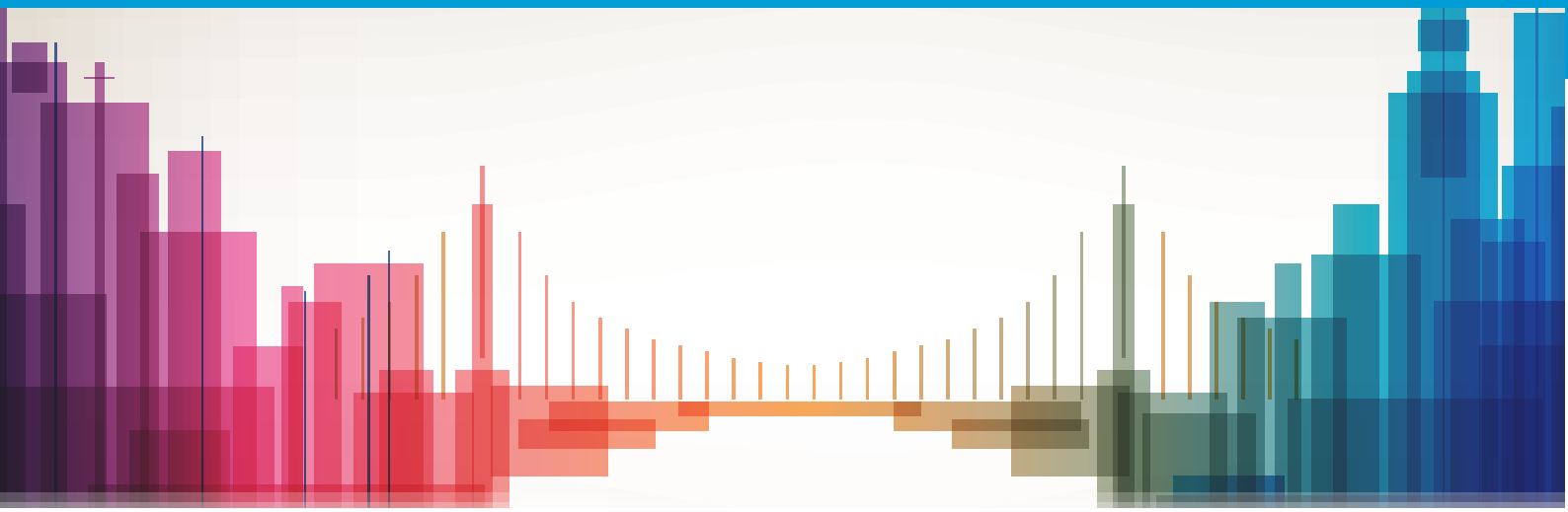
A framework for enabling people-centred cities through digital transformation



Convention on Biological Diversity

United Nations ECLAC

Food and Agriculture Organization of the United Nations

UNIDO

ITU

UNDP

United Nations Economic Commission for Africa

UNECE

UNESCO United Nations Educational, Scientific and Cultural Organization

UN environment programme

UNEP FINANCE INITIATIVE

United Nations Framework Convention on Climate Change

unitar United Nations Institute for Training and Research

UN-HABITAT FOR A BETTER URBAN FUTURE

United Nations Department of Economic and Social Affairs

UN 4 PARTNERSHIPS

UNU EGOV

UN Tourism

UN WOMEN

WORLD METEOROLOGICAL ORGANIZATION

A framework for enabling people-centred cities through digital transformation

Foreword

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Disclaimer

The opinions expressed in this publication are those of the authors and do not necessarily represent the views of their respective organizations or U4SSC members. In line with the U4SSC principles, this report does not promote the adoption and use of any specific digital transformation technology. It advocates for policies encouraging responsible use of information and communications technologies (ICTs) that contribute to the economic, environmental and social sustainability as well as the advancement of the 2030 Agenda for Sustainable Development and the Pact for the Future and its Global Digital Compact.

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List of abbreviations

Abbreviation	Full form
AI	Artificial Intelligence
EU	European Union
ICT	Information Communication Technology
IoT	Internet of things
ITU	International Telecommunication Union
KPIs	Key Performance Indicators
NGO	Non-governmental organization
SDGs	Sustainable Development Goals
SDO	Standards Development Organization
U4SSC	United for Smart Sustainable Cities
UN	United Nations
UNESCO	The United Nations Educational, Scientific and Cultural Organization
WTSA	World Telecommunication Standardization Assembly

Executive summary

People-centred digital transformation is vital for cities in the modern age as it ensures that technological advancements directly benefit inhabitants and visitors.

By focusing on people's needs, rights and well-being, cities can harness digital transformation that not only leverages technology for efficiency and innovation but also enhances the quality of life, boosts economic growth, and creates more sustainable and inclusive urban environments.

A people-centred approach ensures that digital transformation does not merely advance technology for its own sake, but rather integrates it into urban life in an inclusive, equitable and sustainable manner. This approach helps cities address the diverse needs of their populations, so fostering community resilience, social cohesion and long-term prosperity.

In an increasingly digital world, cities should prioritize a People-Centred Digital Transformation Framework that enhances quality of life, drives economic growth, promotes social equity and achieves sustainability. This report, "A Framework for Enabling People-Centred Cities through Digital Transformation," provides cities with a universally applicable technology agnostic framework that builds upon key international principles, including the Pact of the Future, the Global Digital Compact, and Resolution 98 of the ITU's World Telecommunication Standardization Assembly (WTSA). By aligning with these global instruments and complementing international guidelines for people-centred smart cities, the framework offers valuable guidance to cities of all sizes and at different stages of digital transformation.

This framework emphasizes that digital transformation is not an end in itself but a means to integrate technology into urban life in an inclusive, equitable and sustainable manner. It provides a structured approach to fostering smart, sustainable and people-centred development, so ensuring alignment with the United Nations Sustainable Development Goals (SDGs).

The framework is built on five key people-centred pillars:

1. Vision and Strategy
2. Organizational Transformation
3. Digital Infrastructure and Internet of things (IoT)
4. Multi-level Governance
5. Financing and Funding

It is designed to be adaptable to the unique challenges and opportunities faced by cities, offering solutions that remain aligned with global best practices.

Cities can benefit from this framework for several key reasons:

1. **Universal adaptability**: The framework is designed to be versatile and flexible, allowing cities of all sizes and contexts to apply it effectively, regardless of their unique challenges and opportunities.
2. **Strategic vision and alignment**: It aids cities in establishing a cohesive, people-centred vision, setting strategic goals to address people's priorities, and developing the necessary organizational structures to guide their digital transformation, so ensuring alignment with broader objectives.
3. **Rationalization of initiatives**: By incorporating best practices in data transparency, collaborative innovation, and sustainable financing, the framework enables cities to enhance and optimize their digital transformation efforts for greater efficiency and impact for their people.
4. **Commitment to inclusivity and sustainability**: A core strength of the framework is its focus on inclusivity and sustainability. It emphasizes equitable resource distribution, active participation and co-creation, ensuring that digital transformation efforts benefit all city inhabitants, reduce digital divides and promote social equity.
5. **Customization to local priorities**: The framework is flexible enough to accommodate and integrate the specific needs, priorities and objectives of individual cities, allowing for tailored approaches that address local contexts and challenges.

This document incorporates the following key instruments and agreements:

- 2030 Agenda for Sustainable Development
- The New Urban Agenda
- The Paris Agreement on Climate Change
- UN Secretary-General's Roadmap on Digital Cooperation
- UN Human Rights Council Resolution on the right to privacy in the digital age
- UN Resolution on new and emerging digital technologies and human rights
- International Telecommunication Union (ITU) – WTSA Resolution 98 – (Rev. New Delhi, 2024) – Enhancing standardization of Internet of Things, digital twins and smart sustainable cities and communities for global development
- The Global Digital Compact
- Pact of the Future
- United Nations (UN) System Wide Strategy on Sustainable Urban Development
- European Union (EU) Agendas (including Lisbon Strategy, the 10-year Digital Agenda for Europe, EU Digital Compass, New Leipzig Charter, …)

The framework provided here is designed to offer universally applicable guidance for cities of all sizes and stages of digital transformation. It aims to support cities in achieving their aspirations for smart, sustainable and inclusive urban development by aligning with global principles while remaining adaptable to local needs.

1 Introduction

Digital transformation is integral to the lives of all individuals who contribute to, and shape, urban and rural environments, from policymakers and urban planners to businesses, community leaders, inhabitants and visitors. Digital transformation continues to transform various sectors of the economy, public administration, society and the environment. The people-centred digital transformation approach ensures that digital technologies improve the lives of city inhabitants and visitors by enhancing municipal services and city infrastructures – such as energy, buildings, telecommunication, water, sewage and transportation – through integrated development concepts.

A people-centred approach advocates for a just, inclusive and successful transition of cities and communities into smart and sustainable environments, where digital transformation is employed "for the people" by meeting their priorities, needs and expectations.

However, there is an emerging need for guidelines to help cities better understand the people aspect of digital transformation. As digital transformation rapidly reshapes the global landscape, cities can benefit significantly from adopting a **people-centred digital transformation framework anchored in five essential pillars:**

1. Vision and strategy for cities
2. Transformation within organizations
3. Digital infrastructure and Internet of things (IoT)
4. Multi-level governance in cities and communities
5. Financing and funding for cities and communities

2 Background

The integration of digital transformation into sustainable urban development is a pressing global need. As urban populations increase so the strain on resources and infrastructure intensifies, necessitating smarter and more efficient solutions capitalizing on the scalable and innovative nature of digital technologies. Digital transformation offers a pathway to enhance urban sustainability; for example, by optimizing resource allocation, reducing waste and improving service delivery. It fosters data-driven decision-making, enabling cities to respond dynamically to the evolving needs of their inhabitants. By mainstreaming digital transformation, cities can improve the inhabitants' quality of life and contribute to broader environmental goals such as reducing carbon emissions and promoting circular economies.

Incorporating people-centred digital transformation into a city strategy is essential for fostering an ecosystem that is resilient, responsive and rich in opportunities for all. A people-centred city strategy embracing digital transformation can revolutionize urban living, from traffic management and energy distribution to public safety and governance.[1] It allows for real-time monitoring and management of city functions, thus increasing efficiency and reducing operational costs. Moreover, it enhances inhabitant engagement and participation, creating a more inclusive urban environment. By embedding digital transformation within its core, a city strategy can unlock the full potential of technology to create a sustainable, prosperous and equitable urban future.[2]

In the urban context, a people-centred city strategy should prioritize the contextual challenges and needs of the city and its stakeholders and align the strategic priorities with the available resources and investment priorities.

The people-centred city strategy should identify the areas of opportunity in sectors such as transportation, education, health, jobs, food, tourism and security to ensure the alignment of priorities and maximize the use of resources based on the needs of city inhabitants and businesses, leveraging on digital technologies.

A people-centred city strategy should define and explicitly articulate how digital transformation can foster sustainable urban development and address key priorities and challenges such as public and green transport, affordable housing and access to services. It should adopt a people-centred digital transformation framework [hereafter referred to as the "Framework"] that embodies the key elements of the strategy. Such a framework is crucial for successfully implementing a digital transformation strategy. It ensures that all key elements such as digital infrastructure, data, and inhabitant engagement are integrated cohesively. This Framework serves as a blueprint for cities to follow, enabling them to harness digital technologies effectively to improve urban services, enhance quality of life, and achieve the sustainable development goals (SDGs). It is rooted in the

[1] Digital Strategy 2022-2025, United Nations Development Programme (UNDP). Available at: https://www.undp.org/publications/digital-strategy-2022-2025

[2] Digitalisation for Inclusive, Safe, Resilient and Sustainable Cities and Human Settlements, UNCTAD. Available at Digitalisation for Inclusive, Safe, Resilient and Sustainable Cities and Human Settlements | UNCTAD

principles of the Pact of the Future and the Global Digital Compact, while complementing other international guidelines on people-centred smart cities. It provides a universal but structured approach to innovation, ensuring that investments in digital technologies yield tangible benefits for all city stakeholders and lay the groundwork for future advancements.

The Framework should complement the array of existing solutions and tools for sustainable and integrated urban development by incorporating digital components and infrastructures, digital technologies and digital services. The goal is to create a well-developed urban ecosystem that addresses all city stakeholders' diverse needs and expectations, including those of inhabitants, visitors, government entities and businesses. This Framework drives policies, regulations, guidelines, and strategically identified programmes, projects and services, with clear objectives translated into measurable performance indicators. The Framework should act as a catalyst for cities, offering innovative solutions to urbanization challenges such as reducing urban heat islands, carbon emissions and air and water pollution, as well as mobility challenges, social exclusion and environmental degradation. Additionally, it should enhance urban efficiency by leveraging city data for people movement, traffic patterns, air quality, and other community needs related data to optimize services, design public spaces, and effectively conduct urban planning.

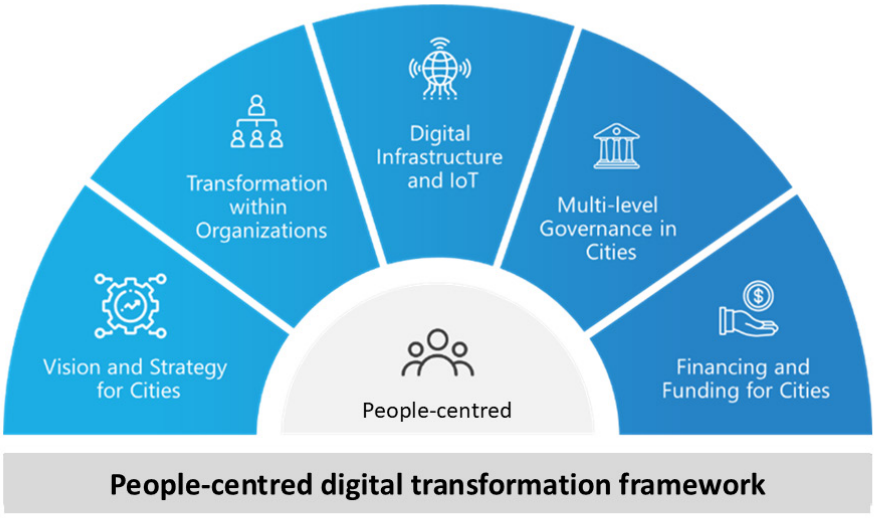
3 People-Centred Digital Transformation Framework

Successful digital transformation requires city governments to operate within a well-defined framework.[3] This Framework should align with the city's policies and regulations, providing clear guidance on the use of digital transformation for urban development and inclusion. It should aim to harness the opportunities presented by frontier digital technologies while safeguarding visitors, inhabitants and businesses from potential safety and security concerns.

The People-Centred Digital Transformation Framework is a comprehensive approach to leveraging digital technology in cities to prioritize the needs, well-being and aspirations of inhabitants and visitors. This technology agnostic framework emphasizes inclusivity, equity and sustainability, ensuring that digital transformation is not only innovative but also meaningful and beneficial to all members of the community.

The framework is built around five interconnected pillars, each addressing a key aspect of creating a people-centred digital ecosystem. Together, these pillars provide a strategic framework to guide cities through their digital transformation journeys.

Figure 1: People-Centred Digital Transformation Framework (Source: ITU)



[3] Insights Into Cities in The Digital Era: A People-Centred Approach to Smart Cities, CDPP, Available at: https://www.cdpp.co.in/articles/insights-into-cities-in-the-digital-era-a-people-centred-approach-to-smart-cities

- **Pillar 1: People-Centred Digital Transformation Vision and Strategy for cities**
    - This pillar focuses on developing a clear, people-first vision and strategy for digital transformation. It emphasizes understanding citizen needs, enhancing quality of life, empowering residents, and fostering inclusive communities. By setting measurable goals and continuously improving, cities can align their strategies with the well-being of their people.
- **Pillar 2: People-Centred Digital Transformation of Organizations**
    - To drive meaningful changes, cities need organizations that prioritize the skills, well-being and engagement of their stakeholders. This pillar emphasizes building a people-centred culture, fostering skill development, empowering decision-making, and leveraging technology to deliver user-friendly services. A strong organizational framework ensures accountability and effectiveness in delivering people-centred outcomes.
- **Pillar 3: People-Centred Digital Infrastructure and IoT**
    - Digital infrastructure and IoT technologies should be designed with people at their core. This pillar focuses on universal access, digital literacy, and user-centred IoT design to improve quality of life. It aims to bridge the digital divide, enhance urban mobility, and leverage data to create smarter, more sustainable urban environments.
- **Pillar 4: People-Centred Multi-level Governance in City Digital Transformation**
    - Governance is essential to ensuring that digital transformation is inclusive, transparent and equitable. This pillar highlights citizen participation, collaboration among levels of government, accountability and equity. By involving all stakeholders, cities can ensure that digital initiatives reflect the needs and priorities of their communities.
- **Pillar 5: People-Centred Financing and Funding for City Digital Transformation**
    - Financial resources should be allocated in ways that benefit citizens directly and address their needs. This pillar emphasizes citizen-driven priorities, equitable funding, public-private partnerships, long-term sustainability, and transparency. Innovative funding mechanisms such as impact investing and crowdfunding, ensure that resources are used effectively to create lasting benefits for the community.

In the upcoming sections of this deliverable, each of these pillars will be explored in greater detail, offering insights and guidance to help cities successfully navigate their people-centred digital transformation journeys.

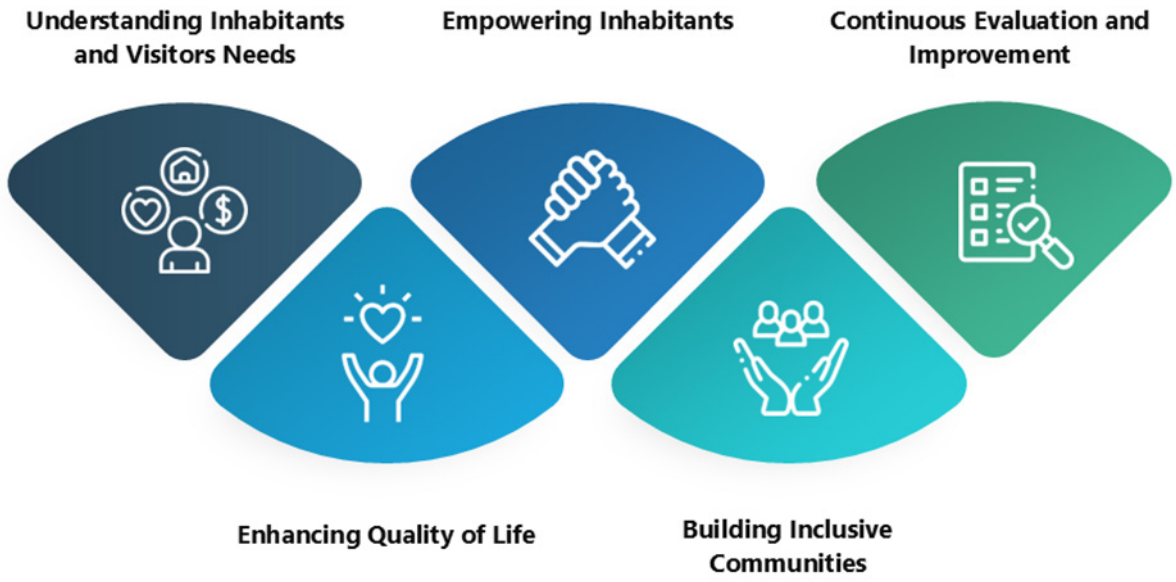
Pillar 1: People-Centred Digital Transformation Vision and Strategy for Cities

A People-Centred Digital Transformation Vision and Strategy for a city prioritizes its inhabitants' and visitors' well-being, city experiences and needs. This approach leverages digital technologies to improve daily life and create inclusive, resilient communities that can adapt to current and future urban challenges. Integrating United Nations SDGs with digital transformation efforts ensures that technology serves people needs, fosters inclusive growth, and does not exacerbate inequalities.

Focusing on people first ensures that digital transformation efforts are undertaken to positively impact people who live and work in, or visit, the city.

Key elements that should be taken into consideration for a people-centred digital transformation vision and strategy include:

Figure 2: Key Elements to Pillar 1 (Source: ITU)



Understanding inhabitants' and visitors' needs

Understanding the needs of inhabitants and visitors is a critical element of this approach. This involves:

- **Community engagement**: Encourage the active participation of inhabitants through various means such as surveys, town halls and digital platforms. This engagement helps ensure that all community members' voices are heard and considered in the city's digital initiatives.

- **Accessibility and inclusivity**: Ensure that digital services are designed to be accessible to all, including individuals of all ages, those with disabilities, and people from diverse socio-economic backgrounds. This ensures equitable access to the benefits of digital transformation.
- **People-centred data collection**: Implement systems and mechanisms to gather and analyse data on the inhabitants' city needs, preferences and behaviours. These data form the foundation for informed decision-making and tailored service delivery.

Enhancing quality of life

Enhancing the quality of life is another key focus. This includes:

- **Smart and sustainable living**: Integrate viable digital technologies and solutions that improve urban living conditions, making daily city experiences more convenient, enjoyable and sustainable. This may entail collaborative and seamless city services (and digital systems) that span the boundaries of the public and private sector organizations (e.g., joined-up services, connected services) and enhance the overall city experience.
- **Digital infrastructure**: Invest in reliable, high-speed Internet access and, where feasible, provide affordable digital devices to ensure that everyone in the city can connect and participate in digital city services and the digital economy.
- **Social innovation**: Develop innovative digital solutions to address social challenges through close engagement with communities.

Empowering inhabitants

Empowering inhabitants is also a crucial aspect of a people-centred strategy. The city vision and strategy should include:

- **Digital literacy**: Promote digital skills and education across all demographics to ensure that everyone can use digital tools and services effectively. This includes initiatives for all age groups, from children to seniors.
- **Digital public services**: Simplify and streamline public sector (government) services and related processes by offering online platforms and digital services (e.g., e-government services) that reduce bureaucracy, increase transparency, and make it easier for inhabitants to access public services.
- **Inhabitant participation**: Empower inhabitants to participate actively in decision-making and governance through digital platforms that facilitate participation, feedback and collaboration.

Building inclusive communities

Building inclusive communities is another vital component. This involves:

- **Bridging the digital divide**: Address and reduce disparities in digital access and usage across different socio-economic groups, ensuring everyone can benefit from the city's digital transformation.
- **Social inclusion**: Use technology as a tool to connect people, foster community bonds, and support vulnerable populations by addressing their specific needs through targeted initiatives.
- **Celebrating cultural diversity**: Promote and celebrate the city's cultural diversity by creating digital spaces that are inclusive, welcoming and reflective of the community's diverse backgrounds.

Continuous evaluation and improvements

Continuous evaluation and improvement are essential for the success of a people-centred digital transformation. This requires:

- **Feedback mechanisms**: Establish robust systems for gathering feedback from inhabitants on the effectiveness and impact of digital services. This feedback should be reviewed regularly, and used to guide future developments.
- **Performance metrics**: Develop and monitor key performance indicators (KPIs) that measure the success of digital initiatives, with a focus on how they impact the quality of life for inhabitants.
- **Iterative approach**: Commit to continuously evaluating and refining digital transformation strategy based on ongoing feedback and performance data, ensuring that the city's digital transformation remains responsive to the evolving needs of its inhabitants and visitors.

Key considerations in this strategy include prioritizing the protection of the inhabitants' personal data, and ensuring that all digital systems are secure from potential threats and vulnerabilities. The ethical implications of technological advancements should be considered carefully, promoting responsible innovation that benefits the community. Finally, integrating sustainable practices into digital initiatives ensures that they contribute to the city's long-term resilience and environmental health.

By centring on the needs and well-being of people, a city can effectively harness the power of technology to create a more equitable, sustainable and vibrant urban environment that benefits all its inhabitants and visitors.

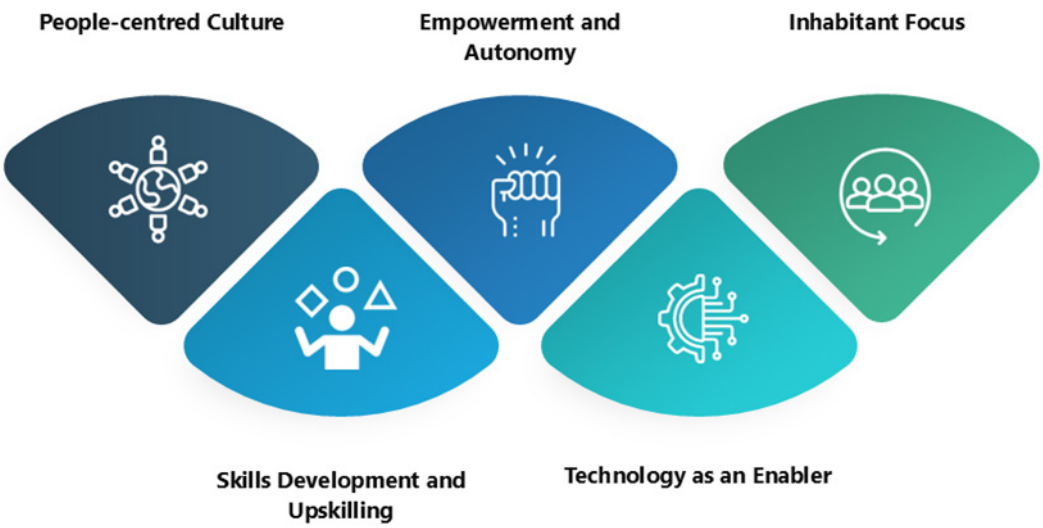
Pillar 2: People-Centred Digital Transformation for Organizations

A people-centred digital transformation for organizations places the needs, skills and well-being of city inhabitants, visitors and businesses at the core of organizations' operations. By leveraging technology, people-centred organizations enhance their internal operations and ensure the delivery of better city services.

Prioritizing people ensures that the organizations create value that positively impacts the urban ecosystem while fostering innovation and inclusivity.

Key elements that should be taken into consideration for a people-centred digital transformation for organizations include:

Figure 3: Key Elements to Pillar 2 (Source: ITU)



People-centred culture

A strong people-centred culture is the foundation of any successful digital transformation. It begins with:

- **Empathy and understanding**: The organization should prioritize understanding the needs, challenges and aspirations of city inhabitants, visitors and businesses. This creates a framework for developing responsive and relevant solutions for the community.
- **Open communication**: Transparent communication at all levels ensures that all city stakeholders – government officials, employees, businesses and inhabitants – are engaged in the transformation process. Open dialogue fosters collaboration, trust and accountability.
- **People well-being**: Investing in the well-being of city inhabitants and those involved in the city's digital transformation process is critical. This could include well-being programmes that address mental health, work-life balance, and other support systems. Additionally, the city can undertake digital well-being initiatives and programmes that specifically address individuals' well-being while using digital technologies and services.
- **Recognition and rewards**: Acknowledging and rewarding people-centred contributions encourages innovation and reinforces the organization's commitment to creating value for city inhabitants. This can be achieved through formal recognition programmes, awards and performance incentives that align with people-centred achievements.

Skill development and upskilling

Building a skilled workforce that understands the needs of city inhabitants is key to a successful transformation. This includes:

- **Needs assessment**: The first step is to identify the skills necessary for the digital transformation journey. This assessment should focus on technical and soft skills that enable a people-centred approach.
- **Training and development**: Regular and targeted training opportunities ensure that employees stay up to date with the latest technologies and best practices. This enhances their capabilities and allows them to serve the inhabitants better.
- **Mentorship and coaching**: Establishing mentorship and coaching programmes creates a support system for employees, helping them adopt a people-centred mind-set and develop the skills they need to excel.
- **Continuous learning culture**: Encouraging a culture of continuous learning, where experimentation is valued and failure is seen as a learning opportunity, ensures that the organization remains agile and responsive to the evolving needs of city inhabitants.

City governments and administrations can utilize digital competency frameworks to build digital skills and institutional capacities for civil servants (e.g., the United Nations Educational, Scientific and Cultural Organization (UNESCO)'s Digital Competency Framework for Civil Servants).[4]

Empowerment and autonomy

A people-centred organization empowers its workforce to make decisions that align with the needs of city inhabitants and businesses:

- **Decision-making**: Employees should be empowered to make people-centred decisions and take ownership of their work. This autonomy allows them to respond more effectively to the needs of the community.
- **Agile methodologies**: Adopting agile methodologies fosters collaboration, adaptability and innovation. Teams can work in smaller, more flexible units to deliver solutions that directly benefit city inhabitants.
- **Experimentation**: The organization should encourage experimentation, allowing employees to test new ideas and learn from their successes and failures. This iterative approach promotes innovation and ensures continuous improvement for the benefit of inhabitants in a city.

[4] The UNESCO Digital Competency Framework for civil servants aims to strengthen human and institutional capacities in digital-related fields. It provides guidelines, resources and tools for governments, educators and professionals seeking to develop the skills necessary for the effective use of information and communication technologies (ICTs).

Technology as an enabler

Technology is a powerful tool for enabling people-centred digital transformation:

- **People-centred tools**: Providing user-friendly digital tools such as e-participation platforms, enables better engagement and participation from inhabitants. These tools should be intuitive, accessible, and designed to enhance the user experience.
- **Data-driven decision making**: Data should be used to inform decisions and improve processes. By analysing inhabitants' needs and behavioural data, the organization can tailor its services to meet the communities' expectations more effectively.

Inhabitant focus

The primary goal of any people-centred organization is to serve its people:

- **Inhabitant-centred design**: The organization should establish processes or dedicated units responsible for designing digital services that prioritize the needs and city experiences of inhabitants. This ensures that every solution is developed with the inhabitants in mind. The digital services should integrate seamlessly into people's daily lives and help them accomplish their needs in a simple and efficient manner. The digital channels should consider people-centred aspects whereby inhabitants can potentially interact through natural language messaging or conversations with digital services (enabled by generative Artificial Intelligence – AI). Additionally, intelligent, immersive and interactive digital services should be considered putting inhabitants at the core of digital services design.
- **Feedback mechanisms**: Incorporating feedback from inhabitants into the digital transformation process is essential for continuous improvement. Regular feedback loops allow the organization to adjust its strategies and services based on real-time insights from the community.

Organizations can build a high-performing, engaged workforce capable of delivering exceptional, people-centred services by focusing on these areas. This approach fosters accountability, innovation and a culture that values the well-being of inhabitants and employees, thereby ensuring that the digital transformation truly benefits the entire urban ecosystem.

Pillar 3: People-Centred Digital Infrastructure and IoT

A people-centred digital infrastructure prioritizes inhabitants' needs, experiences and well-being.

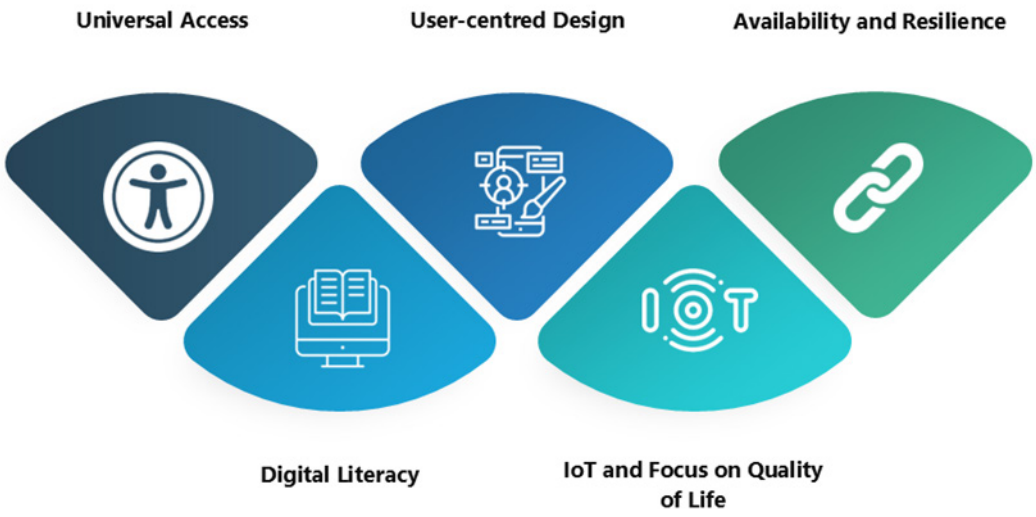
It extends beyond merely building digital networks to creating a digital environment that empowers, connects and benefits everyone.[5]

By focusing on universal access, digital literacy, user-centred design, quality of life, and resilience, this pillar ensures that technology serves as an inclusive tool to enhance urban living and create more connected, reliable, and resilient communities.

Key elements that should be taken into consideration for people-centred digital infrastructure and IoT include:

[5] Building & securing digital public infrastructure – A playbook for local and regional governments, UN-Habitat. https://unhabitat.org/programme/legacy/people-centered-smart-cities/building-securing-digital-public-infrastructure-a

Figure 4: Key Elements for Pillar 3 (Source: ITU)



Universal access

Universal access is fundamental to a people-centred digital infrastructure. This ensures that everyone, regardless of income, geographic location or social background, has the opportunity to engage with and benefit from digital services:

- **Bridging the digital divide**: Equitable access to high-speed Internet is critical. To ensure no one is left behind, cities should invest in digital infrastructure that reaches all areas, including underserved neighbourhoods and rural communities.
- **Public Wi-Fi hotspots**: Providing free Wi-Fi in public spaces such as parks, libraries and community centres promotes greater digital engagement and inclusion. These hotspots create opportunities for inhabitants to access information, education and services without the barrier of cost.
- **Affordable devices**: Digital devices such as smartphones, tablets and computers are essential for connecting to digital infrastructure. Programmes should be implemented to make these devices more accessible to low-income households, ensuring that all inhabitants can participate in the digital economy.

Indicators such as UNESCO's Internet Universality ROAM-X Indicators[6] can be used to assess and advance digital environments that are rights-based, open, accessible and multi-stakeholder-driven, directly supporting the framework's emphasis on inclusivity and human rights.

Digital literacy

Building a people-centred digital infrastructure requires more than just access – it also requires inhabitants to have the skills and knowledge to use technology effectively:

- **Education programmes**: Digital literacy training should be available to inhabitants of all ages, helping them to navigate the digital world confidently. This includes teaching the basics of Internet use, online safety, and the practical applications of digital tools.
- **Skills development**: Cities should provide opportunities for inhabitants to acquire advanced digital skills that can lead to employment, entrepreneurship and community development. These programmes can help bridge the gap between digital access and meaningful engagement with technology.
- **Digital inclusion initiatives**: Partnering with community organizations to promote digital literacy ensures that initiatives reach underserved populations. These collaborations can help deliver targeted programmes that address specific community needs.
- **Digital media and information literacy**: Cities can undertake initiatives to foster people's critical thinking skills, navigate the online environment safely and responsibly, and ensure there can be trust in information ecosystems and digital technologies (e.g., UNESCO Media and Information Literate Citizens, UNESCO Media and Information Literacy Cities).[7]

User-centred design

As cities deploy IoT technologies, ensuring that they are designed with users in mind is key to creating a positive digital experience for inhabitants:

- **Intuitive interfaces**: IoT devices and applications should be easy to use and understand, making technology accessible to people of all ages and technical skill levels. They should provide easy-to-use and easy-to-access interfaces.
- **Accessibility**: IoT devices and services should be designed to be inclusive, ensuring that they are accessible to individuals with disabilities. This includes integrating features such as voice commands, tactile interfaces and visual aids.

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6 UNESCO's Internet Universality Indicators are a set of 303 indicators that aim to assess the state of Internet development at the national level according to the ROAM principles of human Rights, Openness, Accessibility, Multi-stakeholder participation at: https://www.unesco.org/en/internet-universality-indicators/roam-x.

7 UNESCO Media and Information Literacy standards and frameworks include Media and Information Literate Citizens: Think Critically, Click Wisely (UNESCO MIL Curriculum), and Operational Guidelines: Constructing UNESCO Media and Information Literacy Cities.

- **Customization**: Allowing users to personalize their IoT experiences empowers them to tailor digital tools to their unique needs and preferences. This enhances user satisfaction and engagement by providing more relevant and effective services.

IoT and focus on quality of life

IoT has the potential to enhance urban life significantly, but it should be implemented in a way that responds directly to the needs of inhabitants and the environment:

- **People-oriented solutions**: IoT should be deployed to improve urban living in tangible ways such as reducing traffic congestion, enhancing public health services, optimizing energy usage and ensuring efficient waste management. These applications of IoT can lead to smarter, more responsive cities that directly address the everyday challenges faced by inhabitants.
- **Environmental impact**: IoT can contribute to sustainability by monitoring environmental factors like air quality, energy consumption, and water usage. Cities can leverage these data to promote eco-friendly behaviours and reduce their carbon footprint, creating a healthier and more sustainable urban environment.
- **Social connections**: IoT-enabled platforms can facilitate community building and social interactions, helping to create stronger, more connected neighbourhoods. These platforms can foster the inhabitants' sense of belonging and support by providing engagement, communication, and collaboration spaces.

A people-centred digital infrastructure and IoT system enhances connectivity and contributes to the overall well-being of the urban population. By focusing on universal access, digital literacy, user-centred design, and improving the quality of life, cities can ensure that their digital transformation truly benefits all inhabitants and creates a more equitable and sustainable urban future.

Availability and resilience

Cities should be equipped with robust digital infrastructure and IoT solutions to ensure optimal levels of system availability and operational resilience:

- **Availability**: Digital infrastructure and IoT systems often support city operations and services. High availability ensures they remain operational without interruption, maintaining productivity and city inhabitants' satisfaction. It also enhances people's trust in them.
- **Resilience**: Digital infrastructure and IoT systems are increasingly vital for the functioning of cities. As city inhabitants' dependence on these technologies grows, ensuring their resilience becomes crucial. Resilient systems can continue to function or quickly recover from disruptions, avoiding economic losses, and potential adverse impacts on people's lives.

A people-centred digital infrastructure and IoT enhances availability and resilience contributing to the trust of the urban population in city operations and services.

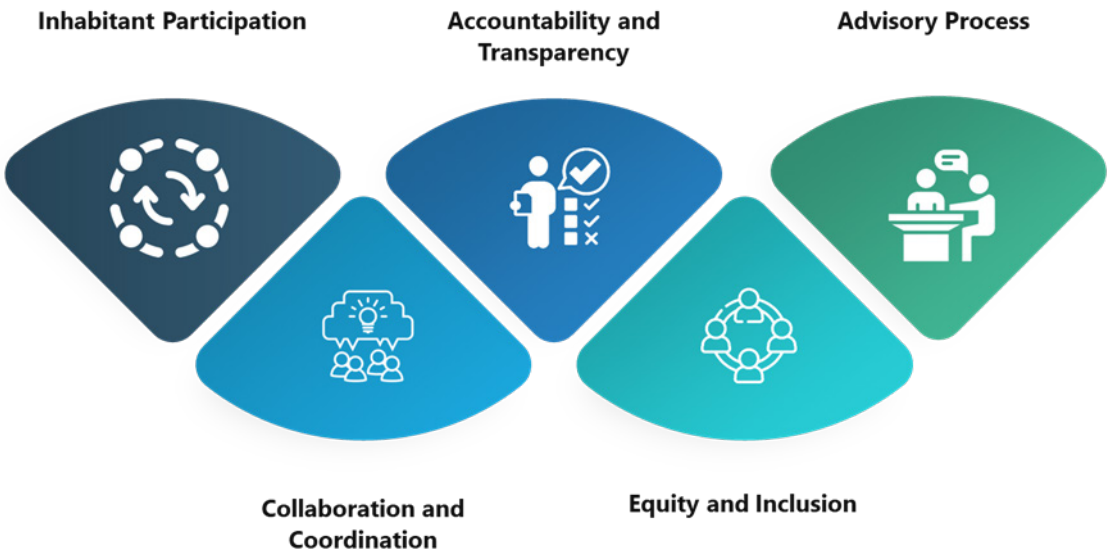
Pillar 4: People-Centred Multi-level Governance of Digital Transformation

A people-centred multi-level governance approach ensures that the digital transformation of cities benefits all by involving different levels of government, inhabitants, and more generally stakeholders in the decision-making process.[8]

A people centred multi-level governance approach fosters collaboration across local, regional and national authorities, as well as with international organizations and community members, ensuring that diverse perspectives are consulted, contemplated and that the digital transformation is inclusive, equitable and sustainable.

Key elements that should be taken into consideration for People-Centred Multi-level Governance include:

Figure 5: Key Elements to Pillar 4 (Source: ITU)



[8] Shaping Co-creation & Collaboration in Smart Cities – A playbook for local and regional governments, UN-Habitat. Available at https://unhabitat.org/programme/legacy/people-centered-smart-cities/shaping-co-creation-collaboration-in-smart-cities-a

Inhabitant participation

Effective digital transformation should encourage and promote the active participation of inhabitants. A people-centred governance model ensures:

- **Inclusive engagement**: All inhabitants, including marginalized and underserved groups, should have a voice in shaping the city's digital transformation. This requires ensuring proactive efforts to engage with all segments of the population.
- **Co-creation**: Collaborate directly with inhabitants to design and develop digital solutions that meet their unique needs and challenges. Co-creation ensures that digital services are relevant and user centred.
- **Feedback mechanisms**: Establish efficient channels for inhabitants to provide continuous feedback on digital services and prioritize inhabitant needs and suggestions when feasible. This feedback loop helps ensure that services evolve in response to real-world experiences.

Collaboration and coordination

Digital transformation requires collaboration not only within city governments but also across various levels of governance and external organizations:

- **Intergovernmental cooperation**: Strengthen collaboration between national, regional and local governments to align strategies and share resources, ensuring that people-centred goals are consistent across all levels.
- **International cooperation**: Foster collaboration with international organizations, non-governmental organization (NGOs), and Standards Development Organizations (SDOs)[9] to accelerate people-centred digital transformation and ensure that global best practices are incorporated.
- **Shared Vision**: Develop an inclusive process to create a shared vision for digital transformation that reflects the goals of all levels of government and the needs of inhabitants. A unified vision enhances coordination and implementation efforts.
- **Data sharing and interoperability**: Facilitate seamless data sharing and interoperability between government agencies to enhance the delivery of public services for the benefit of people. When data are shared effectively, services can be designed and optimized to meet inhabitants' needs better.

[9] The International Telecommunication Union (ITU) develops international standards and guidelines to help cities accelerate their digital transformation. See: https://www.itu.int/

Accountability and transparency

Governance should be transparent and accountable to build trust and ensure that the digital transformation serves the people:

- **Clear roles and responsibilities**: Clearly define roles and responsibilities across all levels of government, thereby ensuring that each authority's mandate is explicitly centred on serving the public interest. Clearly define and assign accountability measures to guarantee transparent and effective governance at every level.
- **Performance metrics**: Establish measurable, people-centred performance indicators to track progress, measure impact, and ensure accountability in the implementation of digital initiatives and communicate results and achievements including impact to city inhabitants.
- **Open governance**: Promote transparency by making government processes and information accessible to inhabitants, allowing them to understand, monitor and influence digital transformation efforts.

Equity and inclusion

Ensuring that digital transformation is equitable and inclusive is critical for building a city where all inhabitants can thrive:

- **Addressing the digital divide**: Implement policies and initiatives that address the digital divide, ensuring that all inhabitants, regardless of socio-economic status, have equitable access to digital services.
- **Inclusive design**: Design digital services that are accessible to all, including those with disabilities, the elderly, and marginalized groups. Digital inclusion ensures that no one is left behind.
- **Impact assessment**: Conduct assessments of the social, economic, and environmental impacts of digital initiatives, with the goal of mitigating any negative consequences and enhancing the positive outcomes for all inhabitants.

Advisory process

A people-centred advisory process ensures that inhabitants and stakeholders are meaningfully involved, engaged and consulted in shaping the city's digital transformation.

- **Establish inhabitant advisory boards**: Create formal advisory boards where inhabitants can actively participate in discussions and provide input to contribute to the city's digital transformation initiatives. This advisory process gives inhabitants a structured platform to influence decisions, ensuring that the digital transformation reflects their needs, concerns and aspirations.

A people-centred, multi-level governance model is crucial to ensuring that city digital transformations are inclusive, transparent and equitable. By prioritizing inhabitant participation, fostering collaboration between different levels of government, maintaining accountability, and focusing on equity, cities can create a digital governance framework that responds to the diverse needs of their population while ensuring that technological advancements benefit everyone.

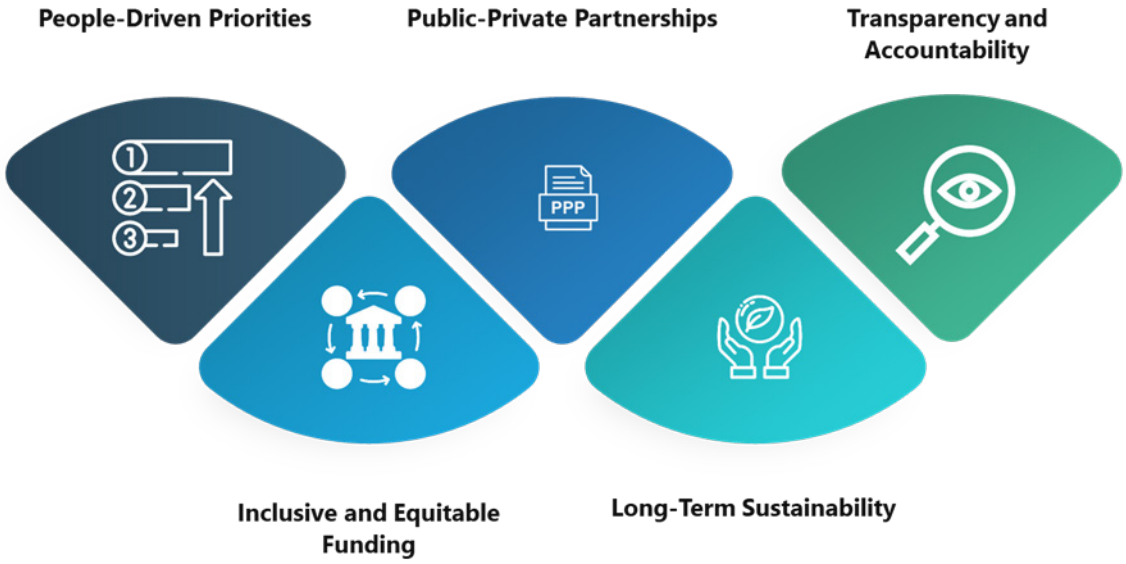
Pillar 5: People-Centred Financing and Funding for Digital Transformation

People-centred financing ensures that financial resources for city digital transformation are allocated in a way that directly benefits inhabitants and addresses their needs. This approach takes into account equity, sustainability, and community engagement, ensuring that funding decisions are transparent and inclusive.

By prioritizing people-driven projects and establishing clear accountability, cities can create financial frameworks that support long term, people-centred urban development.

Key elements that should be taken into consideration for People-Centred Financing and Funding for City Digital Transformation include:

Figure 6: Key Elements of Pillar 5 (Source: ITU)



People-driven priorities

A core principle of people-centred financing is that funding decisions are aligned with the needs and priorities of inhabitants:

- **Needs assessment**: Conduct thorough assessments to identify the most pressing digital needs of inhabitants and ensure that funding is directed toward projects that address these priorities.
- **Budget allocation**: Allocate city funds based on the priorities identified by inhabitants, ensuring that resources are invested in projects that have the greatest potential to improve their lives.
- **People-suggested funding**: Engage with inhabitants to allow them to suggest and decide on how a portion of the digital transformation budget is allocated to specific projects.
- **Predefined budgets for inhabitants' allocation**: Set aside a portion of the city's digital transformation budget that inhabitants can allocate directly to various projects, promoting community engagement and ownership of digital initiatives.

Inclusive and equitable funding

People-centred financing ensures that no one is left behind by promoting equity and inclusion in funding decisions:

- **Addressing the digital divide**: Allocate funds to bridge the digital divide, ensuring that all inhabitants have equitable access to digital services, regardless of socio-economic status.
- **Targeted investments**: Direct funding toward projects that benefit marginalized or underserved communities, reducing disparities in technology and digital infrastructure access.

- **Accessibility**: Ensure that investments in digital infrastructure and services are accessible to individuals with disabilities, so supporting an inclusive city environment for all inhabitants.

Public-private partnerships

Collaboration with the private sector can be an effective way to secure financing for large-scale digital transformation projects:

- **Leveraging private investment**: Partner with private sector stakeholders to finance people-centred digital projects, particularly those that require significant investment.
- **Shared risk and reward**: Develop partnerships that fairly share the risks and rewards between the public and private sectors, ensuring that the benefits of digital projects flow back to the community.
- **Community benefits**: Ensure that public-private partnerships deliver tangible, long-term benefits to the city's inhabitants such as improved services, infrastructure or digital access.

Long-term sustainability

A people-centred financing model should consider the long-term sustainability of digital initiatives:

- **Revenue generation**: Explore innovative ways to generate revenue from digital services, such as user fees or public subscriptions, while ensuring that these services remain accessible and affordable for all inhabitants.
- **Performance-based funding**: Allocate funds to initiatives and projects that consistently achieve high performance and people-centred outcomes delivering real impact to inhabitants.
- **Cost-benefit analysis**: Conduct rigorous cost-benefit analyses to ensure that digital projects provide value over time and contribute to the city's SDGs.
- **Resilience**: Invest in resilient digital infrastructure and services that can withstand future challenges and continue to meet the needs of the inhabitants, so ensuring ongoing service delivery in changing conditions.

Transparency and accountability

Transparency and accountability are essential to ensure that funds are used effectively and in the best interests of the community:

- **Clear reporting**: Provide transparent reporting on the use of public funds, detailing how digital projects are financed and the outcomes they achieve for inhabitants.
- **Inhabitant oversight**: Involve inhabitants in overseeing and evaluating digital transformation projects, ensuring that they have a voice in monitoring how funds are spent and what outcomes are achieved.
- **Accountability**: Hold city officials accountable for the effective and equitable use of digital transformation funds, so ensuring that resources are used to benefit the community and that inhabitants are kept informed about the progress of funded projects.

Additional funding can also come from:

- **Impact investing**: Attract investors who are interested in generating social and environmental impact, aligning investment strategies with the city's people-centred goals.
- **Crowdfunding**: Engage inhabitants in financing digital projects through crowdfunding platforms, allowing them to contribute directly to initiatives that matter most to them.
- **Pay-for-success models**: Implement pay-for-success funding models where financing is linked to the achievement of specific people-centred outcomes, ensuring accountability and a focus on measurable results.

This pillar highlights how cities can design a financing and funding model that is transparent, inclusive and focused on delivering long-term benefits to all inhabitants, ensuring that digital transformation serves the community and its most pressing needs.

Oversight for Ongoing Monitoring and Reporting

As the next step in implementing the People-Centred Digital Transformation Framework, it is essential to establish an oversight mechanism for ongoing monitoring and reporting. This mechanism aims to ensure that digital transformation initiatives meet their set targets, perform as expected, and continuously evolve to serve the needs of the city's inhabitants.

By incorporating robust evaluation and assessment processes, cities can guarantee the sustainability and people-centred focus of their digital transformation efforts, ensuring that they remain effective and efficient in addressing urban challenges.[10]

KPIs are central to this ongoing process. International KPIs for Smart Sustainable Cities have been developed to assess how information and communication technologies (ICTs) contribute to making cities smarter and more sustainable, aligning with the SDGs. The United for Smart Sustainable Cities (U4SSC) initiative has designed a comprehensive set of KPIs to help cities self-assess their progress towards achieving the SDGs. These KPIs evaluate city performance across three critical dimensions: Economy, Environment, and Society and Culture, focusing on inclusivity targets such as access to urban services, participatory governance, and data ownership.[11]

Additionally, frameworks such as UN-Habitat's Urban Monitoring Framework integrate SMART indicators and dynamic KPIs to ensure cities remain responsive to digital inclusion challenges. The Urban Monitoring Framework, along with the international KPIs, emphasizes measuring the inclusiveness of digital services, ensuring that no inhabitant is left behind in accessing or benefiting from urban digital services.[12]

Regular assessment of maturity levels, localization of impacts, and the creation of new policies will be required to ensure that the digital transformation stays aligned and up to date with technological advances and the needs of people living in cities. By integrating dynamic policies and monitoring mechanisms the framework will remain flexible, effective and responsive to changing urban challenges and opportunities, while maintaining its people-centred approach.

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10 Global Digital Compact and the Guidelines on People-Centred Smart Cities, Global Cities Hub. Available at: https://globalcitieshub.org/en/global-digital-compact-and-the-guidelines-on-people-centred-smart-cities/

11 U4SSC, International Telecommunication Union (ITU). Available at: https://u4ssc.itu.int/

12 UN-Habitat Urban Monitoring Framework, UN-Habitat. Available at: https://unhabitat.org/the-global-urban-monitoring-framework

4 Conclusion

A people-centred technology agnostic digital transformation framework is essential for cities seeking to harness the power of digital technologies to improve the lives of their inhabitants and visitors. By focusing on the communities' well-being, needs and aspirations, the framework suggested in this document promotes inclusivity, sustainability and resilience in urban development. Through pillars that emphasize inhabitant participation, people-centred governance, digital infrastructure, and equitable financing, cities can ensure that their digital transformation initiatives are innovative and serve the public's best interests.

Implementation of this framework in cities aims to build stronger, more connected, and vibrant communities that all share digital transformation's benefits.

As cities progress in their digital transformation journeys, the framework outlined in this document will help guide them toward an inclusive, equitable, sustainable and truly people-centred future.

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