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Co-Designing Urban Futures: Innovation and partnerships for improved service delivery in intermediary cities

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GSMA

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UN-HABITAT

The United Nations Human Settlements Programme (UN-Habitat) is mandated by the UN General Assembly to promote socially and environmentally sustainable towns and cities. UN-Habitat is the focal point for all urbanisation and human settlement matters within the UN system, and reports on progress made on Sustainable Development Goal (SDG) 11 on cities. Its mission is to drive transformative change in cities and human settlements through knowledge, policy advice, technical assistance and collaborative action to leave no one and no place behind.

UN-Habitat works with partners to build inclusive, safe, resilient and sustainable cities and communities. Through over 90 active country offices and its regional and international presence, UN-Habitat promotes urbanisation as a positive transformative force for people and communities, while reducing inequality, discrimination and poverty all around the world.

GSMA Digital Utilities

Utility services such as energy, water, sanitation, waste management and transport are essential to life. The Digital Utilities programme enables access to affordable, reliable, safe and sustainable urban utility services for low-income populations through digital solutions and innovative partnerships. In doing so, we also seek to support cities in low- and middle-income countries in their transition to a low-carbon, climate-resilient future.

For more information, please visit www.gsma.com/mobilefordevelopment/digitalutilities/

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CATAPULT Connected Places

Connected Places Catapult is a not-for-profit partially funded by the UK government that operates at the intersection between public and private sectors and between local government and transport authorities. We convene the disparate parts of the market to help innovators navigate the complexity of doing business, creating new commercial opportunities, and improving productivity, socioeconomic and environmental benefits for places, mobility, and the built environment. In order to succeed in this mission, Connected Places Catapult provides expertise in a number of remits including Integrated Infrastructure where we work across cities, transport systems, and with place leaders to enhance the connectivity of their physical, digital, and green infrastructure to enhance their resilience, cost effectiveness, and sustainability.

The Connected Places Catapult Global Programme works with cities and transport authorities around the world to become better informed buyers in the market; and with suppliers to identify opportunities, test, scale, and commercialise their technology with cities and transport authorities. Through this two-pronged approach we accelerate the adoption of innovative technologies, promoting growth, sustainability, social betterment, and efficiency in our increasingly urbanised world.

Executive summary

Intermediary cities, often referred to as 'secondary cities', account for more than half of the urban population in low- and middle- income countries (LMICs). Across these countries, intermediary cities grapple with the concurrent challenges of rapid urbanisation, climate change and widening inequalities. This is often exacerbated by a lack of fiscal autonomy, fragmented governance, inadequate public investment or limited technological development. As a result, municipalities and utility service providers encounter barriers to adopting emerging technologies and adapting their services to the growing needs of their residents.

On the current trajectory, the global population is expected to grow up to 9.7 billion in 2050 from eight billion in 2022, and cities are especially struggling to keep pace with this growth. These urban challenges can be solved through partnerships, collaboration and the adoption of innovative service delivery models. This is why Connected Places Catapult, the GSMA and the United Nations Human Settlements Programme (UN-Habitat) have combined their extensive experience, expertise, and passion for innovation-led development, to work with intermediary cities to tackle the challenges head on.

Innovative solutions that leverage digital technology and foster public-private collaboration are uniquely placed to tackle these challenges. Partnerships between start-ups and the public sector have become an effective way to address critical gaps in essential urban services, particularly when reaching low-income urban populations.

These innovations have the potential to combine the technologies, innovative financing capabilities and the agility of start-ups with the scale, service mandate and resources of the public sector. They also enable new business models that can make essential urban services more accessible, affordable, reliable, safe and sustainable. However, there is little awareness about how start-ups can realistically support governments in achieving their policy objectives, and this has made it difficult for the public and private sectors to collaborate on sustainable urban development.

Most local governments around the world understand the benefits of technology and innovation for improved service delivery. Yet, due to limited human or financial resources, they lack the capacity to train city officials in innovative methods and tools, or effectively engage the private sector in addressing local challenges through innovation. The result is that innovation often becomes concentrated in a handful of major cities in a few key markets. This is what the new partnership between Connected Places Catapult, the GSMA and UN-Habitat will address.

This joint report explores how partnerships and innovation can solve the most pressing challenges for intermediary cities in LMICs in providing essential services and tackling climate change. It provides the basis for the "Co-designing Urban Futures" initiative, elaborating the need for it, and outlining methodology and the capabilities of the three partner organisations.

The three phases of the initiative; challenge identification, innovation catalyst, and investment ecosystem emphasise on the intersection of innovative solutions and financing for climate-resilient cities through a multi-step approach. By integrating these critical elements in its approach, the initiative provides a comprehensive roadmap for addressing the unique challenges faced by intermediary cities.

The report also profiles successful examples of innovative and collaborative projects the three organisations have pioneered. It will also contribute to the literature on intermediary cities and the broader discourse on urban development and sustainability, while also showcasing areas of potential collaboration between cities, the private sector, donors and enabling organisations. By working together, these partners can leverage the power of digital technology to enable access to more affordable, reliable, safe, and sustainable urban services.

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1 Overview of urbanisation and the challenges of intermediary cities

1.1. The state of urbanisation

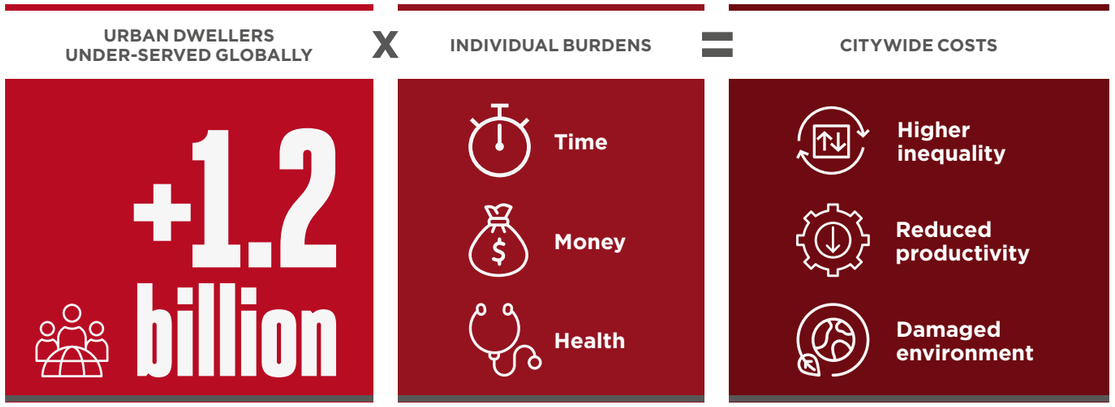
By 2050, it is estimated that more than two-thirds of the world's population will be living in cities and the global urban population will increase by more than 2.2 billion.[1]

Cities across Africa and Asia will account for 90% of this increase, contributing 900 million and 1.1 billion urban residents, respectively. The number of cities in low-income countries is expected to increase by 76% between now and 2070, compared to 20% in lower-middle-income countries and 6% in upper-middle-income countries. Most of this growth will be concentrated in intermediary cities with populations of less than a million people, and "new" cities are expected to account for 20% to 40% of global urban growth by 2070.[2] Between 2010 and 2030, these cities are projected to account for a major share of total urban population growth: 32% in Latin America, 38% in Asia and 47% in Sub-Saharan Africa.[3]

Population growth in many urban areas in LMICs has been rapid, with growth rates in many cities exceeding the ability of municipal governments to provide basic services. More than a billion urban residents globally live in poor housing, have inadequate access to water and electricity and experience food and livelihood insecurity.[4] These challenges are likely to be exacerbated by ongoing trends of rapid urbanisation and population growth, as well as climate change (see next section). Enabling more inclusive, innovative and productive cities across LMICs is, therefore, a pressing global development challenge and key to meeting the United Nations Sustainable Development Goals (SDGs).

Figure 1

The urban service divide and its implications for urban residents and the wider city



Source: World Resources Institute, 2021[5]

1. UN-Habitat. (2022). *World Cities Report 2022: Envisaging the Future of Cities.*
2. Ibid.
3. Ibid.
4. United Nations. (2018). *World Urbanization Prospects: The 2018 Revision.*
5. Mahendra, A. et al. (2021). *Seven Transformations for More Equitable and Sustainable Cities*. World Resources Institute.

Box 1

The challenge of urban service provision

For economic growth and recovery to be sustainable, we need cities that can absorb, recover from, and prepare for future economic shocks. Yet, they can only do so if they are well planned and managed to drive prosperity, inclusion and sustainability. The good news is that the world is committed to achieve this by 2030 through Sustainable Development Goal 11 which sets several targets to improve housing and basic services, sustainable transport systems, and air quality in cities, among others. The bad news is that the world is off track in achieving most of these targets. The 2023 review of progress on Sustainable Development Goal 11 was sobering.[6]

It showed that 3.4 billion people lack safely managed sanitation services, 1.9 billion people lack basic hygiene services, and 2.3 billion metric tonnes of municipal solid waste were reported in 2020, with 40% of this waste in uncontrolled facilities.[7] Only 52% of the global population has access to public transport while 99% of the world's urban population lives in areas that exceed the 2021 World Health Organization guidelines on air quality. In addition, just 45% of urban dwellers have convenient access to open public spaces.[8] Clearly, these deficits undermine the potential of cities to offer a better quality of life for all, leaving far too many people and communities behind.

Addressing these challenges in our cities and communities is costly, but doable. The UN estimates that roughly $2.6 trillion is required every year until 2030 to meet the SDGs and stay on course towards a net-zero society by 2050.[9] To unlock this capital, a paradigm shift is essential to inform the way in which the financing of sustainable cities and communities is pursued in two regards— external and endogenous financing.

First, in terms of external financing deployed in LMICs, a significant drop in development grant funding and an increase in public investment is a clear signal that a change from a granting model to a financing model is crucial in keeping up the pace towards attaining the SDGs. This requires greater focus on leveraging both public and private investments to finance the development of cities and enhance the productivity and growth of urban economies. Channelling investments to cities requires close collaboration between different levels of government to ensure coherence and maximise returns.

Second, the financing of sustainable cities and communities must also better leverage endogenous resources. Centring cities and urbanisation as a driver of economic transformation in national development plans and priorities is key. There is no doubt that investing in cities will transform national economies. Substantial investments in economic sectors beyond the urban sector and local governments' purview have major impacts which could be scaled if better consolidated through national coordination. At the same time, the immense potential of cities to generate revenues and financing for national and global economies must be better leveraged to unlock stranded resources. Innovators and start-up communities can also play a great role in shaping and steering endogenous resources aimed at improving urban services worldwide.

The evidence is compelling. Cities have tremendous potential to drive global prosperity but still face considerable deficits that require urgent action. Now is the time to unleash the tremendous potential of cities through optimum financing models to secure a better quality of life for all. This matters for present and future generations, both of which live in an urban era.

6. UN-Habitat. (2023). *SDG 11 Synthesis Report: Rescuing SDG 11 for a Resilient Urban Planet*
7. Ibid
8. Ibid
9. United Nations. (2023). *Financing for Sustainable Development Report 2023: Financing Sustainable Transformations*

As a country's urbanisation rate increases, it generally is expected to have a positive impact on long-term economic growth since cities are generally associated with greater productivity and innovation. However, the rapid pace of urbanisation in LMICs, combined with a lack of expected inclusive growth and job creation, means that cities face unique challenges in unlocking positive development outcomes. The exclusionary and unplanned nature of urbanisation is hampering productivity gains and, instead of benefiting from pathways to greater prosperity, many urban dwellers risk being locked into poverty traps, living in informal settlements and city peripheries deprived of public and private investment. Given that many urban residents lack access to affordable and reliable essential services, and face challenges accessing education and job opportunities, many cities in LMICs are unable to meet their true potential.

Intermediary cities are vital in connecting rural and urban areas and relieving the infrastructural pressures of larger cities. These cities are expected to grow almost twice as fast as megacities, especially in Africa and Asia. However, they also face challenges, such as a higher proportion of the population living in poverty, less access to essential services, such as energy, water, sanitation and waste management, and inadequate support from national or regional governments. Intermediary cities are also frequently overlooked in national and multilateral urban development strategies. This is both driven by – and compounds – data scarcity, as many countries lack comprehensive and up-to-date data on intermediary cities. The lack of national government and donor support, in addition to data scarcity, depresses private sector investment in intermediary cities and makes it difficult for investors and corporations to evaluate the risks and opportunities of doing business in them.

1.2. Intermediary cities and their unique challenges

Intermediary cities have an important role as hubs of production, transportation and processing, linking regional and national systems of cities. In Asia, it is estimated that intermediary cities contribute about 40% of gross domestic product (GDP).[10] Despite their importance, these cities face unique challenges in meeting the growing demands of their residents, and providing reliable services and infrastructure.[11] This section looks at four challenges facing intermediary cities: governance, digital development, financial capacity and climate change.

Box 2

Defining intermediary cities

There is no fixed or universal definition of an intermediary or secondary city, and what qualifies as one varies significantly by country.

In this report, intermediary or secondary cities are defined as urban areas that serve a function other than that of a capital city or major commercial hub (for example, Lagos in Nigeria or Douala in Cameroon), and generally have a population of less than 1 million. Based on this threshold, intermediary cities are home to 20% of the global population and more than a third of the total urban population.[12] In Africa, intermediary cities are home to more than 250 million people, which represents 44% of the total urban population on the continent.[13] In Asia, 54% of urban residents live in cities of less than 1 million, compared to 16% in megacities.

Governance

Government institutions play critical roles in the economy and society, and quality governance is an essential component of economic development. Typically, intermediary cities lack either one or a combination of the following: a firm legal foundation, institutional capabilities, administrative procedures and financial instruments. This results in weak local governance. This section examines three institutional challenges commonly faced in intermediary cities.

— **Unclear separation of powers and overlapping governance mandates.** Unlike primary or capital cities, intermediary cities often function within a lower tier of government, sitting in a wider administrative area that also includes surrounding rural areas, such as a district or county. This can foster unclear separation of powers and responsibilities between different levels of government, and local governments can lack autonomy, leaving city administrations disempowered or facing trade-offs between urban and rural development. National urban governance frameworks need to enable effective multi-level governance through clear legal and institutional structures (based on

10. Cairns, S. et al. (9 May 2023). "Intermediary Cities in Asia: Sound economy and governance are essential". *City Monitor*.
11. UNICEF. (2020). *Analysis of Multiple Deprivations in Secondary Cities in Sub-Saharan Africa*.
12. United Cities and Local Governments (UCLG). (n.d.). "Intermediary cities".
13. UNICEF. (2020). Analysis of Multiple Deprivations in Secondary Cities in Sub-Saharan Africa.

the principles of decentralisation), adequate financial resources and the empowerment of citizens.[14] Better allocation of national resources to subnational governments needs to be coupled with equalisation mechanisms that reduce inequalities and build synergies between regions, metropolitan areas and intermediary cities.

These challenges are particularly pronounced in the provision of essential services, which tend to have unclear and, at times, conflicting public sector service and regulatory mandates. For example, in many cities in LMICs, authority over sanitation and water services is often split between local, regional and national government bodies.[15] With transport, local governments might be responsible for rule enforcement and delivery performance of transport services, while national regulatory bodies take the lead on rulemaking and resource allocation.

— **Local elite capture.** In addition to a reluctance to share power across national and local governments, another challenge of weak local governance is local elite capture.[16] While local elites have the resources, knowledge, influence and networks to make decentralised governance work, they also have vested interests and can use their economic or social standing to capture resources under decentralisation reforms and use them for personal gain. This stifles procurement processes, slowing public-private collaboration in service delivery. When the political interests of local elites are served rather than the needs of residents, this can lead to the adoption of exclusionary policies that fail to secure livelihoods for most residents.[17]

— **Limited technical capacity.** For cities seeking to develop and transform, it is important that employees have the technical skills to design and implement projects effectively across all stages and within the right parameters. In many countries, however, technical staff are appointed to serve in local municipalities by higher-level governments, limiting local independence. Intermediary cities may also find it difficult to retain qualified technical staff due to remuneration challenges and fewer career opportunities.[18]

Digital development

Digital innovation is having a significant impact in cities across LMICs, where digitally enabled solutions are helping to enable more productive and inclusive environments. The expansion of mobile internet in LMICs is a key enabling factor for innovation, particularly in urban contexts. According to the GSMA report, *The State of Mobile Internet Connectivity 2022*,[19] rural populations in LMICs are 33% less likely than their urban counterparts to use mobile internet.[20] Connecting rural populations, as well as smaller cities, remains a challenge. For example, compared to large cities, Africa's secondary cities are less well connected to the information, communication and technology (ICT) network, limiting the exchange of information and development capacity.[21] Similarly, the presence of higher-income groups in larger cities means that residents can afford to purchase both mobile phones and internet plans, creating an urban-rural gap in mobile internet use across these regions (Figure 2).

As highlighted in the previous section, the lack of technical capacity in local governments is a major barrier to digital transformation.[22] Cities with a shortage of technical skills are not only less likely to adopt digital solutions, but also to attract a strong technology workforce that would set up local start-ups. This is due to some of the challenges mentioned earlier, such as poor connectivity, but also the absence of an attractive ecosystem that would make tech workers abandon larger cities or enable smaller cities to retain home-grown tech talent. While digital solutions by themselves are not a panacea to complex urban challenges, digital inclusion is an essential component of a city's economic transformation roadmap.

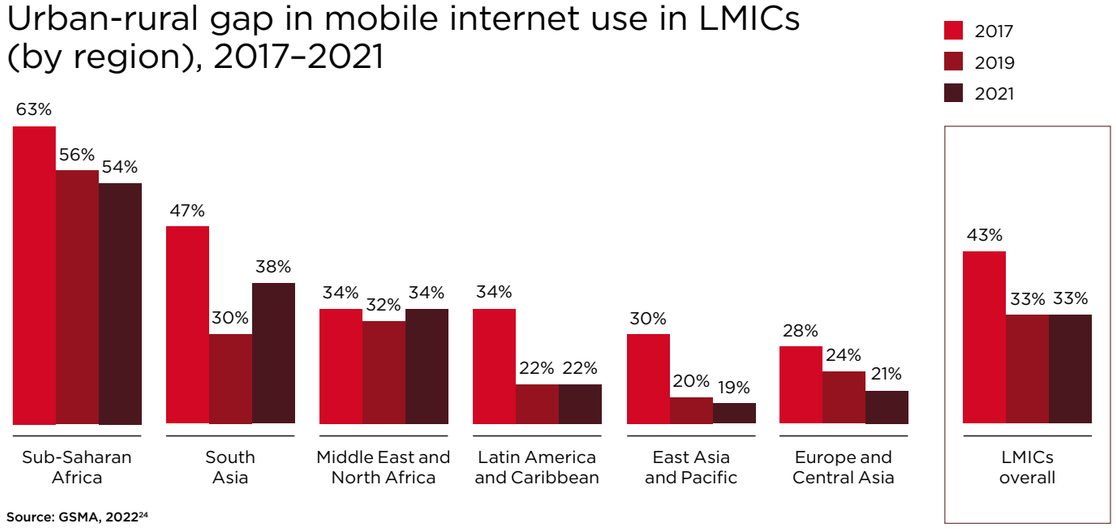
Financial capacity

Most intermediary cities have not been able to access financing from capital markets. Many lack a credit history because they have never had the opportunity to borrow, and credit that is available is often extended at unfavourable rates.[23] The lack of robust data is also a challenge for intermediary and small cities, as it makes decision-making more difficult, renders them less attractive to potential

14. Habitat III. (2016). *Urban Governance, Capacity and Institutional Development. Habitat III Policy Papers*.
15. GSMA. (2022). Partnering With the Public Sector: A toolkit for start-ups in the utilities sectors.
16. Boex, J. et al. (2016). Dynamic Cities? The Role of Urban Local Governments in Improving Urban Service Delivery Performance in Africa and Asia. Center on International Development and Governance.
17. Goodfellow, T. (2017). "Seeing Political Settlements through the City: A Framework for Comparative Analysis of Urban Transformation". *Development and Change*, Vol. 49, Issue 1, pp. 199–222.
18. African Development Bank. (2022). *The State of Urban Governance in Africa*.
19. GSMA. (2022). *The State of Mobile Internet Connectivity 2022*.
20. Ibid.
21. Cities Alliance. (2022). *The Dynamics of Systems of Secondary Cities in Africa: Urbanisation, Migration and Development*.
22. Gasco-Hernandez, M. et al. (2022). "The role of organizational capacity to foster digital transformation in local governments: The case of three European smart cities". *Urban Governance*, Vol. 2, Issue 2, pp. 236–246.
23. UN-Habitat. (n.d.). "Rapid Own Source Revenue Analysis".

Figure 2

Urban-rural gap in mobile internet use in LMICs (by region), 2017–2021



Source: GSMA, 2022[24]

investors and pushes them off the radar of national authorities and development agencies.[25] Having concrete data ensures that cities can borrow at favourable rates and service loans easily through their revenues.[26] Moreover, since intermediary cities struggle with small tax bases and low levels of tax collection, data helps governments make evidence-based decisions to capture more revenue. Their flexibility and strong incentives for reform can also make intermediary cities attractive places for innovation and to experiment with new revenue models.

Connected, robust and resilient infrastructure provides the foundation of productive and economically strong places. When financial resources are limited, infrastructure may become poorly maintained and, over time, becomes more expensive to repair or rebuild. To unlock financing, strengthen financial capacity and stop this vicious cycle, cities can update their own-source revenue management systems. Innovative tools such as UN-Habitat's Rapid Own Source Revenue Analysis (ROSRA) can be an effective way for cities to not only increase tax revenue, but also digitise data and leverage external resources to fund urban development.[27]

Climate change

Climate change is exacerbating the challenges of cities in LMICs, which are particularly vulnerable to its impacts. The physical effects of climate change are already disrupting supply chains, impacting health and productivity and imposing high costs associated with loss and damage. Adaptation efforts to prepare for and manage climate risks are necessary. Building resilient cities where infrastructure and residents can respond to the impacts of climate change requires new strategies and actions tailored to the local context. There are several approaches to strengthening urban resilience. For example, building infrastructure to improve drainage systems and creating green spaces for water absorption can reduce the risk of flooding. In the water sector, digital technologies such as smart meters and sensors can improve resource management, while early warning systems can increase disaster preparedness.[28] To implement these measures, public, concessional and private investments are all required.

Unfortunately, there is still a huge urban climate finance investment gap. This has been exacerbated by high-income countries consistently failing to meet commitments to provide adequate climate financing to LMICs, particularly for climate adaptation. In 2021, only 21% of climate finance went to adaptation despite the serious challenges confronting cities throughout LMICs.[29] Although there are challenges associated with their systems of financing, intermediary cities will need to be considered to ensure climate funding does not flow disproportionately to capital cities.

24. GSMA. (2022). *The State of Mobile Internet Connectivity 2022*.
25. Haas, A. (19 September 2018). "Data: The first step to improving finance in African cities". *OECD Development Matters Blog*.
26. UN-Habitat. (2015). *The Challenge of Local Government Financing in Developing Countries*.
27. UN-Habitat. (n.d.). "Rapid Own Source Revenue Analysis".
28. Aranda, C. and Humeau, E. (2022). *Early Warning Systems in the Philippines: Building resilience through mobile and digital technologies*. GSMA.
29. OECD. (16 November 2023). "Growth accelerated in the climate finance provided and mobilised in 2021 but developed countries remain short and must continue scaling up to reach the USD 100 billion goal".



2 Co-designing urban futures to achieve SDG targets

This chapter looks at the opportunities available in intermediary cities and how the Co-designing Urban Futures initiative will accelerate innovation and partnerships in selected cities.

With the rise of digital connectivity, technology solutions are gaining traction as a way to build urban resilience. The "smart city" concept has been widely accepted by city leaders around the world. In June 2023, 194 UN member states endorsed a resolution by UN-Habitat on people-centred smart cities, which defines a smart city as one that uses data, technology and services for common good, creating the inclusive and sustainable cities that are needed in the 21st century. The resolution recommended developing international guidelines through a consultative process that would set global standards for national and local smart city regulations, plans and strategies. The overarching aim is to ensure that digital urban infrastructure and data help to make cities and human settlements sustainable, inclusive, prosperous and respectful of human rights.[30]

Integrating technology in infrastructure and services can help guarantee high-quality, functioning infrastructure and service delivery that, in turn, reduces vulnerability and builds resilience to climate shocks. Innovation can also support cities to adapt to changing circumstances and plan for policy interventions. Increasingly, cities have partnered with innovators and start-ups to improve service delivery by public sector organisations and close the urban service gap for low-income urban populations.

While most local governments around the world are aware of how technological advances and innovation could help support and improve the effectiveness of service delivery, there is tremendous uncertainty about what this means in practical terms. Cities with limited human or financial resources may lack the capacity to train city officials, planners and other stakeholders in innovative new methods and tools, and may not have the means to engage effectively with the public and private sector to address local challenges through innovation. There is also little confidence in, or insight into, how start-ups or frontier technologies can realistically feed into existing policy mechanisms, and this creates huge gaps in terms of what the public and private sectors can achieve in advancing sustainable and equitable urban development.

In recent years, innovation in essential service delivery has grown tremendously as digital technologies have been adopted in LMICs. This has enabled the rise of new business models across the utility sector, such as pay as you go (PAYG), attracting billions in investment while making critical services more accessible and affordable.[31] However, there is still a long way to go. Innovation has been concentrated in a few key markets and major cities, and ecosystems need to be developed at the country and regional level. Decentralised solutions that support public sector service providers require ongoing assistance to thrive, especially in small and intermediary cities. Intermediary cities face unique challenges in meeting the needs of their residents, and as the global proportion of these cities continues to grow, much more focus, support, and investment will be needed to ensure they develop sustainably.

30. UN-Habitat. (2023). Assembly Resolution HSP/HA.2/L.4.
31. Lemasagarai, J. (23 August 2023). "Innovator Spotlight Series: Empowering small businesses and urban residents with portable energy solutions". *GSMA Mobile for Development Blog*.

Figure 3

Fostering innovation in urban programmes and projects

INGREDIENTS	EXPLANATION
Leadership	Those in positions of influence and decision-making roles must demonstrate the value of innovation for achieving sustainable development, and initiate processes to make people, organizations, programmes and projects more innovative. This includes dedicating resources for capacity development, investing in research and development, as well as in innovative tools, for example.
A culture of innovation and creativity	Innovation is heightened when there is a culture of risk taking, creativity and an expectation for partnerships to generate new ideas. An innovation culture must be fostered both within an organization, as well as encouraged in the broader society and amongst partners. Cities and organizational leaders need to create physical and other signals that show how innovation is valued, and resources are invested.
Capacity and knowledge	Related to a culture of innovation is providing resources and opportunities for capacity building and making knowledge on innovation freely available. Building capacity and knowledge includes training of governments and relevant organizational staff, promotion of innovation in education systems and opportunities for training and exchange for development professionals, entrepreneurs and citizens.
Innovative frameworks	Innovation is elevated in an environment with clear policies, strategies and approaches to promote it. Integrating innovation in design,implementation and evaluation processes significantly improves benefits to target groups. Innovation should feature in national urban frameworks policy, city level strategies or urban plans. At an organizational level, innovation should be captured in strategic plans, as well as individual performance review cycles.
Flexible infrastructure	Infrastructure to support innovative thinking – public spaces for people to meet, exchange ideas, showcase artwork and ideas, innovation labs and hubs – is fundamental. In an organizational setting, this includes physical spaces and time for interaction and ideas exchange and the access to digital tools. In addition, with the leveraging power of digital technologies, infrastructure to connect people to the internet is essential.
Diverse partnerships	Cross-sectoral and multi-stakeholder collaborations are vital for innovation. Providing platforms for different perspectives will generate new ideas and approaches. Bringing together organizations, leaders (including traditional leaders), communities and the private sector creates a dynamic mechanism for fostering innovative solutions.
Dedicated funds	All the ingredients above - innovative processes, projects, fostering a culture as well as spaces for innovation - require financial support Dedicated funds and resources . Seed funding for ideas, labs or spaces are critical and can often be generated from the collaboration with diverse partners. At the same time, in-kind support and dedicated spaces for innovation are required to facilitate innovation.

Source: UN-Habitat. (2021). Fostering Innovation in Urban Programmes and Projects.

Figure 4

Service delivery gaps and digital solutions

SERVICE GAPS	Unaffordable	Unconnected	Unreliable and unaccountable	Unplanned	Unsafe
DIGITAL SOLUTIONS	— PAYG models can make services affordable for low-income consumers by enabling micropayments — For service providers, mobile money can reduce operating costs and improve revenue collection	— GIS can generate granular data to assess needs and coordinate service delivery in complex value chains — Digital tools can identify hotspots and better match supply and demand for essential services	— Smart monitoring and smart metering can improve operational efficiency — The Internet of Things (IoT) can improve the management of service delivery and consumption — Digital tools can create an auditable trail of financial transactions and measure environmental and social impact	— Data and large data sets can inform plans for the provision of urban services — Big data can support evidence-based policymaking	— IoT sensors can be used to monitor service quality and prevent errors — Digital solutions and platforms can drive accountability in the informal sector, making service provision safer for workers and customers

2.1. Ingredients of innovation

There are several key ingredients of urban innovation. These ingredients are important starting points for cities to consider how to be more innovative in their institutions, departments, workforce and capacity, and the types of partners that can support innovative projects and programmes. Incorporating these ingredients in strategic planning, budgetary discussions and other areas will help shape an innovative mindset and guide cities on their journey towards systemic change.

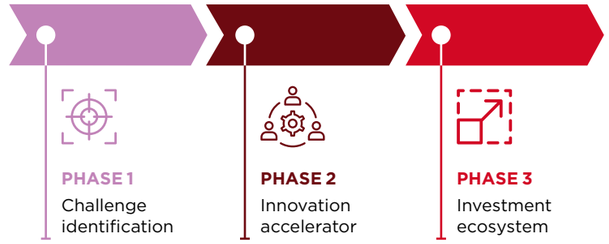
To fuel innovation in different geographies, the Co-designing Urban Futures partners have worked on several fronts, including championing the digitalisation of essential services and designing platforms to encourage innovative partnerships. Digital solutions are uniquely placed to address some of the key challenges associated with urban service delivery (see Figure 4).

2.2. Approach to co-designing urban futures

The proposed Co-designing Urban Futures initiative will be conducted in three phases. These phases will enable cities to unlock maximum capacity for innovative service delivery.

Figure 5

The three phases of the Co-designing Urban Futures initiative



Phase 1: Challenge identification

For cities to unleash their capacity for innovation, they must first understand the current landscape and the challenges they face. During Phase 1, cities should collect data and engage in design thinking exercises to better understand and frame their challenge. This includes an analysis of existing infrastructure for innovation and an assessment using diagnostic tools, culminating in an urban innovation and SDG action profile.

The Co-designing Urban Futures initiative will collaborate with cities in the following ways:

- **Framing the challenge:** Working with cities through participatory workshops and using innovative tools, such as design thinking, to understand their position and approach to SDG performance and readiness, and ability to incorporate innovative elements in their work.
- **Innovation capacity:** Cities will apply a customised version of the City Typology Index to understand their capacities in terms of institutional innovation.
- **SDG diagnostic:** The SDG Cities diagnostics tool will be tailored to the city's context to analyse priority SDGs and the implications for effective service delivery and tackling climate change.
- **Challenge report:** At the end of Phase 1, the city will have a comprehensive report outlining the most pressing challenges to be addressed, as well as a diagnosis of their innovation, SDG performance, and strategic foresight analysis, with recommended steps to take. This report will help innovators respond to challenges with solutions for a long-term trajectory.
- **Innovation challenge:** Our team will conduct a unique innovation challenge for innovators that will highlight how they can solve a city's identified challenge with their solutions.
- **Partnerships:** No innovator's solution should be considered in isolation. A matchmaking process is built into Phase 1 to ensure that solutions fit into the city's wider institutional and innovation ecosystem and lead to truly transformative change.

Box 3 features the City Typology Index tool that cities can use to identify opportunities for innovation, as well as an example of where these tools have been used, while Box 4 highlights what the SDG Cities diagnostic tool assesses.

Box 3

The City Typology Index

Connected Places Catapult and The Business of Cities created the City Typology Index to help public institutions and businesses identify opportunities for urban innovation and navigate the global innovation landscape of effectively. The typology helps Connected Places Catapult to offer cities valuable insights and evidence of where digital connectivity and improved systems can contribute to growth and accelerate progress on innovation and sustainability.

The typology draws on more than 175,000 up-to-date data points on 65 unique indicators. It assesses 500 cities in more than 130 countries based on their performance and needs across three broad themes:

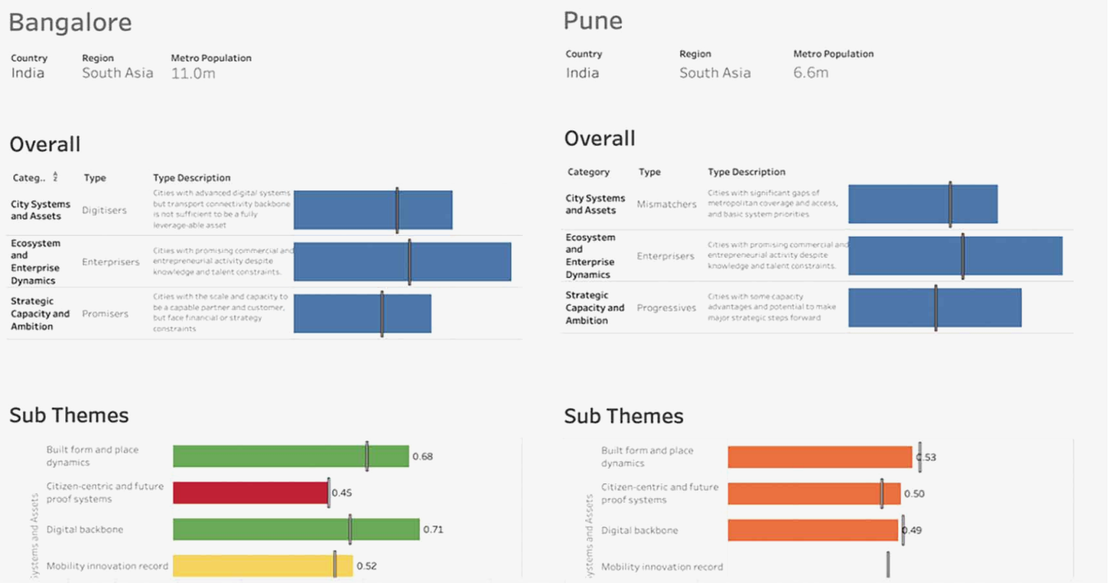
- **City systems and assets:** a city's physical systems and assets (e.g., digital speeds, coverage and capacity, as well as maturity, uptake of and access to public transport and micromobility)
- **Ecosystem and enterprise dynamics:** prospects to grow and scale businesses in advanced sectors (e.g., how open they are to doing business and working with external service providers, their track record of innovation ecosystem growth, level of market saturation)
- **Strategic capacity and ambition:** public-sector capacity to embrace and adopt innovation (e.g., how integrated local governance is across an entire city)

For each of these three themes, the City Typology Index uses performance, trend and strategy data to classify cities into one of seven types. This can help to:

- Identify cohorts of peers from which cities can learn
- Better characterise the specific needs and assets of cities
- Tailor urban innovation strategies

Figure 6

Example of a city profile, City Typology Index



- Identify cities with similar challenges and opportunities
- Better understand the opportunities and challenges of specific SDGs (e.g., health and well-being; industry, innovation and infrastructure; sustainable and resilient cities and communities)

Figure 6 shows an example of a city profile generated by the City Typology Index.

Connected Places Catapult has used the City Typology Index, in conjunction with other research, to support its collaboration with cities, providing deeper insights into the specific challenges cities face. For example, by combining the tool with insights from interviews, Connected Places Catapult and its city partners co- created 11 Net-Zero profiles in Latin America, which provide an accurate analysis of how cities have responded to climate issues in innovative ways. This work enabled the cities to identify potential global, high-impact solutions to address their challenges.

The Net-Zero profiles included insights into:

- The assets and systems a city has inherited
- The scope and ambition of the city's climate change and associated net-zero strategies
- The tools and powers they must leverage to undertake bold reforms and shift to net zero, and which sectors seem to offer the most scope for intervention
- The size, scale and mix of projects being mounted to progress to net zero and the extent and maturity of platforms to support action
- The maturity and dynamism of the net-zero innovation and investment environment

As shown in Spotlights 1 and 2, outcomes from diagnostic tools are matched to data and feedback from stakeholder engagement processes, shedding light on the gaps and opportunities cities face in terms of innovation, entrepreneurship and digital technology.

Box 4
SDG Cities diagnostic tool

The SDG Cities Global Initiative has developed a four-track process to accelerate the implementation of the SDGs in cities. At the forefront of this endeavour is the development of a digitised, cutting-edge diagnostic tools platform that can empower cities to assess their capacities. These diagnostic tools are designed to help cities build institutional capacity in critical areas, namely, governance, urban planning, own-source revenue and urban basic services, including mobility, waste, water and sanitation. The diagnostic tools assess the functionality of systems and the capacities of city and subnational institutions in areas critical to sustainable urban development. Relevant institutions and service providers in participating cities can access the diagnostic tools.

The online self-assessment platform helps cities identify strengths and weaknesses more efficiently, increase productivity while lowering costs and introduce data management practices to support more accurate forecasts and better decision-making. Each diagnostic tool has unique assessment questions to evaluate a city's progress on the SDGs, and the results can be used to address the identified gaps.

By increasing access and ease of use, digitisation offers cities a unique opportunity to bolster institutional capacities in governance, urban planning, innovation and revenue generation. By leveraging these tools, cities can identify areas for improvement, implement sustainable and innovative practices and create urban environments that are not only resilient, but also prosperous, inclusive and smart. As cities continue to grow and evolve, the insights gleaned from these tools will prove invaluable in shaping a smarter, more sustainable and equitable future.

Spotlight 1
UN-Habitat's City Scan Data Tool- statistical and spatial data collection in Mombasa, Kenya

The statistical data was gathered from official documents. Complementing this, spatial data was collected using Kobo Toolbox Surveys as part of the City Scan Data Tool developed by UN-Habitat. Swahili Pot, a youth-led group which was part of the Youth 2030 Cities initiative, were engaged in a participatory mapping training, where they were equipped with tablets and airtime, enabling them to map over 400 data points and 14,698 street sections.

The data analysis offered crucial insights into Mombasa's urban development, shedding light on development priorities and challenges and opportunities that the city faces. Importantly, the data helped identify areas of inequalities in terms of access to basic urban services. By understanding existing disparities, stakeholders can now engage in a strategic planning process, fostering local ownership and collaboration to accelerate the achievement of the SDGs. The initiative served to prioritise interventions and seek targeted partnerships and investments to address the identified gaps, ultimately working towards creating an inclusive, safe, resilient, and sustainable city. The use of participatory methods through the engagement with Swahili Pot assured that both the "Leave no one behind" principle, as well as ground-truthed and localised data, was realised. For Mombasa and its citizens, this exercise has been valuable in using data-driven approaches in achieving the SDGs and fostering positive change.

Spotlight 2
Innovating for Clean Air India

In partnership with Energy Systems Catapult and Satellite Applications Catapult, the CPC led a joint programme to support UK and Indian innovators in the city of Bengaluru to tackle poor air quality through best practice innovation and technology exchange. Funded by the UK Government's Newton Fund, the project supported the Government of India's efforts to accelerate the adoption of electric vehicles (EVs), as well as trialling and demonstrating other activities that have positive impacts on urban air quality.

CityEV has been established to design and manufacture the next generation of charge points that will address the challenges faced by infrastructure providers. Through the Clean Air Testbed, CityEV deployed their charge point into three pilot projects in India. CityEV worked with government and private partners, one of these being eee-taxi, an electric vehicle fleet with operations in Bengaluru.

Energeo create unique data for towns and cities by digitally studying the built environment using sources such as satellite imagery and LiDar - to automatically identify the most beneficial locations to deploy low-carbon technologies such as Solar PV, Heat Pumps and EV charge points. Through the Clean Air Testbed, Energeo worked in collaboration with the Karnataka State's 'Directorate of Urban Land Transport' {DULT) to deploy geospatially focused, data driven techniques to identify demand and the optimal position for on street and public EV charging infrastructure in areas of the state's capital city, Bengaluru.

EV Technology: aims to make the transition of vehicle fleets to electric as easy as possible. They support fleet providers by analysing and advising on everything from infrastructure requirements and installation, to managing and monitoring vehicles and eco-driving training. Through the Clean Air Testbed, EV Technology worked with eee-taxi to adapt their existing IoT platform to enable more efficient operation of their electric vehicle fleet.

GreenEnco provides strategic and risk management consulting services for renewable energy including technical and financial services across the complete solar PV project lifecycle and energy storage projects. Through the Clean Air Testbed, GreenEnco designed and installed an integrated solution of solar pv with battery storage and EV charging infrastructure at the Indian Institute of Science campus.

The project helped to identify Bengaluru's critical EV and air quality challenges. This resulted in a "Clean Air Testbed" that enabled the introduction and early adoption and deployment of new products in real-life environments. Through the testbed, a cohort of 17 high-potential UK and Indian SMEs to demonstrate their impact, develop their products and services and showcase their efficacy to prospective partners and customers. Because it improved the quality of life of residents, city council extended the pedestrianisation of the testbed site beyond the project timeline. The same approach could be tested in intermediary cities based on the urban challenges identified.

To foster partnerships with the private sector, cities should hold an open competition for small and growing enterprises with significant ambition and potential. Once submissions are received, an independent panel would create a longlist of enterprises, narrow it to a shortlist and then award the selected ones. Successful enterprises will have clearly demonstrated how innovative digital technology, including mobile, can support the delivery of urban services and have a clear understanding of the climate impact of their operations.

Phase 2: Innovation accelerator

In this phase, an innovation accelerator would prepare cities to be "innovation ready" by:

- **Upskilling cities through capacity-building workshops** in areas identified by the SDG Cities diagnostics tool and in public-private partnerships (PPPs), as well as validating opportunities to use the urban innovation and action profile and restructure institutional and procurement processes to find efficiencies.
- **Capacity building for observer cities** by hosting in-country workshops that provide guidance on analysing opportunities for innovation, aligning with the SDGs and their future outlook.
- **Benchmarking the testbed** to establish a foundation of strong enterprises within the ecosystem, including creating a baseline of existing impacts and efficiencies.
- **Establishing a testbed** and supporting the selected enterprises to demonstrate their solutions.

After this phase, cities will benefit from a set of bankable projects and concept notes that can be presented to potential partners and investors. In addition to capacity building for city authorities, cities will gain significant new insights into city data on innovation, digital technology and other areas of potential action and investment.

Phase 3: Investment ecosystem

Once enterprises have been selected and received rigorous technical and business support, the Co-designing Urban Futures initiative supports business models to scale. It does this by seeking follow-on funding and establishing a pipeline of investors willing to provide additional resources. This phase is crucial for local governments partners who provide invaluable inputs to the process. The enterprises and innovators selected through the innovation accelerator do not work in isolation. Rather, they adapt their solutions and tools to their city ecosystem in both the public and private realm. After Phase 3, when the solutions are ready for larger investment opportunities, there will be a clear path for these solutions to be adopted by local governments seeking to improve essential urban services and the quality of life of all urban residents.

Phase 3 involves:

- **Validating the impact** of the accelerator programme.
- **Creating opportunities to scale the solutions** with cities and incorporating tools from the innovators to create a systemic shift in how the local authority manages essential public services.
- **Organising a "deal room"** to give innovators the opportunity to pitch their solutions to investors and donors. The focus will be on scalability and how well the innovators have collaborated with a local government to ensure the solution fits within the city's existing service ecosystem.
- **Facilitating the creation of an innovation fund** to scale up the solutions.

Spotlight 3

Catalysing urban innovation through digital solutions

The GSMA Innovation Fund, part of the GSMA Mobile for Development (M4D) programme, seeks to support innovative digital solutions with a positive impact in LMICs. To date, the Fund has provided equity-free grants to more than 100 organisations to test and scale their business models. As of November 2022, the Fund has disbursed more than £23.5 million in grant funding and facilitated 89 partnerships with mobile network operators (MNOs), impacting more than 47 million people. Collectively, the organisations supported by the GSMA Innovation Fund raised £647.7 million in follow-on funding from commercial investors and other funders. Besides funding, the Fund also provides technical assistance to improve business offerings and outcomes and unlock capacity beyond the grant period.

In 2022, with support from the UK Foreign, Commonwealth & Development Office (FCDO), the GSMA aimed to catalyse investment in start-ups, small and medium enterprises (SMEs) and social enterprises working in Africa, South Asia and Southeast Asia that leverage digital technology to deliver digital urban services. The Innovation Fund covered four sectors: plastic and waste management, energy, sanitation and water. Successful organisations were awarded between £100,000 and £250,000 in grant funding, as well as support to develop partnerships with MNOs and technical assistance. The Fund received 335 applications from 43 countries across Africa, South Asia and Southeast Asia,[32] three-quarters of which came from Sub-Saharan African countries, with the highest concentration from West Africa.

The Fund consists of nine grantees that are building urban resilience through digital solutions:[33]

ATEC | Bangladesh | Pay-as-you-go e-cooking for low-income customers, with GSM tracking of climate impacts

Bhumijo | Bangladesh | Affordable sanitation through public toilets in Dhaka

Diyalo | Nepal | IoT-based digital solutions for water utilities

Freetown Waste Transformers | Sierra Leone | Organic waste collection and processing, producing energy (biogas) and fertiliser

JanaJal | India | Doorstep delivery of clean, affordable drinking water using digital tools

Koolboks | Nigeria | PAYG solar-powered refrigerators for commercial use by MSME traders

ReCircle | India | Aggregating and digitising the dry waste supply chains to track safe disposal or recycling

Regenize | South Africa | Household waste collection and recycling, organised and tracked through mobile

SOSO Care | Nigeria | Micromobile health insurance from household waste collection

32. Njoroge, B. and White, Z. (31 March 2022). "Application trends and highlights from the GSMA Innovation Fund for Digital Urban Services". *GSMA Mobile for Development Blog*
33. Njoroge, B. (12 April 2022). "Announcing the GSMA Innovation Fund for Digital Urban Services cohort". *GSMA Mobile for Development Blog*.

Spotlight 4

Climate Smart Cities Challenge

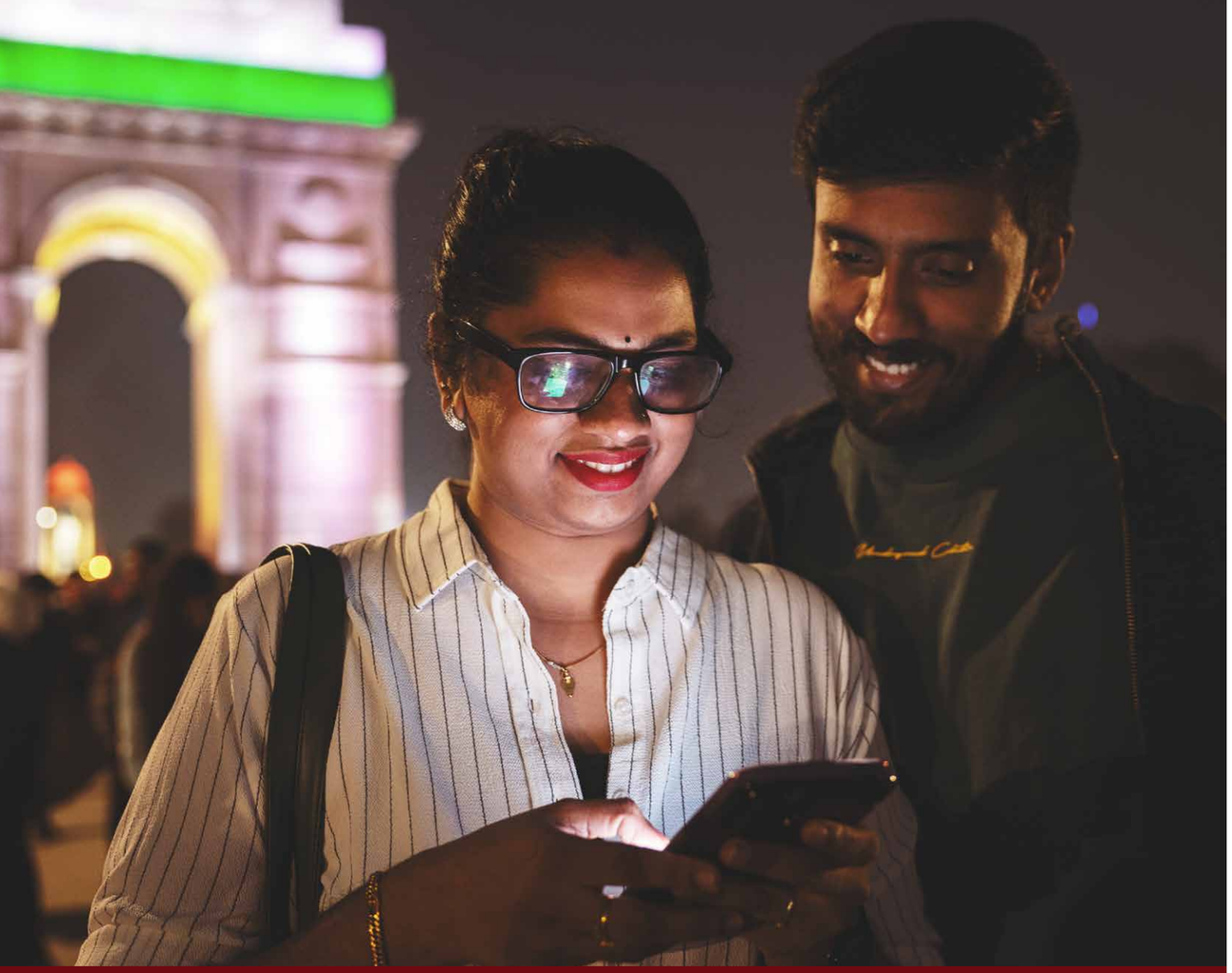
Since 2020, the Climate Smart Cities Challenge, a global initiative of UN-Habitat and Viable Cities, has offered people-centred, open-innovation and system-demonstration approaches to climate transition in cities. With existing pathways to 1.5 degrees Celsius increasingly inadequate, new and innovative approaches are needed to achieve the goals set out by the Paris Climate Agreement. Through the Climate Smart Cities Challenge, UN-Habitat and partners have mobilised a diverse and global network of cities and implementation partners to raise more than $300 million in climate-smart investments for transformative urban change.

This global initiative uses challenge-driven innovation to match cities with smart solutions that help them achieve their climate goals. A key element is innovation competitions that match a city's identified needs with concrete and innovative solutions from different sectors. This creates an incentive for innovators to come up with solutions to a city's challenges, helping them to innovate and identify climate-smart solutions that can be tested and implemented in different stages. These so-called "system demonstrators" help to develop a portfolio of connected innovations, targeting different aspects of a city's climate and sustainability challenges. The purpose is to achieve large-scale transformation through policy, regulation, technology, capacity and financing with the involvement of all actors and stakeholders.

The following are highlights from four cities that have participated in the Climate Smart Cities Challenge:

- **Bogotá, Colombia – Freight logistics:** Bogotá is combating traffic congestion and emissions with the Green Routes' (Artificial Intelligence of Things) AIoT platform, which aims to streamline freight mobility and reduce greenhouse gases and air pollutants.
- **Bristol, United Kingdom – Affordable, carbon-neutral homes:** Bristol plans to develop 24,000 affordable, zero-carbon homes by 2050, with Thriving Places using underutilised brownfield sites and a digital twin approach for fast-track housing development and systemic viability questions.
- **Curitiba, Brazil – Zero-carbon neighbourhoods:** Curitiba's Smart Neighborhoods is working towards a carbon-neutral city by 2050 through a decentralised model of urban public cleaning services performed by residents, an education programme for energy efficiency, smart waste and mobility points as well as a local composting programme.
- **Makindye Ssabagabo, Uganda – Affordable, net-zero homes:** In response to rapid population growth and housing challenges, Green Community Cities is developing sustainable, net-zero housing at the building and neighbourhood level, focusing on local community needs and scalability for broader impacts.





3 The impact of the Co-designing Urban Futures initiative

3.1 Conclusion

Cities are home to half the world's population and are still growing rapidly, particularly in LMICs.

Alongside rapid urbanisation, cities must also address widening inequalities in access to essential services and the multidimensional impacts of climate change.

Intermediary cities face tremendous fiscal constraints, account for a significant proportion of urban growth in LMICs and are often overlooked by national governments and donor initiatives. This makes it particularly challenging for cities to aadapt, plan, and innovate. To ensure urbanisation results in better development outcomes and greater productivity, intermediary cities need various forms of support, especially in driving access to affordable, reliable, safe and sustainable services, such as energy, water, sanitation, waste management and transport.

This report has outlined several areas critical to the provision of essential services in intermediary cities in LMICs. These include:

- **Governance:** Effective governance structures are essential for planning, implementing and managing urban services. These enable the coordination of various stakeholders responsible for delivering these services. Local governments that prioritise the integration of climate adaptation in urban planning, while also ensuring transparency and inclusivity in decision-making processes, will ultimately design infrastructure that can withstand the impacts of climate change.
- **Digital innovation:** Digital solutions such as remote sensing, IoT and big data are valuable tools for enhancing climate resilience and service delivery in cities. They enable efficient resource management, early warning systems for disasters and real-time monitoring of climate-related risks. Digital innovation also supports more evidence-based policy interventions, adaptive measures and effective allocations of scarce public resources that maximise development impact and respond to growing demands for essential services.
- **Financial capacity:** Cities require adequate financial resources to maintain and improve their infrastructure and to continue providing services to their residents. Investing in climate-resilient infrastructure requires significant funding and access to multiple funding sources, such as public budgets, international grants, private investments and innovative financing mechanisms, and ensures that urban services are sustainable.
- **Climate change:** Addressing climate change is essential to prevent the disruption of services which often leads to high costs incurred by cities following loss and damage. Strengthening urban resilience prepares cities and residents to anticipate and manage climate risks while also addressing some of the current challenges. Urban resilience efforts also cushion the low-income residents who are most vulnerable and are disproportionately affected by risks such as flooding and heat waves.

3.2 Looking ahead

As this report has demonstrated, supporting intermediary cities in LMICs to extend access to sustainable, affordable and reliable services is essential to meet global development and climate objectives.

Digital technology and innovative partnerships between the public and private sectors have already demonstrated how urban service provision can be improved across a variety of use cases and contexts. The challenge now lies in enabling these technologies and partnerships to replicate and scale to more cities, particularly intermediary cities.

The Co-designing Urban Futures initiative is seeking to collaborate with partner city governments, private sector innovators and start-ups as well as donors, to support cities in the sustainable adoption of innovative solutions to their challenges, and help urban managers take the first steps to build urban resilience and promote a green recovery in cities.

The initiative does this through a challenge-driven innovation model that develops novel city partnerships with many stakeholders and creates innovative, sustainable solutions that help cities adopt new and effective ways of solving urban challenges. In addition to making these innovative service solutions accessible to all, the initiative demonstrates how vital digital solutions and public-private collaboration are to closing the urban service gap and catalysing more investment in essential urban infrastructure and services.

For cities, the initiative aims to support their capacity for innovation and promote the adoption of innovative solutions to address urban challenges effectively. The initiative also aims to build local government capacity to engage SMEs and innovators and to support these innovators in their journey to scale by connecting them to suitable investment opportunities. It also supports cities in setting key priorities for innovation and partnerships in line with the SDG agenda.

As part of our preliminary activities in the challenge identification phase, we will conduct interviews and run surveys in partner cities in Africa and Asia. This will build a thorough understanding of partner cities' capacities around innovation and (digital) service delivery to achieve climate neutrality, in line with the SDGs and the New Urban Agenda. The findings will highlight key elements and processes for preparing city-level strategies and action plans, as well as Incorporating this into national urban and digitalisation policies.

The initiative also aims to identify innovators and start-ups working in intermediary cities across LMICs to provide access to sustainable urban services. The market potential for emerging technologies to advance deployment of digital utilities solutions and SDGs in LMICs is significant. There are several emerging technologies and digital innovations such as AI, IoT, and big data that will continue to shape opportunities for start-ups and the public sector working across the utilities ecosystem. We look forward to supporting innovators to work with governments and other key partners, such as MNOs, moving the partnerships forward and identifying business models that can support sustainable, long-term change. We also hope to unlock new funding models with a range of donors, funders, and investors who recognise that shared value creation and sustainability requires multi-stakeholder collaboration and partnerships.

As this report has highlighted, the Co-designing Urban Futures initiative builds on a vast body of research, engagement, and collaboration with cities around the world and aims to leverage these insights to help partner cities drive transformational changes in urban governance, service delivery and development outcomes.

We are looking forward to working with partners to bring this vision to reality and are excited to announce our future collaborations with partner cities.



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