E-decision-making can include opportunities for residents to directly set the agenda for government initiatives, often through vehicles such as **participatory budgeting** or e-voting. This category refers to allowing the public to directly shape smart city interventions, design strategic goals, and even build infrastructure. In-person participation is equally valued in people-centered smart cities. **The bottom line is local governments should acknowledge that residents' lived experiences are its own form of expertise that can be leveraged for the success of any given project.**

Public participation with ICTs

There are several advantages to residents' meaningful participation in smart cities. Through their involvement, residents can learn about difficult technical problems and upskill in issues of technology and planning. Likewise, city staff can uncover public perception of a policy from the residents' point of view, and through the provision of open data or other city-managed assets, unlock their creative power for the public good. Involving residents in a participation process up-front is cost effective when you take into account the risks of litigation, redundant investments in technology or infrastructure, or financing projects that may be unused[84].

There are several roles that residents can play in a public participation process including as monitors, volunteers or watchdogs. Below we highlight four key roles that can specifically involve the use of ICTs in smart city frameworks.

- **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 and providers** - 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.

A people-centered smart city combines these roles to set the bar for meaningful public participation. But how can a local government evaluate their success in developing these roles? The table below summarises the modes of participation for each role, and the criteria by which a local government can evaluate the success of an engagement effort for each.

Table 1: Public participation models and evaluation criteria

Public role	Modes and tools	Evaluation criteria	Examples
Residents as drivers	Participatory budgeting Resident-owned and managed data commons Crowdsourcing & gamification tools	Representative group of citizens Direct connection between decision-making process and institutional execution Execution of projects under resident-established goals Transparency, and documented results that are archivable	DECODE (EU) Block By Block (UN-Habitat) City of New York Open Data (US) The Tegola project (Scotland) Nangi Village ICT Project (Nepal)
Residents as democratic participants	Online participation platforms, including e-voting, interactive websites, citizen platforms or apps In person workshops and events	Representative Group of Citizens Unbiased third-party facilitators Evidence of resident influence on strategic goals, and project prioritization Documentation of residents' desired outcomes Demonstrated correlation between participation and the achievement of goals	DecideMadrid (Spain) E-Estonia (Estonia) Citizen's Voice for Digital Rights (Albania) Eyes & Ears Project (Nigeria) Public Consultation (Argentina)
Residents as co-creators	Co-creation events, such as hackathons, datathons or codeathons Online platforms and applications for co-creation, including AR and VR with a feedback or creation component LivinglLabs and small scale pilots Community internet connectivity networks (mesh, small-cell)	Documented integration of resident-developed products or infrastructure into government operations Documented integration of resident-developed concepts into smart city strategy Facilitation of resident-driven processes through the provision of funding, infrastructure access, permitting, approvals Captured feedback and documented integration of feedback into project, program, or strategy development Visualization of community-feedback data	Rhizomatica (Mexico) Peta Jakarta (Indonesia) Digital Villages (Germany) VPUU community network (South Africa) Yen Hoa Commune (Vietnam)
Residents as ICT users and providers	Online platforms and apps with a feedback component, such as a 311 app Open Data Platforms Citizen Science programs Sensors, IoT, and ubiquitous data collection managed by residents	Public open data policy and strategy Track public open data usage Integrate citizen-gathered data into open data portal offerings Documented feedback provided from public facing apps or platforms	311SA (US) E-People Portal (Korea) Digital Matatus (Kenya) The Mobility Data Specification (US) Omunana (Oman)

Inclusive public participation

Creating inclusive conditions for participation is challenging. Many residents work multiple jobs, they may require some form of childcare to effectively participate, participants may require language accommodations, persons with disabilities and older people require accommodations such as interpreters or physical assistance and virtual events could exclude people with limited access to the internet. For cities in developing countries, many residents may live in informal settlements, making outreach and gathering difficult. Furthermore, the public may be complacent about the issue, economically motivated special interest groups may dominate the engagement effort, and participants may not be representative of the community at-large. While some of these challenging realities may never be fully resolved, they can be mitigated through building an intentionally inclusive space, and embracing the messiness of a valuable public participation process. Below are a few opportunities to help you create an inclusive participatory model.

Invite & empower groups at risk of exclusion

Representation is a challenge for all participation processes. To reduce the risk of over-representation from a single group, first identify groups that are typically at risk of exclusion, particularly in a process using technology. These groups often include older people, women, low income residents, persons with disabilities, indigenous people, those living in slums and informal settlements, rural communities, refugees, immigrants or persons on the move. An inclusive process works to reduce the barriers to participation for these and other marginalised groups.

Address privacy up front

Addressing privacy is critical to an inclusive participatory process. Some individuals may forgo participation if they feel it will lead to discrimination, harassment or pose a threat to their livelihoods. Participants, particularly in a virtual setting, should have the option to do so anonymously. It's also important to clearly indicate to residents what data is collected through a participatory process, and what the data will be used for. It's typically a good idea to make the data generated through a public process accessible to participants and the public, so long as no personally identifiable information is shared.

Communicate with intent & inclusion

Communication is key for building trust with your community. When communicating verbally, digitally or in print, be sure to use inclusive language, and change

language to respond to the community you're interacting with. The actions below are not comprehensive, but will help you get started towards building a more inclusive process.

- Avoid technical language and buzzwords like "smart city." Explain in clear terms what is being discussed.

- Avoid generic statements about groups based on identity including gender, race, class, or (dis)ability. Make statements that are supported by data.

- In some contexts it's appropriate to use the correct gender pronouns when addressing individuals, such as he/him, she/her or they/them.

- Translate your material into multiple languages used by community members.

- Ensure your digital or print materials are compatible with **assistive technologies,** and for in-person events, include a sign language interpreter.

Work with community partners
In most communities there are leaders who serve the communities you seek to impact, and there are service providers who likely already work on efforts related to your engagement process. Embedding these community leaders in an inclusive and transparent process is strategic for two reasons: 1) your reach can be expanded by working with leaders who serve, are part of, or have relationships with those you seek to impact, 2) your efforts can complement existing efforts rather than wasting effort building services that may already exist. Likewise, community groups may find value in partnering with a local government to achieve their goals and expand their reach. Working with community partners will significantly benefit the participation process, and earn trust in the process, recognising that some community leaders and groups are not always inclusive of diverse perspectives.

Demonstrate results of participation
Why should residents participate? It should be made clear to residents up front what benefits they might experience from the engagement effort. Early on, and throughout the process, identify clearly what the goal is, and how the outcome will directly affect participants. It is critical to share with the community the output of the process, and demonstrate how it achieved an outcome. In some cases, it may be appropriate to compensate residents for their time through direct payments, gift cards to local businesses, or other incentives.

Resources
For more guidance on developing robust participatory processes, take a look at these resources.

- United Nations Community Engagement Guidelines on Peacebuilding and Sustaining Peace

- E-Participation Index, UN Department of Social & Economic Affairs

- Exploring the Role of Participatory Budgeting in Accelerating the SDGs: A Multidimensional Approach in Escobedo, Mexico

- Mixed reality for public participation in urban and public space design - Towards a new way of crowdsourcing more inclusive smart cities

11

Challenges with setting up a people-centered smart city

A people-centered smart city shares several challenges with other frameworks that attempt a change in organizational structure and culture. Orienting city staff to a new frame of mind, upgrading systems and infrastructure, and aligning programme priorities with legal and regulatory frameworks are some of the common challenges associated with creating a new way of working within an organization. Below is a primer on some of the challenges you might encounter when attempting to stand up a people-centered smart city programme or strategy, and steps that can be taken to mitigate them.

Lack of local capacity

Internal capacity in terms of expertise, knowledge and skills regarding technology, community engagement or digital transformation is very important when working to build an ethical approach to smart cities. Likewise, such expertise coming from the community is also important to further smart city efforts.

- Partner with external organizations and NGOs to help train their staff

- Set aside a budget to build a new office for the effort and attract new talent.

- Seek out community expertise on such matters, and where it is lacking, consider partnering with community organizations to develop public programming that helps residents learn these skills to better participate in government-led efforts.

- Invite community experts with knowledge in the space can join steering committees, advisory groups, or support planning processes.

Lack of community participation

Residents can sometimes be complacent or uneducated about certain issues in smart cities. Removing barriers to participation is one key approach to help stimulate more participation among residents. This can include changing the timing, location and language of an event to better fit the needs of residents.

- Partner with local civil society organizations and community advocacy groups to help encourage public participation.

- Compensate residents for their time participating in a community engagement event.

- Treat residents' lived experiences as its own form of expertise.

Outdated procurement processes

Smart city projects often pose a challenge to traditional procurement models. For example, traditional procurement requirements may not support smart city innovations such as small scale pilot efforts, or the development of innovative programming such as in-house residence programs for smart city start-up companies. Furthermore, procurement language and standards often do not address important issues in digital governance or emerging technology, and need to be reformed to better position local governments in contracts with smart city technology vendors.

- Use international standards for data management, open data, data licensing, IoT, artificial intelligence and interoperability.

- Work with your procurement office to create special local standards for smart city technology.

Finance restrictions and challenging investments

How smart city projects are financed, particularly those involving digital infrastructure, is critical to achieving a people-centered outcome. Finance mechanisms shape who controls digital assets and the data they produce in smart cities. Should a local government lose control over its digital assets through contract negotiations and procurements favoring privatization, it also loses access to the data those assets generate, and relinquishes the ability to make decisions in the long term that can improve quality of life for residents and achieve equitable outcomes.

- Identify savings and revenue-generating contracts for smart city technologies.

- Use community-based financing including participatory budgeting where citizens are invited by public authorities to directly decide on how to spend part of the government's budget[85].

- Use government-backed bank loans, bonds or municipal bonds, also known as guarantees.

- Negotiate Public Private Partnerships that appropriately balance risk and control.

Achieving interoperability and standardization

A city can have hundreds of departments simultaneously using and procuring technology at the same time. Ensuring all these departments follow a similar set of ethical and interoperability standards when procuring technology, or engaging the public about technology can be a huge challenge for medium and large cities with many departments. Working to eliminate redundancies in procurement through interoperability standards can achieve tremendous cost savings, the issue lies in raising awareness of these standards, and how they are enforced.

◆ Introduce city-wide policies for employees regarding data governance, procurement or ethics in technology.

◆ Establish "digital service standards," for employees that create standards around the use of technology by individuals and departments, including on ethical considerations, interoperability and the use of open source technology. .

◆ Assign each department an IT staff member to ensure compliance within the department on such standards.

Culture-change

Taking a people-centered smart city approach may require a shift in culture within a local government on several issues. Culture change may include shifts in how city staff understand, use and manage data, how they think about their roles in technology and process development, raising awareness about human rights and privacy issues and changing how they perceive the role of residents in strategic planning and policymaking.

◆ Identify the rights stakeholders within government. Who within the organization stands to benefit from this shift in thinking? Who within the organization is already leading the change? Who can be a champion for your people-centered smart city strategy?

◆ Identifying these individuals and empowering them with support, training, or leadership roles, you can plant the seeds for a shift in approach.

◆ Foster leadership buy-in so city staff can dedicate time and resources to creating the shift.

Legal landscape lacks guidance

Many national governments around the world have not yet provided leadership on legal frameworks for data governance and digital infrastructure, which often leaves local governments at the frontlines of emerging ethical issues in technology. Roughly a third of UN Member States (65 countries) do not have a data privacy statement online, even though they may be offering an array of e-services. According to the UN Conference on Trade and Agreement, as of 2020 29% of countries had draft legislation or no legislation regarding data privacy, 18% had draft legislation or no legislation about cybercrime, and 10% of countries had draft legislation or no legislation for protecting online transactions[86].

◆ Take advantage of ordinances, executive orders and municipal codes to establish legal frameworks that support human rights. For example, both Portland and Somerville in the United States banned surveillance using facial recognition by ordinance in their municipal codes[87]. The city of New York created Local Law 11 in 2012, legislating their data governance policy for open data and open standards, and more recently created a privacy policy governing the use of IoT. The City of Seattle adopted a privacy policy as City Council Resolution #31570, which provides an ethical framework for developing appropriate policies, standards, and practices regarding the public's personal information.
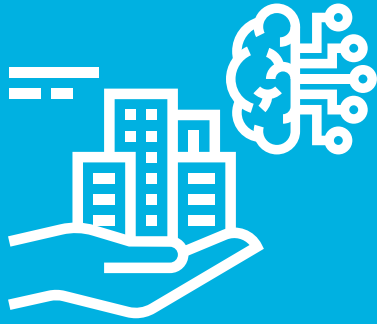
12
Conclusion

Cities and human settlements are the heart of humanity, and humanity is at a tipping point.

Climate change, inequality, and emerging technologies like AI are all reaching phase changes that guarantee dramatic shifts in how we live and participate in society.

Technology is not a solution in and of itself, but can be a powerful tool if it responds to the lived experiences of the people it serves. As hubs shaping the future of human life, smart cities have a responsibility to leverage technology in a way that truly helps people improve their lives and their environment. Under the people-centered smart city approach, technology is evaluated for its ability to address the needs determined by the people it serves, people are empowered to intervene and shape interventions in collaboration with the government, and human rights are at the core of all activities.

The recommended actions, activities and resources presented in this document help local governments build smart cities that work for people. Each of the five pillars (Community, Digital Equity, Infrastructure, Security and Capacity) is accompanied by a series of playbooks that guide local governments and partners through a more in-depth process by which to achieve the SDGs through an inclusive, equitable and sustainable approach to smart cities. **Ultimately, people-centered smart cities cannot be built when so many people are excluded from the digital world**. Therefore, cities and communities must take steps to ensure that the urban digital transformation works for the benefits of everyone, driving sustainability, inclusion and prosperity in the process.

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 Research and Markets, "Global Smart Cities Market by Smart Transportation (Type, Solutions & Services), Smart Buildings (Type, Solutions & Services), Smart Utilities (Public Safety, Smart Healthcare, Education, Street Lighting & e-Governance), Smart Citizen Services and Region - Forecast to 2025," (September, 2020)

5 Price Waterhouse Cooper, "Creating the Future of Smart Cities", (2020)

6 Catapult, Future Cities, "Smart City Strategies: A Global Review" , (2017)

7 Martin, Reinhold, "The Organizational Complex Architecture, Media, And Corporate Space", (MIT Press, 2003)

8 Forrester, Jay W. "Urban Dynamics", (MIT Press, 1969)

9 Batty, M., *"Cities and complexity: Understanding cities with cellular automata, agent-based models, and fractals"*. (Cambridge, MA: MIT Press, 2005), & Forrester. J. W., *"Urban dynamics" (*Cambridge. MA, M.I.T. Press, 1969), & Jacobs, J., "*The death and life of great American cities*",.(New York: Vintage Books 1977)

10 Batty, Michael, "The Computable City," in *International Planning Studies,* (1997), and Mitchell, William, "City of Bits," (MIT Press, 1995)

11 Glaeser, Edward. "Big Data & Big Cities," in *Economic Inquiry,* Vol 56 Issue 1, (2016)

12 Albino et al., "Smart Cities: Definitions, Dimensions, Performance and Initiatives", in *Journal of Urban Technology* (2015)

13 Goodspeed, R., "Smart cities: moving beyond urban cybernetics to tackle wicked problems", (2014)

14 Oliveira, Alvaro, "From Smart Cities to Human Cities", in the *48th Hawaii International Conference on System Sciences,* (2015)

15 Hollands, Robert, "Will the Real Smart City Please Stand Up?" in *City*, Vol 12 Issue 3, (2008)

16 Greenfield, Adam. "Against the Smart City," in *Do projects,* (2013), and Townsend, Anthony. "Smart Cities: Big Data, Civic Hackers, and the Quest for a New Utopia" (20130

17 Mattern, Shannon, "Instrumental City: The View from Hudson Yards", in *Places Journal* (2019).

18 Wylie, Bianca & Wood, David M., "Is Sidewalk Labs Doing Enough to Protect Our Privacy? No," (Toronto Star, 2018)

19 Shaw & Graham, "An Informational Right to the City?", in *Our Digital Rights to the City* (2017).

20 J Buolamwini, T Gebru., "Gender shades: Intersectional accuracy disparities in commercial gender classification", in *Conference on fairness, accountability and transparency: Proceedings of Machine Learning Research,* Vol 81, Issue 1-15, pp 77-91, (2018)

21 Zuboff, Shoshana. "The Age of Surveillance Capitalism: The Fight for a Human Future at the New Frontier of Power", (New York: Public Affairs, 2019)

22 OECD, "Trust in Government", Available at https://www.oecd.org/gov/trust-in-government.htm

23 Foster and Freiden, "Crisis of trust: Socio-economic determinants of Europeans' confidence in government", in *European Union Politics*, Vol 18, Issue 4, (2017)

24 Cardullo, Paolo & Kitchin, Robert. "Smart urbanism and smart citizenship: The neoliberal logic of 'citizen-focused' smart cities in Europe," in *Politics and Space,* (2018) and Wylie, Bianca. "Searching for the Smart City's Democratic Future," in *Centre for International Governance Innovation,* (2018).

25 ITU-T,(2016), "Overview of key performance indicators in smart sustainable cities", Recommendation database.

26 Calzada, I. "Democratising Smart Cities? Penta-Helix Multi Stakeholder Social Innovation Framework", in *Smart Cities*, Vol *3*, pp 1145-1172, (2020), Available at https://doi.org/10.3390/smartcities3040057

27 Mazzucato, M., "The entrepreneurial state: Debunking public vs. private sector myths", (2015)

28 For example, the Open and Agile Smart Cities' "dRural" project aims to coordinate regional digital infrastructure for rural EU areas.

29 H.Trostle, "Building Indigenous Future Zones: Four Tribal Broadband Case Studies", (Institute for Local Self Reliance, 2021).

30 Rebecca Tsosie, "Tribal Data Governance and Informational Privacy: Constructing "Indigenous Data Sovereignty"", Vol 80, (Montana Law Review, 2019)

31 For example the Rhizomatica project that enables community-developed internet infrastructure in Mexico.

32 P3s involve a long term partnership between one or more public authorities and private sector partners typically for the purpose of financing, building, maintaining and operating infrastructure or providing services to a population. P3s are globally popular, but their performance and impact remains contested. Due to the growing privatization of public infrastructure and services globally, gaps have emerged in areas where it is not lucrative for private actors to deliver their products. For example, the digital divide is experienced throughout the world in both rural and urban areas, including informal settlements and slums, where it is less economically viable to deliver internet connectivity infrastructure.

33 See "Urban Labs". Available at https://urbanlabs.uchicago.edu/

34 See "Good Systems". Available at https://bridgingbarriers.utexas.edu/good-systems/

35 https://idc.sutd.edu.sg/design-contributions/creations/city-form-labs-urban-planning-workshops-collaborations

36 For example, the U4SSC is a UN initiative led by UN-Habitat, ITU and UNECE, along with the support of over 14 UN agencies and bodies, to serve as a global platform for advocating public policies and supporting the transition to smart sustainable cities. Available at https://www.itu.int/en/ITU-T/ssc/united/Pages/default.aspx.

37   ITU Study Group 20 works to develop international standards that address the standardization requirements of IoTs and their application in smart cities and communities.

38 Barcelona Ciutat Digital "Barcelona City Council technological sovereignty guide", (2017)

39 See Mayor of London, "An Emerging Technology Charter for London," .

40 City of Toronto "Digital Infrastructure Plan", .

41 United Nations, "UN Hub for Human Rights and Digital Technology" .

42 Wylie, Bianca, "Why We Need Digital Rights: Not Everything About Us Should Be For Sale," in *Financial Post,* (2019)

43 United Nations, "Digital Human Rights", in *Report of the Secretary-General: Roadmap for Digital Cooperation*, pp. 14, (United Nations, June 2020), .

44 Cities Coalition for Digital Rights "Expected Outcomes & Activities", (2018), Available at https://citiesfordigitalrights.org/declaration , .

45 Cities For Digital Rights, "Citizen Voices for Digital Rights project" (2021)

46 See: Decide Madrid: portal de participación ciudadana de Madrid

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

48 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.

49 de Lange & de Waal, "Owning the city: New media and citizen engagement in urban design", in *First Monday,* (2013)

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   See: DIGITAL MATATUS

54   See: DIGITAL MATATUS

55   See: "About MDS"

56   National Digital Inclusion Alliance, "Definitions," (2020), Accessed February 11th, 2021.

57   Berryhill, Bourgery, and Hanson, "Blockchains Unchained: Blockchain technology and its use in the public sector," in OECD Working Papers on Public Governance, No. 28., (2018)

58   Open Government Partnership, "Citizen Eyes and Ears on the Government: Kaduna State, Nigeria" (2021)

59   European Network for Rural Development, "Case studies on Smart Villages | The European Network for Rural Development," (2018)

60   Adler, Laura. "Planning the Data-Driven City," (Harvard Data Smart Cities, 2017)

61   For example, Barcelona's open-source IoT platform, Sentilo collects and manages all the city's sensor data, making it accessible across systems and more usable for apps. Effective management of this urban data has resulted in thousands of dollars in cost savings, annually. https://www.sentilo.io/wordpress/

62   Lewis, T., Gangadharan, S. P., Saba, M., Petty, T., "Digital defense playbook: Community power tools for reclaiming data" Detroit: Our Data Bodies.(2018)

63   IAPP, "Moroccan data protection law: Moving to align with EU data protection", (2018)

64   City of Seattle, "Privacy and Data"

65   OECD, "Trust in Government", (2019)

66   United Nations, "6.3.2 Data Privacy & Ethics",in UN E-Government Survey 2020, (United Nations, New York, 2020)

67   See: Africa's Most Comprehensive Cyber Security Conference

68   See the e-estonia toolkit — e-Estonia

69   See the: Sustainable Development Goals Knowledge Platform "Multi-stakeholder partnerships & voluntary commitments"

70   United Nations, "The SDG Partnership Guidebook," (United Nations, 2020)

71   U4SSC's latest deliverable "Simple ways to be smart", developed in collaboration with civil society members, the academia, and other city representatives, highlights a series of cases of using smart technologies to enhance inclusiveness, sustainability, and resiliency in cities based on experts from around the world.

72   Stewart, Matthew. "The Deceptive Platform Utopianism of Google's Sidewalk Labs," Failed Architecture, (2019)

73   United Nations, "Human and Institutional Capacity", in Report of the Secretary-General: Digital Cooperation Roadmap pp. 12, (United Nations, June, 2020)

74   For example, the What Work Cities Certification from Bloomberg Philanthropies assesses participating local governments on a set of criteria for developing data-driven government: https://whatworkscities.bloomberg.org/certification/

75   CORA' "Digital skills for public authorities"

76   Patrão C, Moura P, Almeida ATd. "Review of Smart City Assessment Tools", in Smart Cities, Vol. 3(4), pp. 1117-1132.(2020)

77   IMD, SUTD, and SCO Smart City Observatory, "Smart City Index 2020," (2020)

78   Sheldon, Dan., "The Government IT Self-Harm Playbook," (2016)

79   ITU, (2016), "Key Performance Indicators Related to the Sustainability Impacts of Information and Communication Technology in Smart Sustainable Cities", Recommendation database. Available at Y.4902/L.1602

80   Constantine E. Kontokosta, "The Quantified Community and Neighborhood Labs: A Framework for Computational Urban Science and Civic Technology Innovation", in *Journal of Urban Technology,* Vol 23, Issue 4, pp. 67-84 (2016)

81   Oystein Sæbø, Jeremy Rose and Leif Skiftenes Flak, "The shape of eparticipation: characterising an emerging research area", in *Government Information Quarterly,* vol. 25, No. 3, pp. 400-428, (July 2008), .

82   United Nations Department of Economic and Social Affairs, "United Nations E-Government Survey 2020", pp. 132, (United Nations, 2020)

83   United Nations, Department of Economic and Social Affairs, "E-government Knowledgebase: E-Participation Index"

84   Simonofski, Anthony & Serral, Estefanía & De Smedt, Johannes & Snoeck, Monique., "Citizen Participation in Smart Cities: Evaluation Framework Proposal"in the *19th IEEE Conference on Business Informatics* (2017). Available at https://doi.org/10.1109/CBI.2017.21

85   United Nations, UN-Habitat, "Participatory-Habitat Initiative", (2020)

86   United Nations, Conference on Trade and Development, "UNCTAD Cyberlaw Tracker", (United Nations, 2020)

87   City of Somerville, Code of Ordinances, "Banning the Use of Facial Recognition Surveillance Technology", (September 10, 2021) sects, 9-25

67   Kelly et. al.,"Good Practice in the Conduct and Reporting of Survey Research," in International Journal for Quality in Health Care, 2003.

Terms

Agile labs
Groups of cross-departmental city staff that use agile methodology (managing a project by breaking it up into several phases) to develop new tools, workflows and products that enhance service delivery.

Assistive technologies
Products, equipment, and systems that enhance learning, working, and daily living for persons with disabilities.

Augmented reality (AR)
Interactive technology presenting digital objects overlaid onto the real-world environment through visual, auditory, haptic, somatosensory, or olfactory means. Augmented Reality can be useful for visualising planned improvements to physical urban spaces.

Civic hackathons
Event-based problem solving sessions whereby participants are encouraged to leverage digital technologies to improve local conditions.

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.

Civic technology stack
Foundational systems for digital government including digital identity, data management, and payments along with an application layer for services that rely on these foundation systems such as land titling, taxation, public benefits, asset tracking, procurement, public registries and citizen participation.

Cybersecurity
The practice of protecting computer systems from unauthorized access or attacks.

Crowdsource
Using ICTs to obtain work, analysis, information, or opinions from a large group of people via the Internet.

Data governance
A systemic and multi-dimensional approach to setting policies and regulations for securing, managing, analysing, storing, sharing and accessing data through institutional coordination.

Data sharing agreement
A formal contract that specifies the requirements for sharing data between two parties. The contract clearly documents what data is being shared and sets parameters for the use of data, data transmission, security, storage and destruction between any two parties that collect and/or manage data

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 and use 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
The provision and operation of online products and services offered from a government to its citizens.

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, 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 sovereignty
The authority to independently control, protect, and manage digital data.

Digital transformation
The process of using digital technologies to modify existing systems.

Digitization
The process of transforming in-person services into digital services through the creation of digital analogs including but not limited to online forms, interactive platforms, and open data websites. Can also refer to transforming content on paper into a machine-readable format.

E-government
The application of information and communication technologies to government functions.

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

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 manipulate information in a digital form.

Least developed countries (LDCs)
Least developed countries (LDCs) are low-income countries confronting severe structural impediments to sustainable development. They are highly vulnerable to economic and environmental shocks and have low levels of human assets. There are currently 46 countries on the list of LDCs which are reviewed every three years by the UN Committee for Development (CDP).

Open data
Data that is freely available online for anyone to use and republish for any purpose.

Open data platform
An online portal which supports users in accessing electronic information to share and use.

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

Technological sovereignty
A political perspective where ICTs are aligned to the laws, needs and interests of the users subject to a local, regional or national governing body. To achieve technological sovereignty, governments should procure technology when a demonstrated public interest is clear, or expressed by communities through public participatory processes.

Technological sovereignty
A political outlook that information and communications infrastructure and technology is aligned to the laws, needs and interests of the country in which users are located.

The Internet of Things (IoT)
A global infrastructure for the information society enabling advanced services by interconnecting (physical and virtual) things based on existing and evolving, interoperable information and communication technologies (Recommendation ITU-T Y.2060)

Vendor lock-in
The structured dependency of a customer on a provider for a service that occurs through material or legal means.

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