

Industry Agenda

Inspiring Future Cities & Urban Services

Shaping the Future of Urban Development & Services Initiative

April 2016



Contents

3	Foreword
6	Executive Summary
9	1. The Future of Cities
9	1.1 It's an Urban World
10	1.2 Challenges Due to Urbanization
13	1.3 The Future of Cities
15	1.4 The Business of Running Cities: Urban Services
18	2. Enablers for Adopting New Models for Urban Services
18	2.1 Challenges
19	2.2 Enablers
26	3. Accelerating Public-Private Partnerships for Urban Services
26	3.1 The Need for Collaboration
27	3.2 Risks in Public-Private Partnerships
28	3.3 Addressing Risks (Government-Initiated Actions)
29	3.4 Addressing Risks (Private-Sector-Initiated Actions)
30	3.5 Attracting Private Players
34	4. Roadmap for Urban Transformation
34	4.1 Approaches
35	4.2 Call for Action: The 10-Step Action Plan
35	4.3 Conclusion
37	Annex
38	Endnotes
40	Acknowledgements

Foreword



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Throughout history, no country has ever achieved economic prosperity without urbanizing. On its surface, then, the urbanization trend dominating the 21st century should be good news - not only for the countries experiencing this growth, but the global economy. Upon closer analysis, however, we can see that current urbanization patterns are largely unsustainable -- socially, economically, and environmentally.

Cities, now home to 55 per cent of the global population, now account for 70 per cent of global GDP. But they also account for an increasing share of greenhouse gas emissions and widening levels of inequality. The current urbanization model that largely favours low-density arrangements and an over-reliance on industrialized forms of transport is contributing to pollution and sprawl, and diminishing economies of agglomeration. UN-Habitat's research shows that the absolute number of the world's slum population has actually been rising over the past 25 years, from 650 million in 1990 to nearly 1 billion today. In Africa, which has the highest rate of urbanization globally, 62 per cent of people live in slum conditions without access to clean water, sanitation, and other basic human services.

However, as this report rightly observes, although the pace of urbanization brings numerous challenges, it also presents a generational opportunity to re-define the social, economic and environmental fabric of our cities, as well as re-think the private sector's role in urban investment and service delivery. This report's emphasis on innovation, good governance, planning, and the efficient and equitable provision of urban services all are core to the work of UN-Habitat. But it is the discussion on the correlation between urban growth and transformation (p. 9) that most closely aligns with our vision of the future.

As the UN's specialized agency in sustainable urban development, UN-Habitat approaches urbanization not as a risk, but rather as a transformative source of prosperity and sustainable development of all human settlements. When thoughtfully arranged and managed, the process of urbanization itself can be a form of disruptive innovation that provides solutions to the most significant global challenges of our age – from poverty and inequality, to climate change and security.

For many cities, though, the pace of urbanization is overwhelming both national and local capacities to capitalize on the opportunities before them. The most common challenges include unplanned urban expansion, ineffectual governance and legal frameworks, and a dearth of local-level revenue generation mechanisms. Cities with the greatest infrastructure needs often lack the capacity and knowledge to develop bankable projects. This is exacerbated by limited access to credit and an insufficient ability to take advantage of endogenous sources of finance, which, for example, could be used to invest in core infrastructure such as water, drainage, and energy.

In response, UN-Habitat and the international community are initiating a set of strategies embodied in what we refer to as the New Urban Agenda (NUA), which is being prepared within the framework of the UN Conference on Housing and Sustainable Urban Development (Habitat III), taking place in Quito, Ecuador in October this year. The NUA offers a frame of five strategies centred on: (1) national urban policies; (2) urban governance and legislation; (3) urban planning and design; (4) financial designs of urban operations, and; (5) planned city extensions and planned city in-fills. All components act in concert to empower governments at all levels to adequately plan for, design, and manage sustainable urban expansion and growth.

Core to the NUA is the promotion of mixed used space, which combines residential, commercial, industrial, office, or other land-use, with adequate space reserved for public use. Mixed configurations contribute to urban productivity by making efficient use of a city's resources, which, in turn, drive economic growth (locally and nationally), ultimately contributing to improved living standards and prosperity. Mixed-use space also fosters local-level revenue generation, by adding value to public property and facilitating the establishment and sustainability of small and medium-sized businesses. This is especially important for small and informal sector enterprises, which dominate developing country economies.

The greatest opportunity to apply the NUA model is in countries where the form of a city is not yet 'locked in'. Globally, some 60 per cent of the area expected to be urban by 2030 remains to be built. The World Economic Forum estimates the corresponding infrastructure investment needed stands at USD 3.7 trillion per year until 2050. What is still not counted is the quantity of urban value that can be generated by such investments.

Public-private partnerships (PPPs) are a requirement for feasible solutions to address forthcoming urban demands. PPPs are an increasing source of finance for large-scale infrastructure projects across energy, transport and other sectors. But, clearly, the value generated should be far greater than the costs. Therefore, a system of value sharing is needed to address the investment needs.

Current project designs frequently overlook the basics of urban financing. In the end, few realize the value of new investments, with the public sector often left holding a long-term maintenance tab they can rarely afford. This is an example of the privatization of profits and the "publification" of expenses.

The NUA calls for a step-change in investment behavior and approaches to PPPs. Project designs must factor in the longer-term financial burden on municipal authorities, as well as opportunities for local-level revenue generation that positively impact on wealth and livelihoods, as well as poverty reduction.

For their part, the public sector must adopt legal frameworks that create a business-friendly environment by providing investors with a level of predictability in public policies and plans at both national and local levels. As seen in many developing countries, the financing provided by public sector and development banks is insufficient and must be paired by private finance. In this regard, new, flexible and innovative mechanisms for PPPs are urgently needed.

I congratulate WEF on pursuing this important topic, especially as we approach Habitat III. I invite all you to join us in Quito and take advantage of the opportunity to define the transformative role of our cities and secure a new vision of the urban environment for the 21st Century.



Executive Summary

Cities are growing at a rapid rate, with the global urban population set to increase by 2.5 billion by 2050. People continue to migrate to cities for better economic, social and creative opportunities. Growing cities are dense in terms of land use and, at the same time, are difficult to govern because of their diverse social and economic fabric. While cities battle issues such as climate change, social segregation and economic development, they increasingly have to do so with fewer resources as they face budgetary constraints and battle with suboptimal devolution of funds and functions. City administrations are using emerging business models and technologies to deliver services. The use of technology and changing ownership models have disrupted the way excess capacities within cities are efficiently utilized. However, technology is not a silver-bullet solution to urban problems. To holistically address such problems cities need to transform planning, governance and regulatory aspects.

This report aims to identify the key urban challenges, issues encountered when moving towards an urban transformation and the risks associated with public private partnership (PPPs) in urban development projects, which include:

- Key urban issues around the world, among them common ones such as climate change, economic development and regional issues, including urban planning (in Asia), migration and social segregation (in Europe), social inclusion (in North America), mobility (in South America), safety and security (in the Middle East and North Africa), and water (in Sub-Saharan Africa)
- Challenges inhibiting urban transformation, such as governance structures, budgetary constraints, talent, leadership and demographic changes
- Risks in PPPs, including industry and asset-specific regulation risks, as well as environmental, community, judicial and market/corruption risks

With a myriad of issues to deal with, the key questions that surface are:

- Which issues need to be addressed as a priority?
- How should reforms be undertaken?
- Who should be engaged to accelerate urban development?
- What approach should be taken to achieve urban rejuvenation and transformation?

The report acknowledges the diversity of cities based on size, stage of development, demographics, geographical location and governance framework. Moreover, rather than recommending a one-size-fits-all approach, it identifies a structured process in the “city maturity” model that cities around the world can use to accelerate urban development. The report also identifies new business models and emerging technologies that are transforming how services are delivered in cities. While introducing and further strengthening the use of technology, city administrations can employ the following enablers to improve service delivery and co-create infrastructure with participation from citizens, the private sector, non-governmental organizations (NGOs) and academic institutions:

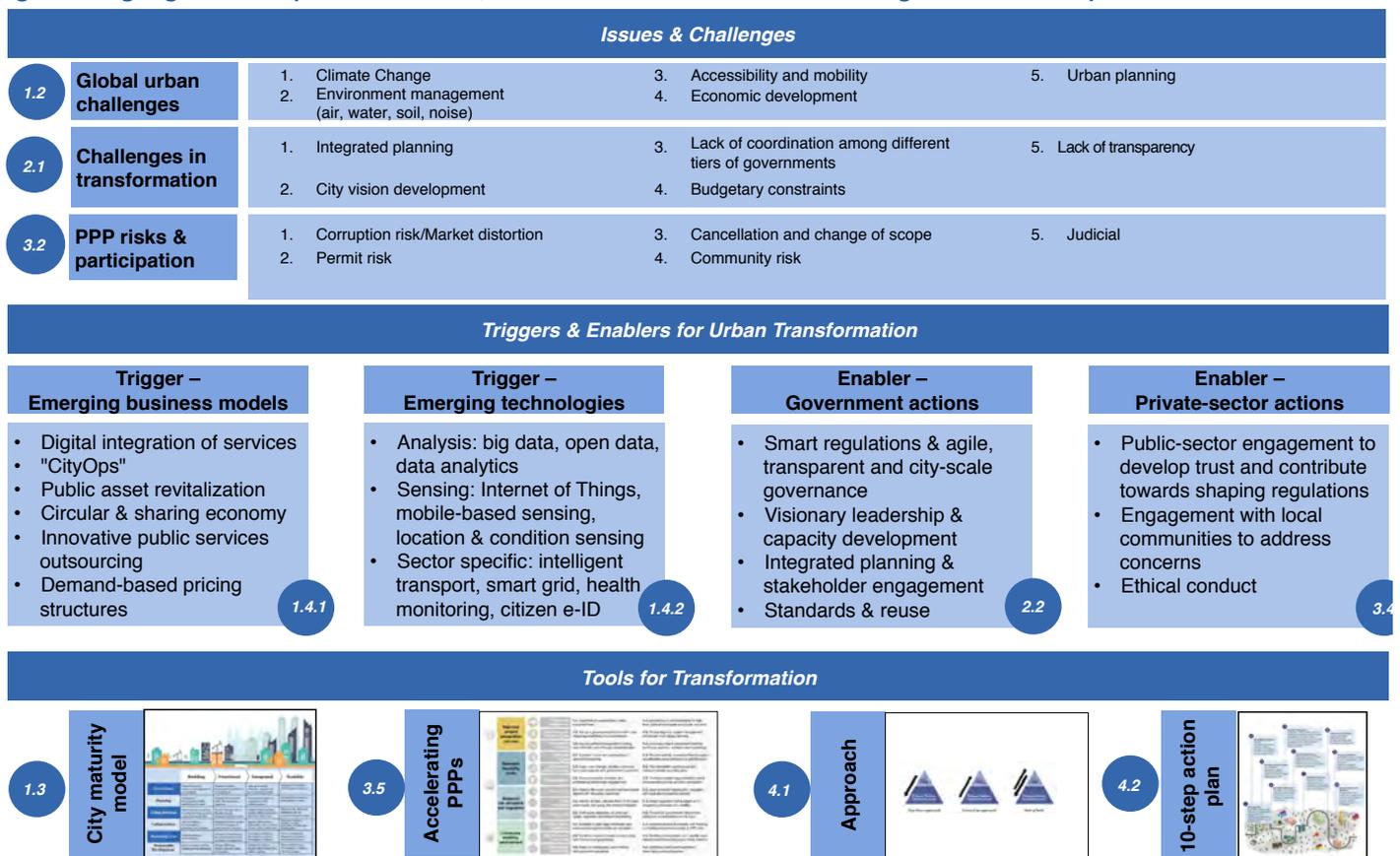
- **Smart regulations:** In a global, competitive landscape, cities first need to address the basics to create a thriving investment environment, and then formulate new regulations that aim to achieve sustainable outcomes. To do this, they must engage all stakeholders and update them on a timely basis by closing the feedback loop.
- **Agile, transparent and city-scale governments:** The difference in the boundaries of the *de-facto* city and *de-jure* city has led to multiple administrative entities at the city scale. The growing economic significance of cities has to be supplemented with adequate devolution of powers to local governments. City governments need to become agile and transparent to address both the rapid changes in urban systems and a lack of trust.
- **Development of institutional capacity:** Cities will need to invest in people by attracting and nurturing talent, and empower and equip organizations while they address urban challenges.
- **Visionary leadership:** City leaders will need to take well-informed risks while moving away from a default position of risk aversion to improve the quality of life delivered. They will need to adopt a pragmatic, business-friendly and can-do attitude to energize their organizations and external stakeholders.
- **Integrated planning:** City administrations need to achieve the right balance to allow for organic growth while adhering to master plans created by cross-functional teams. Long-term urban development plans also need to give due consideration to information and communications technology, as well as emerging business models, to ensure that excess capacities are exhausted prior to developing new infrastructure.
- **Reuse promoted through adoption of standards:** Cities need to adopt standards for using common language while engaging with external stakeholders, and to ensure the risks of vendor lock-in are adequately addressed while embedding technology with infrastructure.

City administrations will not be able to address the increasing demands, changing demographics and ageing infrastructure on their own, and will need support from the private sector throughout the urban development value chain. While city administrations would need to lead such phases as policy-making, planning and monitoring, the private sector may play a significant role in others, including design, implementation, operation and maintenance, and financing. Both government and the private sector will have to address key risks in PPPs to enhance mutual trust and obtain a community’s buy-in. Government can create an enabling context for the private sector to participate by ensuring a stable regulatory environment and efficient administration, and by creating a reliable dispute resolution mechanism. The private sector, on the other hand, can build trust by engaging with the public sector and local communities, and by conducting itself ethically.

Finally, a 10-step action plan is provided to help city authorities navigate the journey of urban transformation. The journey begins with cities identifying their DNA – their distinctive, key characteristics – and singling out the important challenges that need to be addressed to meet the needs of all stakeholders. Cities then need to develop a shared vision by engaging citizens, the private sector, NGOs and academic institutions. Once the shared vision and key performance indicators (KPIs) are established, cities will then need to prioritize goals to meet the KPIs. The programme development, regulatory changes, selection of standards, financing and creation of funding mechanisms need to take place based on the cities' vision. Success will be driven by learning from other cities and experimenting to target quick wins with tangible outcomes that can build confidence among stakeholders.

Report Structure

Figure 1 highlights the report's structure, and indicates the section covering each of the topics in detail.



Source: World Economic Forum, Shaping the Future of Urban Development & Services Initiative & PwC research



1. The Future of Cities

1.1 It's an Urban World

Cities will witness an inflow of 2.5 billion new urban dwellers by 2050, more than the current combined population of India and China.

From the late 18th century, the growth of modern industry triggered massive urbanization and paved the way for new, great cities – first in Europe, then in other regions – as new opportunities brought huge numbers of migrants from rural communities into urban areas. In 1900, just 13% of people lived in cities; by 1950, the proportion rose to 29%.

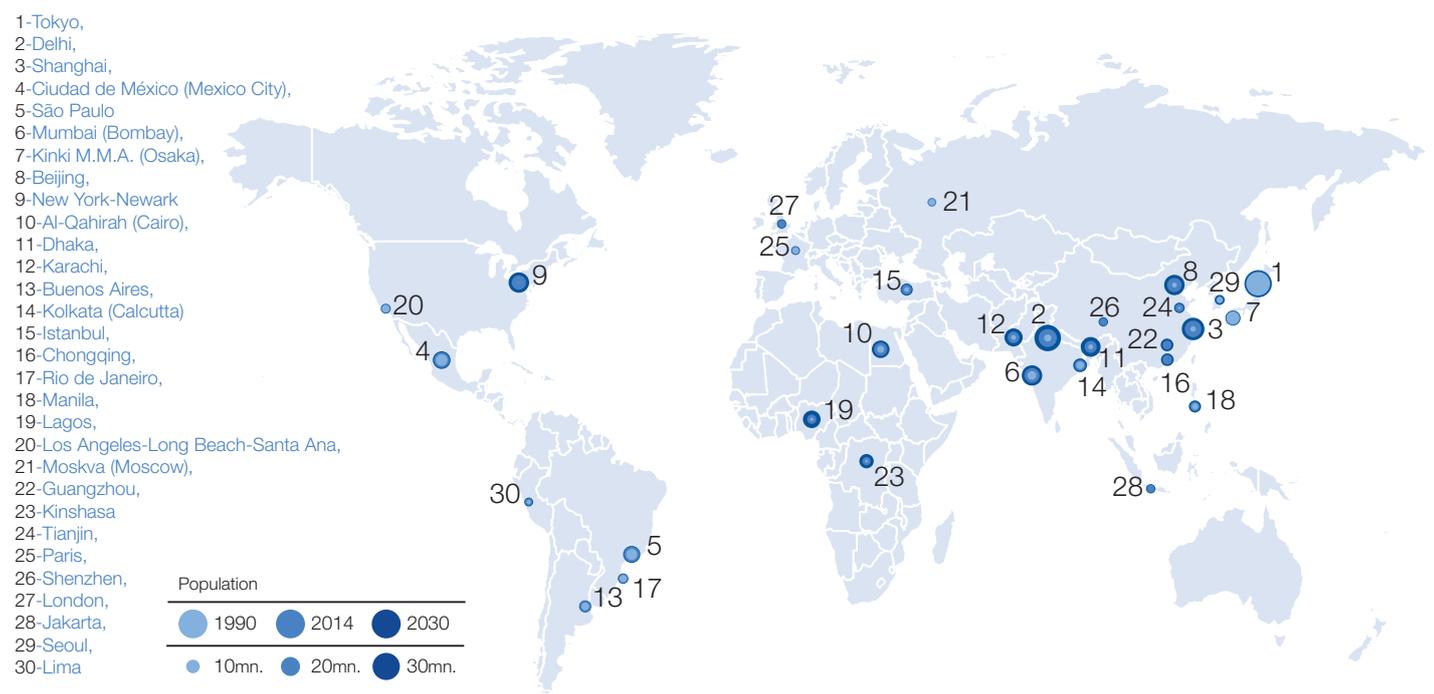
The share of the world's population living in urban areas is expected to increase to 66% by 2050, adding 2.5 billion people to the urban population, with about 90% of the increase concentrated in Asia and Africa. This geographic concentration is already reflected by the world's most populated urban agglomerations as of 2014 (Figure 2). Living in cities allows individuals and families to take advantage of opportunities arising from proximity, diversity and marketplace competition. The number of megacities has nearly tripled since 1990; and, by 2030, 41 urban agglomerations are projected to have populations of at least 10 million each.¹

Cities are growing at a rapid rate, and with increasing urban populations they need to be built faster and more effectively. Growing cities are not only dense in terms of land use, but their diverse social and economic fabric makes them challenging to govern. Unlike nation states, the *de-jure* and *de-facto* boundaries of cities are different. The boundaries where a functional (or economic) city begins and ends are difficult to define, often creating friction between the administrative entities that govern it.

While cities have provided economic opportunities to migrants, they have also faced increased social segregation and acute shortages of physical and social infrastructure. Cities today must:

- Plan for a sustainable and resilient future
- Balance economic and social development, as well as environmental protection
- Design solutions adapted to their local contexts, and enhance their character

Figure 2: Global Footprint – The 30 Most Populated Urban Agglomerations (as of 2014)



Source: Data from United Nations, Department of Economic and Social Affairs, Population Division. "World Urbanization Prospects, the 2014 Revision", Highlights, 2014



Hung Chung Chih / Shutterstock.com

1.2 Challenges Due to Urbanization

The environment, climate change and economic development emerge as common challenges around the globe.

Cities around the world are confronted with many problems, such as traffic congestion, inadequate energy, lack of basic services, informal dwellings, poor management of natural hazards, crime, environmental degradation, climate change, poor governance, urban poverty, informal economy and unplanned development. Often city administrators have little control over population growth. Hence, some of the major challenges are effectively monitoring the change in population and being able to respond through planning and infrastructure development (Figure 3).

Environmental management and economic development have emerged from a myriad of problems as common ones around the world. Increasing climate variability and extreme weather events are expected to severely affect cities, with floods and droughts predicted to grow in both magnitude and frequency. In urban areas, heat stress, extreme precipitation, inland and coastal flooding, drought and water scarcity pose risks that are amplified for those lacking essential infrastructure and services.

The economic recovery after the financial crises of 2008 has been slow, with various regions around the globe experiencing localized crises. While cities continue to drive economic growth, the business environment for investment in urban infrastructure and services remains challenging. Although both the environment and economy have consistently appeared among top regional challenges in the World Economic Forum's Global Survey on Urban Services², the survey's participants expect greater transformation in the environment than in the economy (Figure 4).

Figure 4 maps urban challenges against the extent of perceived transformation. While a correlation exists globally between the significance of urban challenges and the perceived transformation, some urban domains, such as "economy" and "institution", do not show a perception of transformation commensurate with the extent of challenge (with lesser transformation expected).

The respondents believe that, over the next five years, maximum transformation will take place in developing economies across urban domains such as urban planning, infrastructure (buildings, waste, water, power and energy) and social services (health, safety and inclusion), whereas in developed economies, maximum transformation is anticipated in the environmental domain.

City administrations will need to give special attention to urban domains such as culture and leisure, e-government services and institutional set-up, as survey respondents do not perceive a great extent of transformation. Urban domains traditionally under the public sector will require further investment to create a fulfilling experience for urban residents. Administrators will have to respond quickly to modify policies and gain a competitive edge in a global world where cities are competing for investment by offering enhanced infrastructure and providing incentives. Even with a growing urban population, talent continues to remain an issue in the developing world, and cities will need to nurture local talent to remain competitive worldwide.

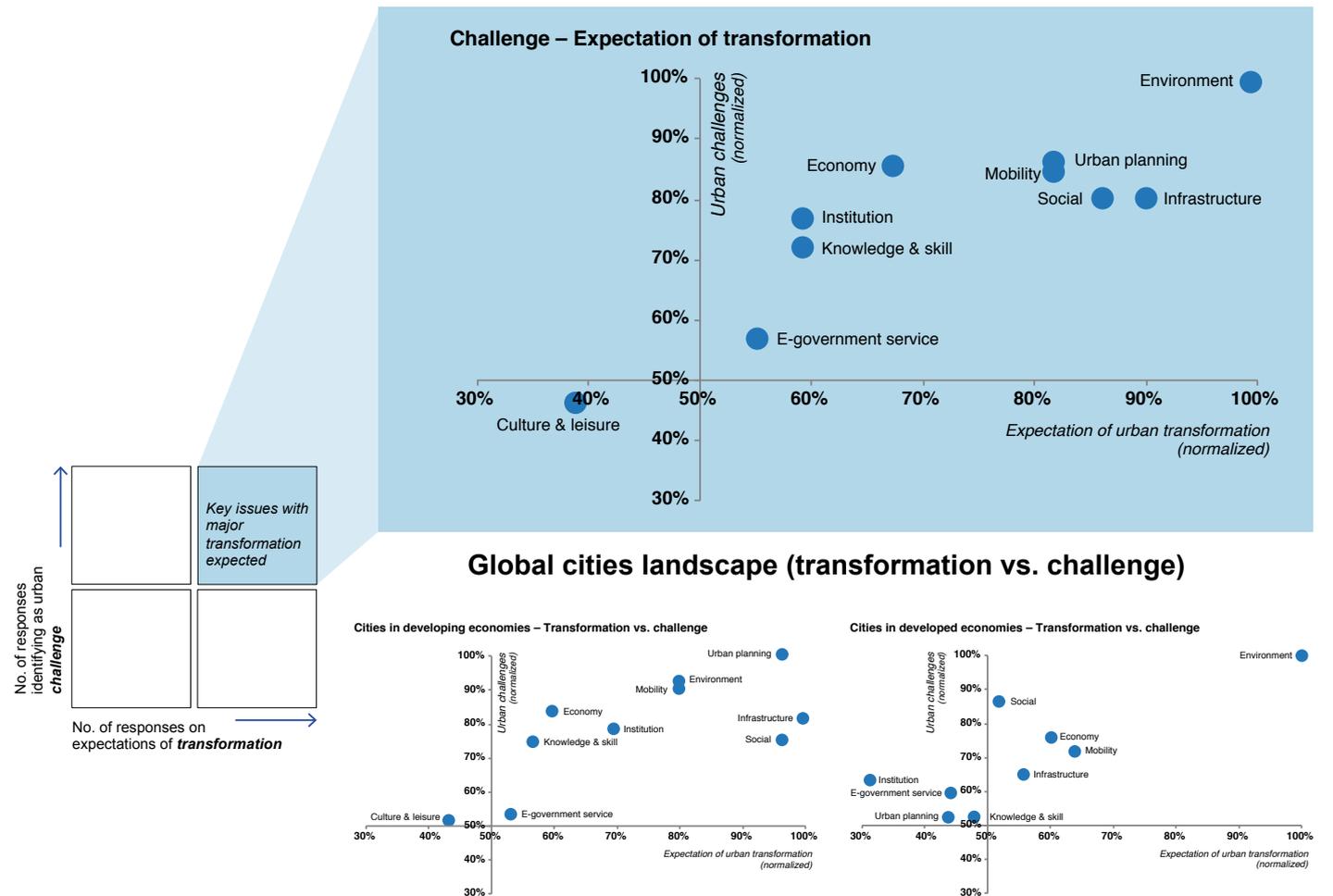
City administrations alone cannot address the challenges posed by rapid urbanization, and are increasingly relying on citizens, the private sector, NGOs and academic institutions to provide complementary skills and resources.

Figure 3: Regional Urban Challenges



Source: World Economic Forum, Shaping the Future of Urban Development & Services Initiative, Global Survey on Urban Services (Oct.-Dec. 2015)

Figure 4: The Expectation of Urban Transformation across Domains



Source: World Economic Forum, Shaping the Future of Urban Development & Services Initiative, Global Survey on Urban Services (Oct.-Dec. 2015)

1.2.1 Urban Stakeholders and the Implications of Urbanization

Governments, businesses, citizens and civil society will need to work in synergy to address urban challenges.

As urban demands and complexity of infrastructure and services grow, the resources required to tackle them (e.g. knowledge, finance, legitimacy) are increasingly spread across many different stakeholders. In such a scenario, partnerships and “co-production” have increasing relevance. While good partnerships bring additional capabilities, they take time and effort to mature. Trust, mutual understanding and experimentation make them function.

- *Global citizens* are seeking enhanced interaction and multi-layered experiences, with technology the key enabler of cultural exchange and engagement. Citizens are emphasizing access over ownership, and are particularly attuned to sustainability issues, expecting goods and services to be produced and delivered responsibly. Government agencies can capitalize on the increased awareness and accessibility of urban residents to elicit a higher level of engagement and community participation, to facilitate co-creation and to reduce the community risks in urban development initiatives.
- *Businesses* are fostering a global collaborative mindset. They are forging new bonds within both the working and social environments to understand the urban system and create products and services relevant to urban residents. Preferring digital channels, entrepreneurs are changing how excess capacities are utilized in an urban context. City leaders can unleash the dormant capacity within urban areas while engaging with businesses, and make the city adapt quickly in order to address migration and demographic changes.

- *Multilateral organizations and donor agencies* have crucial roles as urbanization advances at a rapid pace. Achieving the sustainable development goals will require inclusive partnerships that provide collective, cross-border solutions for eradicating poverty, stimulating economic progress and environmental sustainability, and developing inclusive societies.
- *Public policy* typically lags behind urbanization. As a result, basic services are often inadequate for the migrant population and urban poor; moreover, the latter often don't have a say in the urban planning process. *NGOs* are beginning to find a niche for themselves by facilitating conversations that haven't occurred. Thus, they help the urban poor to articulate their concerns to people in power and thereby encourage equitable development.
- *The shifting urban economic landscape* is creating new challenges for city leaders and national governments around the globe. In developed countries, large cities looking to sustain growth need to forge close commercial links with the emerging market economies that are reshaping the urban world. To ensure strong national and regional growth, regional and national government agencies will have to work along with cities on economic development, housing and social policies. National governments are likely to recognize the growing power of cities as they play a crucial role in shaping foreign relations and economic policies.

Each city's distinctive character develops over years through interaction among stakeholders over formal and informal communication channels. However, the key ingredients for a thriving city remain the same: cities fundamentally create better economic opportunity that brings people together from different walks of life. These people add value to cities' economic, social and infrastructural dimensions. The following sections explore important characteristics of future cities – characteristics that are being driven by innovations.





1.3 The Future of Cities

To attract talent and investment, cities will need to be sustainable, citizen centric, economically vibrant, accessible, resilient, well governed and responsive.

In the distant future, urban infrastructure and services will be a function of the way technology and, more importantly, business models evolve. However, future cities are expected to exhibit the following characteristics:

- **Sustainable:** Such a city demonstrates balanced accomplishment of social and economic development, environmental management and effective urban governance.
- **Citizen centric:** The focus in this city is on the physical, mental and social well-being of individuals and society, encompassing many factors (life satisfaction, physical health, psychological state, level of independence, education, wealth, religious beliefs, local services and infrastructure, employment, social relationships and cultural perspectives, among others).
- **Economically vibrant:** Such a city attracts investments, facilitates business, nurtures indispensable assets (its well-educated people), improves productivity, promotes growth and expands opportunities for all stakeholders.
- **Accessible:** All sections of society in an accessible city can live independently and participate fully in all aspects of life. This city ensures that people with special abilities and the vulnerable section of society have equal access to all services provided.
- **Resilient:** Such a city enhances the capacity of individuals, communities, institutions, businesses and systems to survive and adapt while they experience chronic stress and acute shock across health, the economy, infrastructure and environment.

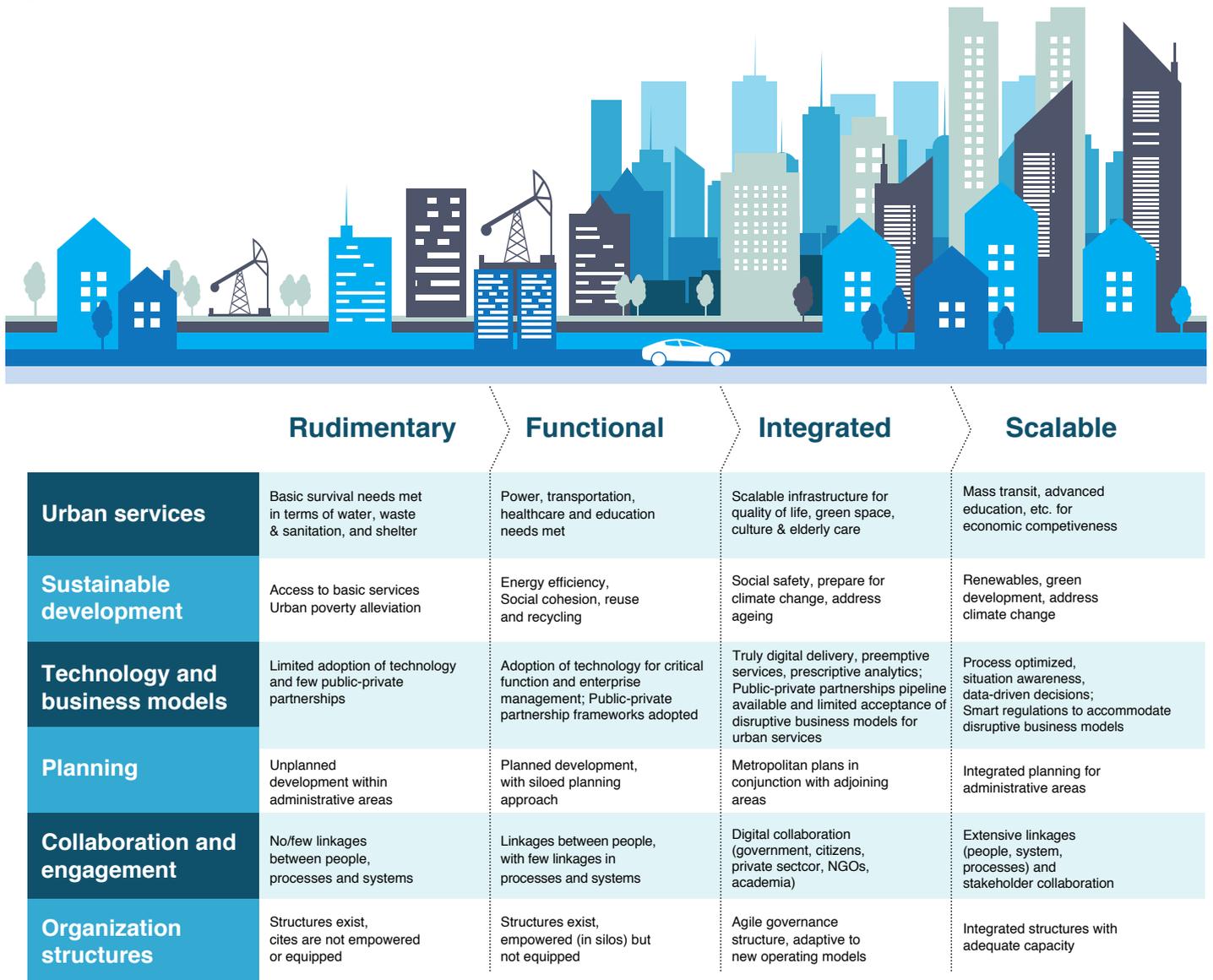
- **Well governed:** This city optimally utilizes resources to effectively realize the short- and long-term agenda of its development, while achieving greater transparency in public decision-making and establishing institutional accountability.
- **Responsive:** To consume its available resources in the best way possible, such a city enables all stakeholders to use data collected by digital infrastructure to spot patterns, identify problems and make real-time decisions.
- **Planned:** This city strengthens its local economy by creating a master plan that integrates all urban domains, and offers enough flexibility to make amendments to the plan when external conditions change or when innovative solutions emerge.

Cities would move through stages of development (Figure 5) in the journey to attain or strengthen these characteristics, particularly the six key levers of governance, planning, urban services, collaboration, technology use and sustainable development. These stages are described as:

- **Rudimentary:** battling to meet demand and supply
- **Functional:** meeting residents' essential needs and starting to adopt modern solutions
- **Integrated:** meeting the aspirational needs of all stakeholders and adopting a holistic approach towards urban development
- **Scalable:** being ready for new challenges that emerge on the horizon and adapting quickly to address these changing scenarios

Cities can use the six levers in this “city maturity” model to navigate through the stages. Moreover, by using the technology lever or a combination of them, they may be able to leapfrog stages. Again, the use of levers will need to be adapted to the cities’ distinctive contexts in order to strengthen their DNA while navigating through the stages of development.

Figure 5: Stages of Urban Development



Source: World Economic Forum, Shaping the Future of Urban Development & Services Initiative & PwC research

Gazing into the crystal ball: What does the future hold for cities and urban dwellers?

Over the past couple of decades, urban service delivery has changed because of technology, with cities now providing urban services on demand and independent of where their residents are located. Disruption in technology and business models will help to further improve the provision of services and the use of infrastructure. Such innovation is a great opportunity for cities in both developing and developed countries to leapfrog stages of maturity and mode – from a “rudimentary” or “functional” city to an “integrated” or “scalable” one. At the same time, city administrators and urban residents must not look at technology as a panacea for all their problems; a myriad of reforms across the areas of governance, regulation, institutional capacity and public-private collaboration will be required in the drive to improve delivery of urban services. Cities as presently conceived are unsustainable, but cities are also the key to sustainability. A combination of strong leadership, new technologies and bottom-up innovation can propel cities towards urban transformation and achieve more with less in an environment where resource constraints are increasing.

1.4 The Business of Running Cities: Urban Services

The “business of running cities” is complex, covering a wide range of domains such as mobility, infrastructure (buildings, energy, water, waste management), social services (health, safety, security, welfare), the environment (ecological preservation, resource management), knowledge and skills (education, skill development), and culture (culture and leisure facilities, public spaces, tourism). It also involves a large number of stakeholders in the planning and administrative process, including national, regional and local governments, and a number of beneficiaries and partners, such as citizens, the private sector and NGOs. City planning and administration have changed significantly in the last decade with the rise of technology; disruptive business models and technological solutions can enable the sharing of data across domains and help cities build situational awareness.



1.4.1 New Business Models

Cities will need to adopt new business models and technology to transform themselves and continuously improve.

A new trend emerging in the business of running cities, with technology as an important component, is the innovative business models that are disrupting the way urban services are delivered.³ How urban infrastructure and services are being managed has attracted increased private-sector and entrepreneurial interest. Cities are constrained by both budgets and capacity to offer services over digital channels. The private sector is enabling cities to adapt faster, using its innovation and agility through the following models:

- **Digital “integrated city” services:** In several cities developed over decades, the physical integration of infrastructural components is difficult; however, digital integration is possible. Digitally integrated infrastructure components, such as water, storm water, sewage, power, waste management and roads, not only bring economies of scale, but also enhance service delivery for citizens, who now get a one-stop shop to meet all their needs.

Example: Barcelona’s mWallet programme intends to develop a new information technology (IT) application and smart services for virtual payments through smart phones, or “mSmart City”, aiming to integrate urban services through a single-channel technology interface.⁴

Example: Kalundborg, Denmark, has integrated waste recycling into the local industrial system. The city integrates energy management across power, water, heating, transport and building systems through an open, intelligent platform. Any generator or aggregator can use the platform to offer demand response capacity to grid operators looking to manage fluctuations in power

supply or reduce the need for network reinforcement. Similarly, Aarhus, Denmark, has transformed a wastewater plant into a combined heat and power plant, converting the conventionally energy-consuming facility into an energy-generating facility.^{4a}

- **“CityOps” (city operations) as a service:** The digital solutions driving improvements in physical efficiency are increasingly available “as a service”, thus transferring upfront capital investment into operational expenses. This enables city administrators to take more risks and implement solutions rapidly.
Example: Norfolk County Council (UK) was facing budgetary constraints, with its IT budget consumed by existing service. It used a cloud-based model to transform municipal service delivery and achieve an overall saving of \$10 million. The solution introduced technologies, such as big data and the cloud, to transform how internal departments collaborate.⁵
- **Public asset revitalization:** Cities are converting “dead assets” that consume resources, such as light poles, into assets that can attract substantial revenue through value-added services, such as sensing ambient conditions for air quality, weather and parking spots. Such services, coupled with digital advertising platforms, are enabling cities to capitalize on unused capacity while adopting more economically and environmentally sustainable means of providing the original functions.
Example: The Array of Things is an urban sensing project in Chicago (USA) where a network of interactive, modular sensor boxes will be installed on streetlights to collect real-time data on the city’s environment and infrastructure (parking spaces). The switch to LED technology provides an opportunity to turn streetlights from a “dead asset” into a “live” one.⁶
- **The circular and sharing economy:** Traditional consumption patterns follow the “take-make-dispose” economic model, which leads to intensive use of

materials and energy.⁷ Moving towards a circular economy will help to reduce the use of resources and cut emissions. Many city residents are reducing wasted capacity when commuting by using websites to carpool, or even giving up car ownership altogether in favour of web-facilitated car-sharing clubs. Opportunities exist to expand the sharing principle to providing physical, social and recreational infrastructure.

Example: Peerby, a service started in the Netherlands, lets users share seldom-used goods and tools through a neighbourhood peer-to-peer borrowing service.⁸ Zipcar, another case, allows commuters to rent a car for hours or days on the go through a web and app-enabled booking service.⁹

Example: In South Korea, Seoul's metropolitan government has announced a new initiative, Sharing City Seoul. The government sees "sharing city" as a new alternative for social reform that can simultaneously resolve many of the city's economic, social and environmental issues. It would create new business opportunities, recover trust-based relationships and minimize wastage of resources. Sharing allows the community to gain more benefits with fewer resources, since it enhances their usefulness.¹⁰

- **Innovative public services outsourcing:** Cities already have the economic rationale and technological ability to outsource management processes, enabled through the Internet of Things (IoT), data analytics and visualization technologies. This is similar to the private sector's leveraging of information, communications technology (ICT) and skilled labour over the last decades. Cities are moving operations and functions to places where work can be done more efficiently. Outsourcing is further backed by outcome-based contracts and service-level agreements rather than by traditional methods of procuring goods and services. As a result, the private sector has become an equal partner in achieving the necessary social and economic outcomes.

Example: In the United Kingdom, London's leading bus operator, Arriva London, has a long-term outsourcing contract for management of core bus operations such as crew scheduling, operational staffing, on-bus revenue accounting, performance monitoring and mileage planning.¹¹

- **Pricing structures for peak load distribution:** Designed to meet peak demand, urban infrastructure often remains idle when demand is off peak. Congestion charging, and dynamic pricing based on demand and consumption patterns, can average out the peaks, thereby reducing the need to develop additional infrastructure while the average demand grows. Cities are looking increasingly to optimize their existing resources and use the excess capacities while they battle with budgetary constraints to fund capital projects.

Example: In Israel, the fast lane project in Tel Aviv uses dynamic tolling (where the charges are determined in real time); as lane usage increases, toll prices increase as well. Carpooling is encouraged by waving the toll for vehicles with three or more passengers, and part of the revenue from the collected toll finances a free commuter bus.¹²

- **City advisory:** Some cities are better than others at, for example, urban planning, mobility planning and programme management. Some may want to emulate how others have tackled a particular issue. Cities

typically are willing to share their best practices, and, while most are already freely sharing ideas with others, some are starting to sell their best practices to other local governments.

Example: Local Government Denmark has been active in projects across Asia, Africa and Latin America, offering services such as decentralization strategies, local government finance, support to local government associations, intermunicipal cooperation and public participation.¹³



Madrid: Improving Private-Sector Provisioned Urban Services with Technology Platform

Madrid has been a torch-bearer in using public-private partnerships for provisioning key urban services such as water supply, waste management, transport, street lighting and tree maintenance. While depending on the private sector for urban service delivery, contract governance and performance management is crucial, the city administration also has to ensure that standards set for key performance indicators are met repeatedly.

An integrated view of all urban services is required to effectively manage private provisioning of services. The City of Madrid implemented an intelligent technology platform called as MiNT (Madrid Intelligence) that allows for management of service providers and communication with citizens. A key feature of the solution is a mechanism where citizens can provide immediate feedback about a service or event in the city with their location details. The platform integrates data from citizens with data captured through sensors, cameras and IoT (Internet of Things) devices to generate a comprehensive view of city services.

The platform is built on a database of more than 5 million city assets and provides a real-time city view, enabling better responses to service requirements. The platform provides a mechanism to measure and analyse more than 300 performance indicators across urban domains and incentivizes service providers through better compensation for higher quality of delivery. This contributes to improved quality of life in the city as private agencies responsible for management make their best effort to improve service benchmarks for better compensation.

Datasets created on account of city functions hold immense value and can be used to constantly analyse and improve city operations across all domains. The case study highlights the benefits of progressive technology in enhancing urban services, and that transferability is high for cities that have a mature urban services system and data available on core infrastructure and services.

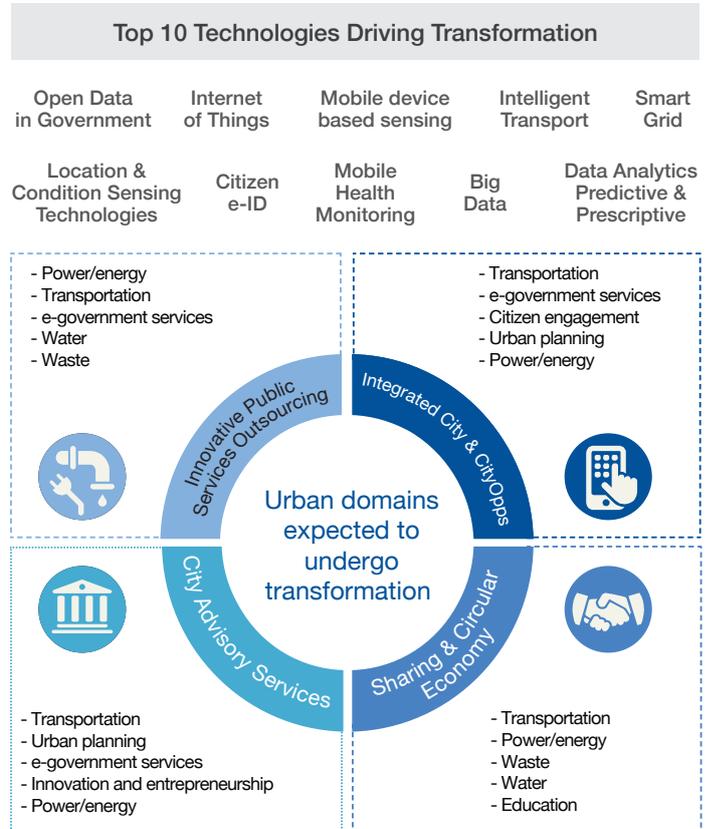
(This case study was provided by IBM Corporation)



1.4.2 Technologies Driving Urban Transformation

Technology has been one of the drivers of transformation (Figure 6) and is likewise driving the emergence of the new urban services paradigm.

Figure 6: Top 10 Technologies Driving Transformation



Source: World Economic Forum, Shaping the Future of Urban Development & Services Initiative, Global Survey on Urban Services (Oct.-Dec. 2015)

While the use of technology varies across developing and developed countries, city administrators are increasingly looking at the following technologies to identify solutions to their urban challenges (Table 1):

Table 1: Technologies and Innovations for Solving Key Urban Challenges

Sensors (for improving situational awareness)	
<i>Internet of Things</i>	Deployed sensors (hooked on the internet) and advanced computing are making the physical assets of the utilities network more intelligent and driving responses based on the ambient conditions. The IoT is finding use across asset performance, maintenance and visibility, as well as through fleet operations and customer metering, thereby impacting the entire chain of utilities. For example, in Queensland (Australia), Unitywater cut its direct water losses by 1 billion litres in one year, saving \$1.9 million; it reduced the time required to detect and resolve network events by two-thirds, and increased availability by almost 20%. ¹⁴
<i>Mobile-based sensing</i>	Citizens Connect is a mobile application developed at the Boston (USA) Mayor’s Office of New Urban Mechanics (MONUM) that allows residents to report public issues directly from their smartphones into the city’s work-order management system. Those issues go immediately to the right person in City Hall to fix the problem. This application has been adopted by many other cities throughout the state of Massachusetts and across the United States. ¹⁵
<i>Location & condition sensing</i>	Japan has deployed a solution that gathers information on disasters from sources such as surveillance cameras, water-level gauges, rain gauges and seismometers, and processes the data at a command centre. If analysis suggests that evaluation is required, multiple agencies (police, fire brigade, army and hospitals) are informed, using various communication channels to save people’s lives. ¹⁶ Street Bump, a project of Boston’s MONUM, helps residents improve their neighbourhood streets. Volunteers use the Street Bump mobile app to collect road condition data while they drive. Boston aggregates the data across users to provide the city with real-time information for fixing short-term problems and planning long-term investments. ¹⁷
Data (for improving decision-making)	
<i>Big data</i>	The city of Auckland (New Zealand) uses big data – from business transactions, video streams and sensor data to social media feeds such as tweets – to manage its transport system on a day-to-day basis. The big data solution operates on real time on tens of thousands of video streams to detect a range of information, including number plates, vehicle demographic analysis and intelligent scene analysis for many moving vehicles. All of this is integrated with multiple, disparate physical security, building and traffic management control and monitoring functions. Government organizations can thus make instant conceptual and contextual associations between disparate pieces of data and are able to respond in the most efficient way possible. ¹⁸
<i>Data analytics</i>	Utilities have begun applying differential rates based on in-depth consumer analysis, consumption patterns of users and efficiency levels of the network. The consumption data also allows users to monitor rates and save money by shifting use away from times when utility rates are high. Consumption analytics are supporting the distributor to determine the right user charges for normalizing peak loads.
<i>Open data</i>	Dublin (Ireland) intends to increase transparency and create opportunities to attract transnational companies and local businesses interested in urban technology through its Dublinked initiative. Dublinked is managed by a partnership of four city councils in Dublin’s region, a university and a major technology provider, which has recently opened a “smart city R&D centre” with 200 jobs in the city. ¹⁹
Sector-specific	
<i>Intelligent transport</i>	Intelligent transportation systems (ITS) enable various users to be better informed and make safer, more coordinated and “smarter” use of transport networks. The systems include stand-alone applications such as traffic management systems, information and warning systems installed in individual vehicles, and cooperative ITS (C-ITS) applications involving vehicle-to-infrastructure and vehicle-to-vehicle communications. Countries including Australia have developed a framework and endorse the use of ITS in all their states, cities and towns. ²⁰ Singapore has developed an Electronic Road Pricing System, which charges motorists based on usage of roads during peak hours. The system optimizes road usage with differential pricing based on local traffic conditions, prompting motorists to change their mode of transport, travel route and time of travel. The system not only makes the best of available capacity, but also has a greater social benefit by reducing the loss of productive hours, environmental pollution, fuel consumption and adverse health effects. ²¹
<i>Smart grid</i>	The city of Chattanooga (USA) has provided its community with the latest technology-enabled, fibre optic smart-grid energy network, a more secure, affordable and efficient power supply for homes and businesses throughout the city. Beyond energy security, the overall impacts were a reduction in energy consumption and cost-saving benefits from reduced usage and demand-sensitive pricing. Over 20 large industries have signed up to “time-of-use” tariffs that will save those businesses \$2.3 million collectively a year. ²²
<i>Citizen e-ID</i>	Belgium’s Flemish region has implemented Maximum Data Sharing Between Administrations and Agencies, a platform that enables once-only data collection. Citizens log on to the Flemish e-government services using electronic ID cards that automatically transfer data to the concerned state registry. ²³
<i>Mobile health monitoring</i>	3G-enabled monitoring devices are being used in Japan to measure blood pressure. The solution was primarily employed in temporary houses in the area impacted by the country’s 2011 earthquake. The wireless monitoring system helped to ensure patients’ health and safety, manage and control lifestyle-related diseases such as hypertension, and enhance cooperation with local communities. ²⁴

Source: World Economic Forum, Shaping the Future of Urban Development & Services Initiative, Global Survey on Urban Services (Oct.-Dec. 2015)



Chattanooga: Increasing Resilience by Implementing Smart Grid

Chattanooga is one of those cities that has often faced economic adversity, yet has managed to bring forth its potential through the efficient use of its natural resources, technology and infrastructure. After the global economic recession, Chattanooga needed funds to reinvigorate its economy to attract new businesses and provide the right incentives and tools for the businesses to thrive. These funds were made available through the national 2009 Recovery Act to revitalize its economies in the wake of the global recession.

Chattanooga used this opportunity to develop a smart grid network. The fibre-optic smart grid energy network not only provides secure, affordable and efficient power supply to homes and businesses across the city, but also significantly reduces the energy consumption and carbon emissions in the city. The resulting cost savings have been used by the government in other initiatives such as city construction projects, which has improved the communities.

One of the key highlights of the success of this initiative was when Chattanooga was hit by a series of tornadoes in July 2011, leaving 77,000 homes without power. Through this smart solution, power was restored in two seconds to over 50% of homes; prior to the smart solution, it would have taken 17 hours. Availability of information at a remote

location through the smart grid technologies prevented about 250 service visits and significantly speeded up the restoration process. About \$1.4 million was saved because of the speedy and efficient restoration at the time of these storms.

The latest technology-enabled grid network enables re-routing of power in the event of a fault and supports isolating the event and reducing outages across the city. With the necessary information provided to the users on managing their energy consumption, they can limit the use of unnecessary energy consumption. Leveraging the latest energy network technology, Chattanooga has successfully increased resilience from power outages. A key takeaway of the case study is that use of similar smart technology solutions can enhance operational efficiency, reduce losses across urban domains such as energy, water and waste management.

(This case was developed based on the report, Investor Ready Cities, How cities can create and deliver infrastructure value, published by Siemens, PwC, Berwin Leighton Paisner)



Big Data for Water Management in the Netherlands

Water management is crucial in the Netherlands, where 55% of the population reside in flood-prone zones and flood risks affect up to 70% of GDP. Droughts also have an impact on the local economy with reduced power output and agriculture production. Water management costs up to 7 billion euros and is expected to further rise by 2 billion euros by 2020. The exposure to floods and droughts calls for a dynamic mechanism for analysing ambient water scenarios and predicting future scenarios to prepare for emergencies and improve response to water level variations in accordance with local requirements.

The Netherlands has deployed a big data analytics solution to enhance flood management and improve management efficiency in response to varying water resource requirements and to reduce costs in management of the water system. The “Digital Delta” platform collates data from a sensor network and various existing sources to provide a dashboard that helps in taking proactive measures to prevent disasters and environmental degradation. While the immediate impact of this initiative is on the Dutch water resource system (with a cost reduction of almost 15%), the benefits of better water management are felt by the power sector, agriculture sector and the built environment.

While the project is executed by the Dutch Ministry of Water, the initiative engages multiple stakeholders – universities (to use data to effectively maintain schedules while preventing floods), the private sector (to implement the technology solution) and other government entities (to manage local water conditions). The public-private partnership has enabled the government to leverage the expertise of the private sector in data modelling and using intelligent platforms for effective water management. The case study showcases how multiple stakeholders with complementary resources can come together to implement technology solutions that address a key urban challenge.

(This case study was provided by IBM Corporation)



Auckland: Big Data Analytics for Mobility Management

Auckland, on the North Island of New Zealand, is the largest and most populous urban area in the country. It is an emerging international city that is fast developing a reputation for the quality of life it offers its residents. The city aspires to become the most liveable city in the world by 2040 by improving mobility, housing, economy and environment. Auckland Transport is responsible for all of the region's transport services, from roads and footpaths to cycling, parking and public transport.

The city has implemented a technology solution to obtain real-time insights on traffic movements and support quick decision-making. The big data solution enhances public safety and transport efficiency by analysing a large volume of structured and unstructured data. The system uses video analytics, automatic number plate recognition, vehicle model recognition, face recognition, demographic analysis and intelligent scene analysis to support decision-making. The stakeholders involved in the execution of the project include Auckland Transport and its partner organizations responsible for control and monitoring functions of physical security (including surveillance), building management, traffic management and computer-aided dispatch.

Further, Auckland Transport collaborated with the private sector to design and implement the technology solution. The tiered, open and fault-tolerant architecture of the solution facilitates replication across cities. The key takeaway is that agencies must collaborate to use the same technology infrastructure and concerns of multiple departmental silos through a common solution.

(This case study was provided by Hewlett Packard Enterprise)



Integrating Government Services in Flemish Region

Flanders is the northern Flemish-speaking portion of Belgium. More than 70 government agencies under the Flemish government oversee the education, culture, healthcare and international development of nearly 6 million citizens of the region. With several agencies involved in government services, citizens had to approach multiple departments for services. Flanders saw the opportunity to streamline information flow and reduce operational data efficiency across agencies each time they interacted with citizens.

The solution is based on the idea that services should be available easily with minimal effort and that no information should require submission twice. This was enabled through a platform that enables data exchange and provides a smooth experience to citizens. The Flemish government designed and built a platform named “Maximum Data Sharing Between Administrations and Agencies” (MAGDA). The vision of this initiative was to re-engineer and digitize processes in a manner that enables once-only data collection for accurate and faster service delivery. As a part of the system, citizens log on to the Flemish e-government services using electronic ID (e-ID) cards that automatically transfer data to the state registry.

Partnership with the private sector for its technological capabilities was one of the key enablers for this project. Critical to the success of the project was the approach devised by the Flemish government of using technology to transition from a “pull” to a “push” model of information exchange. The government was able to eliminate 250,000 paper forms, thus saving costs on mailing. The MAGDA framework is recognized by the European Union as an e-government best practice and has received recognition from other countries as well. Such solutions can enable governments to provide more services regardless of the budgetary constraints.

(This case study was provided by Hewlett Packard Enterprise)

2. Enablers for Adopting New Models for Urban Services

City administrators and other stakeholders need to make a concentrated effort to address the aspirational needs of residents. In their journey towards urban transformation, city administrations will encounter challenges such as budgetary constraints, inefficient governance structures, lack of leadership and talent, sourcing risks, trust issues and external factors such as changing demographics. Smart regulations and effective governance structures, and the development of nimble institutions will be required to address these issues. City administrators must demonstrate visionary leadership and think beyond political tenures, while planning for a future city that addresses the needs of all sections of society, irrespective of their social and economic status.

2.1 Challenges

Although the top challenges for transformation differ to an extent in developing and developed countries (Figure 7), the key ones include the following:

- **Budget constraints:** Cities have difficulty raising taxes and user charges. Moreover, with national and regional government allocations not increasing, they are finding it more difficult to manage their finances and establish a mechanism to fund infrastructure development.
- **Governance:** The functional city's increasing population and geographical footprint have not resulted in a commensurate increase in the geographical footprint of administrative boundaries. A lack of coordination between national, regional and urban governments has

further exacerbated administrative issues, so that certain urban functions have deteriorated in the absence of a segregation of duty between entities.

- **Leadership:** Inadequate devolution of power to city leaders and mayors has led to ineffective city leadership. An absence of strong leadership support leads to gaps in planning, prioritizing and implementing key projects.
- **Talent:** Without adequate technical and managerial talent, cities have not been able to keep pace with the increased demand for urban services, resulting in inadequate delivery of infrastructure and services.
- **Demographics:** Changing demographics – an increased population in some cities, and an ageing one in others – has led to growing demand-supply gaps.
- **Sourcing risks and trust:** As cities have limited resources, the private sector can contribute with innovation and efficiency. However, lack of trust in the sector has led to its limited engagement in delivering infrastructure.

The cities can address challenges in transformation by using the levers such as organization structure, planning, collaboration and engagement (as indicated in Figure 5) based on the stage of maturity. Each city needs to assess its existing level of maturity and take action to move or leapfrog stages. Technology infusion within each of the layers will help cities make the transition faster.

Figure 7: Regional Challenges in Urban Transformation

Developed countries

1. Demographic challenges
2. City vision development
3. Budgetary constraints
4. Lack of coordination between government agencies
5. Integrated urban planning

Developing countries

1. Integrated urban planning
2. Lack of transparency
3. Lack of coordination between government agencies
4. Unplanned growth/urban sprawl
5. City vision development

6. Financing for urban development projects
7. Migration and rise in population
8. Policy distortions
9. Inadequate citizen engagement
10. Leadership support

6. City governance structures
7. Budgetary constraints
8. Migration and rise in population
9. Inadequate public-private partnerships
10. Access to talent

2.2 Enablers

2.2.1 Regulatory Reforms to Accelerate Adoption of New Models

Begin with fundamentals

Regulatory reforms begin with getting the fundamentals right to create an environment where innovation thrives. The fundamentals include:

- Efficient and competitive taxation regime
- Healthy labour market
- Trade policies that encourage foreign investment
- Simple and transparent regulations and processes
- Robust judiciary
- Measures to meet the needs of vulnerable sections of society

While focusing on fundamentals, national governments must ensure that cities are not discriminated against through policies favouring suburbs and rural areas. Although development in the hinterland is required to sustain a city, policy distortions in the form of subsidies that favour the hinterland should only be taken up to address a dire need. With cities competing at the global stage to attract resources, they must be well integrated in the global value chain through trade, direct and indirect foreign investment, tourism and foreign talent.

Example: Through its external openness and free trade, Singapore is symbolic for cities that demonstrate how fundamental policy changes can usher in global players and improve the standard of living for the local population. Using Singapore's reforms as an example, Dubai (United Arab Emirates) has enabled 100% foreign ownership, eased a restriction on foreign exchange, simplified licensing and allowed accelerated development.²⁴

Develop smart regulations

Cities need to adopt “smart regulations” to address changes brought on by new models. Smart regulations do not necessarily imply deregulation, but rather the establishing of principles on which regulations must be created to make them more responsive and attuned to stakeholders' needs.

- **Involve stakeholders in formulating regulations:** While defining regulations, all stakeholders across urban domains – those directly or indirectly influenced or impacted by policy – must be involved at the beginning of the policy development cycle. This will allow a move towards a solution-oriented policy design process. Cities can develop comprehensive policies devoid of isolated perspectives that often plague urban policies.
- **Monitor impact and close feedback loops:** Policies need to be amended based on feedback received from stakeholders following both roll-out and measurement of the impact. Feedback mechanisms provide city governments with tools to avoid the danger of too many or very few regulations.

- **Use ICT during the entire policy-making cycle:** Open data and social media have helped with real-time sharing of data, and provided a channel for citizens and civil-society members to protest and raise their concerns. Local government can use the collaborative power of social media to implement other tenets of smart regulations. Through social media, the local government can close the information gap (often a source of mistrust among stakeholders) and develop regulations built on trust and mutual understanding.
- **Aim for sustainable outcomes:** With climate change, the environment and changing social demographics identified as top issues around the world, social and environmental sustainability must be embedded in policy frameworks when creating regulations that impact cities.
Example: The European Commission's “Better Regulation” intends to design European Union (EU) policies and laws so that they achieve their objectives at minimum cost. It ensures that policy is prepared, implemented and reviewed in an open and transparent manner, informed by the best available evidence and backed up by involving stakeholders. To ensure that EU action is effective, the commission assesses the expected and actual impacts of policies, legislation and other important measures at every stage of the policy cycle – from planning to implementation, to review and subsequent revision.²⁵



Safeguarding citizens' privacy and security becomes important with the growing use of technology and new business models for providing urban services. Cities are increasingly employing data to make decisions through the use of services supplied by the private sector; while doing so, cities must be cognizant of the shared data and potential to monetize it. The key to building scalable cities is to ensure regulatory safeguards while providing an environment that encourages innovation.



2.2.2 Agile, Transparent and City-Scale Governance

City-scale governments

The first step in establishing relevant governance structures is to decentralize power to city governments. A generally positive move, it often results in coordination problems among city, regional and national governments. In the course of decentralizing, it is important to segregate responsibilities among various levels of government, keep the overlaps to a minimum and ensure that city governments are fiscally capable, empowered and equipped to plan and ensure success.

Across cities globally, the urban realm has expanded over decades, leading to differences in a city's administrative, geographical and economic boundaries. The economic boundary of an urban agglomeration can entail multiple administrative boundaries, within which local governments compete for the same resources by offering incentives, leading to sub-optimal allocation of resources. This issue is further aggravated when regional or national governments carve out niche administrative bodies to address specific urban domains. If various areas of an urban agglomeration are to be developed coherently, programmes relevant to the economic boundaries need to be developed under stewardship of the regional or national government to ensure cooperation among agencies. Financial arrangements for allocating funds to administrative bodies within an economic city, commensurate to the number of citizens (or other relevant parameters), need to be established while giving due consideration to externalities.

Example: Denmark went through a process to create larger municipalities (the number of municipalities being reduced from 275 to 98) to improve their ability to handle the increasing number of municipal tasks, such as environmental con-

trol, adult education and specialized social services; and, to resolve issues closer to their source, within the cities. Reducing the number of municipalities also led to economies of scale, as common functions such as wage administration or customer service had to be performed at fewer places.²⁶

Agility in governance

In a dynamic urban landscape where new challenges are emerging – physical and cybersecurity threats, migration, extreme weather events and disruptive technology – city governments have to become agile and resilient when faced with uncertainty. The governments need to pre-empt situations through a well-defined process of continuously scanning the environment and gathering weak signals before they become pervasive, in order to ensure timely intervention. Moreover, such responses should be effective on a short-term basis without compromising the long-term needs of the city and its stakeholders.

City governments will need to be the right size and to adjust quickly by redeploying resources across isolated organizational elements, making use of external relationships with the private sector, academia and civil society. Agility can be enhanced through co-creation and engaging stakeholders in service innovation. A human capital strategy is necessary to create an agile city government, and should include equipping resources to work across functions and promoting a flexible mindset, along with strong and effective leadership.

Example: Sweden has established the Secretariat for the Future to address emerging concerns such as green transition, global cooperation, income distribution, demographics and welfare management. The secretariat intends to develop strategies and measures in areas of substantial importance for the future, and to cooperate with businesses, researchers and civil society.²⁷

Agility is crucial when responding to unforeseen circumstances. Responses to natural disasters in recent years, such as the tsunami on the coast of Japan, included mobilizing the personnel, expertise and equipment of multiple agencies (among them foreign entities). Such ad hoc and unpredictable events require adaptable platforms that can be tailored to individual and sometimes concurrent crises. Agile city governments need to respond quickly, shift their focus from regular operations to humanitarian operations and communicate effectively in cross-agency efforts.

Transparency in governance

Transparency is required to build trust and legitimacy among stakeholders. Transparent governments can better manage citizen expectations and demands by proactively sharing data. Transparency enabled through open data allows for accountability and improved decision-making, and empowers communities to voice their opinion and act. Further, it allows for city administrators to explain difficult trade-offs made during the planning or procurement processes. City administrations need to adopt effective open-data strategies to move beyond the mere release of data and ensure timeliness, reliability and quality of publicly released information.

Example: The New York City Mayor's Office of Operations created the NYCStat Stimulus Tracker, an online tool to help the city track federal stimulus funds. The tool enables residents to follow the progress of stimulus funding on a project, contract and payment level, and ties public outcomes to the money spent. The tool provides detailed, almost immediate information on stimulus projects in eight areas: infrastructure, energy efficiency, economic and workforce development, health and social support, education, public safety, neighbourhood stabilization and budget relief.²⁸

Example: The Open Knowledge Foundation is an NGO that promotes transparency in the United Kingdom through the portal, *Where Does My Money Go?*, which provides visual representation of public spending across various sectors and regions.²⁹ The city of Helsinki has developed a similar platform to publish financial statement information, budgets and even individual transactions as open data.³⁰

City governments will need to exhibit three characteristics – city scale, agility and transparency – to encourage adoption of new business models for delivering urban services. Failure to showcase even one of the characteristics will lead to solutions that are either not suitable for the urban scale or take time to be adopted, or are not trusted by stakeholders, leaving them with little chance of acceptance.

2.2.3 Developing Institutional Capacity to Drive Transformation

Even with weak institutions, some cities can prosper for a while. While a city scales up, however, such institutions will inhibit its growth and may even contribute to its decline. Having strong institutions at the outset, while a city is transitioning from being a rural area, is advisable, and becomes necessary when a city scales up. Municipalities with strong institutions empower their employees to plan and manage the cities, and further equip them with tools to carry out responsibilities. A city administration needs to invest in both people and processes in order to create institutions that can adapt to the changes in how urban services are delivered.

Invest in people

The public sector in general faces a challenge in attracting talent. To attract technical and managerial talent to plan and operate them, cities require the following:

- Compensation structures on par with those of the private sector and academic institutions
- Competitive incentives and reward mechanisms
- Opportunities for continuous training
- Clearly defined career opportunities

As cities adopt principles of co-creation, civic employees will increasingly engage with stakeholders (other government bodies, the private sector, NGOs, citizens and academic institutions) to identify solutions that address urban issues. While performing this task, they need to have the knowledge and information required to do the task effectively. More importantly in a collaborative set up, soft skills in aspects such as empathy, negotiation and communication are required to achieve desired outcomes. Employees also need regular motivation to operate with the positive attitude required in public service.

Capacity development is a continuous process requiring leadership commitment, and is not just limited to developing a few specialists within civic administration. Traditional training establishments play an important role in developing capacity; however, administrations need to adopt new modes of training, such as massive open online courses that provide specialized training, to gain expertise at the required scale. Cities have often relied on external expertise to perform specialized tasks, and have depended on these experts due to a lack of involvement. While this dependency cannot be eliminated overnight, city administrators need to gain the knowledge required to manage and monitor the experts, and adopt the principle of “management through knowledge” rather than being limited to “management by authority”. With cities adopting new models of urban service delivery, management through knowledge becomes all the more important to prevent vendor lock-ins and exercise effective control mechanisms.

New technology calls for new expertise; in an interconnected world, city government's ability to deliver efficient, reliable and secure services is a critical factor in business confidence. Embracing the cyberworld, through sensors based on the IoT, means opening up systems and processes to external suppliers, and accepting that the old boundaries are being swept away. Top levels of management need to drive this realization, with a need for greater awareness of the challenge at the leadership level. As it scales up on the technology curve, a city can only achieve its objectives by paying attention to cybersecurity. Cities of the future will require cybersecurity experts to address new issues.

Invest in processes

Cities need to look again at the way internal processes are organized and the way work gets done collectively within the organization. Management practices, procedures and organizational structure (hierarchy and job description) may require changes or adjustments while adopting a new way of working. If it outsources activities, a city must establish robust processes for managing risk, compliance, service and benefits. If a city embraces digital platforms, practices will need to be adopted around data sharing, data security and data privacy.

New business models will mean adopting more flexible and responsive management styles for developing and managing cities. Institutional development includes addressing issues such as amending regulations that control financial management, reviewing borrowing and the capacity of civic bodies, and enhancing local government's ability to negotiate contracts and form partnerships with private enterprises and community organizations. Dealing with such institutional issues will require political will and visionary leadership at the city level.

Example: The city of Hong Kong faced a challenge with a lengthy process for providing construction permits. In order to accelerate the procedure, the city changed its processes to adopt a single window system, which caters to building permits. Further, a software system covering six government departments and two private utility vendors was developed to ease coordination among agencies.³¹



Singapore: Building Expertise in Water Management

Since Singapore's independence in 1965, water management has been a top priority for the nation state, which has concentrated on being self-sustaining. Singapore took a holistic view towards managing its water sector to become self-sustaining and create economic value out of water management. The "Four National Taps" long-term water supply strategy and the "Active, Beautiful, Clean Waters" (ABC Waters) programme integrate the water bodies with the surrounding environment.

Singapore's sound water management is enabled through several factors:

- The ambition of making the country self-sustaining and simultaneously tapping the economic potential of the water sector to improve the country's global standing in this domain
- Heavy investment in R&D to improve its technological capabilities in the water domain; Singapore is widely known as the global hydro-hub for water technologies

- Seamless coordination between government agencies and a unified vision for the water sector helped to implement the water programmes

As a result of the global image, private sector organizations operating in the water domain have flourished in Singapore, and have taken their expertise to other parts of the world such as China and the Middle East. More than 100 international projects valued at more than \$10 billion have been bagged by Singapore's water technology industry. Global cities can learn from the concentrated efforts of Singapore to turn their vulnerability into an economic strength while meeting the government's social objectives of water supply.

(This case was developed based on the report, iUrban, inspire, innovate, implement, published by Euricur, PwC, IHS)

2.2.4 Visionary Leadership for the Cities of Tomorrow

Singapore's success story shows the vital role that leaders play in shaping the development trajectory; they set a far-sighted aspirational goal for the city and drove a single-minded and practical approach towards the vision. The governance structure and the extent of a leader's or mayor's empowerment definitely have an impact on a city's leadership. However, important characteristics that civic leaders need to exhibit, such as pragmatism, business-friendliness and a can-do attitude, remain consistent irrespective of the governance structure. Leaders need to:

- Develop a culture and mindset of agility among employees
- Promote the measurement of performance
- Create structures that reward impacts on the urban environment (rather than rewarding outputs)

Wear multiple hats to balance internal and external issues

City leaders have to balance both internal and external issues, as cities are increasingly engaged in the global products and services value chain. The leaders need to exert influence both internally (influencing the leadership team and the people in the civic body) and externally (the surrounding environment, citizens and their expectations). This requires not only having a high level of awareness of local and global environments, but also evaluating new prospects and threats against the city's vision and plans. To accomplish the balancing act of tackling internal and external issues, city leaders must assume different roles within and outside the organization, based on the situation. These roles include:

- **Decision-maker:** City leaders should make data-driven decisions and encourage civic officials to do the same (though all data may not always be available). As technology is already widely adopted, and with the drive to increase legitimacy and transparency, city leaders can increasingly make data-driven decisions rather than those based on "gut feelings".
- **Public servant:** Non-linear communication channels can enable city leaders to connect directly with citizens to address their concerns and raise their views on key issues about their urban environment. Technology now enables leaders to reach out to their constituents directly at a personal level and develop trust.
- **Standard-bearer:** City leaders must establish personal standards of ethical leadership, effective management practices and moral behaviour as examples for other officials. Adherence to those standards leads to trust and openness to fulfil the vision.
- **Boundary setter:** By leveraging sharing and collaborative platforms, city leaders can communicate the clear ethical boundaries that officials and stakeholders must follow when dealing with civic officials, and take appropriate action against violations.

Adopt new models for delivering urban services

City leaders must benchmark their cities against the very best, particularly those in urban services delivery. Barcelona, Amsterdam and Singapore, for example, have set global benchmarks for using technology to understand ambient situations and make data-driven decisions. Importantly, while cities embark on adopting new business models

for delivering urban services, city-level leaders must effectively distribute their responsibilities and authority among individuals who exert different types of power (e.g. institutional, technical, financial). A common purpose and distributed leadership capacity will eventually allow a city's leadership to bring in the required agility to promptly react to changing circumstances.

The leaders need to weigh the risk of taking no action against the risk of making decisions with potentially unknown implications. City leaders need to be strong and decisive in pushing through the desired transformation, take calculated and well-informed risks and guard against assuming the default position of risk aversion.

A good city leader not only energizes the organization, but also creates meaning with context, moving people to action to jointly achieve the shared vision. Such a leader needs to create a legacy and a framework in order to ensure that future leaders can draw on the foundation while making key choices.

As a leader, am I:

- Creating an organizational culture developed on diversity and not on standardization or "group think"?
- Managing from the standpoint of relationship and not position, and developing management methods based on dialogue?
- Developing the ability to give and take authority with the purpose of creating high legitimacy, both outwards towards the surrounding environment and inwards towards the organization?
- Being clear about the vision, goals and direction of the organization I am leading?
- Developing my employees and their competencies?
- Creating a climate of openness and trust for dialogue, even in difficult and complicated matters?
- Being courageous enough to take responsibility for my own and my employees' successes and failures?
- Working from the basis of a strong personal commitment, and prepared to make decisions and reconsider them?
- Being aware of, and alert to, the surrounding environment and inclined to innovation?³²



2.2.5 Stakeholder Engagement

The growing urban demands and capacity spread across stakeholders (spanning city, regional and national boundaries) underline the growing relevance of partnership in urban management. Cities need to become more porous, and reach out to the private sector, NGOs, academic institutions and citizens across different organizational levels. With cities adopting new models of service delivery, as in the sharing economy and circular economy, which depend on double-sided networks of buyers (service consumers) and sellers (service providers), increased stakeholder engagement is even more important for reaching critical mass. Developing long-lasting partnerships is difficult, but it offers better guarantees of sustainable outcomes. Such collaborative effort results in identifying impacts across domains, and contributes towards mobilizing complementary resources such as knowledge, finance and manpower.

Collaboration is essential for a city's sustainable development. Good collaboration requires trust, mutual understanding and flexibility/capacity to try out new approaches.

What can stakeholders bring to the table?

- **Academic institutions:** The performance of cities increasingly relies on their backbone of education and research, and educational and research institutes depend on cities to attract top talent. Knowledge institutes increasingly see urban environments as research subjects in their own right, and cities can benefit from their own problem-solving capacity. A city must develop a local think tank or leverage a global think tank to engage academics and enhance collaboration in the urban development process.

- **Citizens:** For many cities, the norm among citizens includes a greater awareness of their rights, better access to information through technology and higher expectations of service levels. Citizens are calling out for increased transparency and accountability as governments grapple to rebuild trust and legitimacy at all levels. Involving citizens to the greatest extent possible often results in bringing novelty and identifying previously hidden problems and opportunities.
- **Non-governmental organizations:** Involving non-profit organizations and NGOs proved relevant in many of the projects analysed, such as where these stakeholders acted as brokers, with a degree of independence to carry projects through to completion and to encourage the right partnerships.
- **The private sector:** Private-sector participation can range from entrepreneurs with disruptive business models to large multinational corporations. The private sector can support city administrations through specialized competencies, innovation and financing capabilities. Many private-sector organizations are willing to invest in urban environments to cement their core strategies and make profits. A city benefits from the operational efficiency and improved service delivery that these stakeholders provide.

Example: In South Africa, Cape Town's central business district (CBD) was struggling with high levels of crime and gang violence, with many "high risk, no-go" areas negatively impacting the city's economic growth. A collaboration between public- and private-sector stakeholders helped to develop, promote and manage Cape Town's central city. The Central City Improvement District's (CCID) vision is to provide an inclusive, vibrant and sustainable city centre. CCID has an effective operational structure, a clearly defined business plan and strong performance management measures in place, facilitating effective transparency and accountability to enable it to achieve its objective of improving safety in the CBD.³³

Enhancing collaboration using ICTs

ICTs can be used to collect and disseminate information from stakeholders to diminish gaps in the traditional ways of obtaining feedback. This real-time feedback can be used during the following phases:

- Budgeting – to encourage participation
- Planning – to get the necessary buy-in from stakeholders
- Project preparation – to reduce the risk to communities
- Operations – to engage citizens in the audit process
- Impact assessment – to evaluate the service delivery

Example: The cities of Boston and Atlanta (USA) use coUrbanize, a city development platform that aims to help communities and developers build better cities together. The project sites help developers distribute information and gather online feedback from residents and community stakeholders. When project information is easily accessible, communities can avoid costly misunderstandings, and more people can participate in the process.³⁴

Example: Melbourne (Australia) has developed a new website, Urban Forest Visual, which details the location, genus and lifespan of the city's urban forest by precinct. The interactive tree map allows users to explore Melbourne's tree data, learn more about the life expectancy and diversity of trees in the city, and submit questions.³⁵



Helsinki: Open Data for Collaborative Governance

Massive datasets are created in the course of government operations; however, these datasets are seldom available to citizens, private enterprises or other government agencies. Correlation of data across urban domains such as planning, leisure and culture, healthcare, housing, economy and taxation could improve city management and enhance transparency. The City of Helsinki's open data initiative led by Helsinki Region Infoshare (HRI) provides easy web access to the city's data. This data can be used by citizens, the private sector and other government departments to correlate government functions and develop innovative data-driven applications that can improve the quality of life.

The project is operated by a board comprising mayors of six participating cities (from the region), financiers, executors and affiliated public entities. As the initiative spans six cities in Finland, each city can analyse the characteristics of other cities and build on each other's best practices and reforms.

HRI has placed accessibility at the top of this initiative to ensure datasets are available with ease and in different formats for analysis and use. The Ministry of Finance provided initial grants, and the initiative is now funded by participating cities and the Finnish Innovation Fund Sitra.

Open data brings together the data creators, developers and users to develop applications based on citizens' needs and enable all stakeholders to make informed data-driven decisions. Cities in other parts of the world can take up joint initiatives with cities with similar characteristics to understand urban patterns and learn from best practices. The availability of such datasets is, however, dependent on underlying infrastructure that collects data and brings it together in a format understandable to humans. Cities need to develop underlying technology infrastructure to involve all stakeholders in collaborative governance.

(This case study was developed using publicly available information from Helsinki Region Infoshare)

2.2.6 Adopting Standards, Promoting Reuse

Cities are increasingly adopting technology and innovative business models that will ultimately result in reduced costs of providing services and lower usage of resources, as well as efficiency gains for city administrations and residents. While standards exist for different domains and functions in cities, several city standards have been formulated that are more horizontal and applied across domains. To develop standardized solutions, cities around the globe need to start accepting some of the common standards at a regional/national level first, and then accept them globally, so that the need to reinvent the wheel for each city is eliminated. Such standard solutions will help achieve the following:

- Reduce costs
- Ease the procurement process
- Enhance interoperability
- Improve social acceptance of developed solutions
- Enable city leaders to communicate their ambitions for the city to investors
- Make it easier to develop the evidence investors need to underpin their investments

Standards will enable a common understanding and facilitate integration

Standards can help cities and those providing solutions to arrive at a common understanding. Even within projects of a single industry, what is delivered is often different from what was required, simply because of misunderstandings between the participating parties. To minimize mix-ups, standards can help provide a shared language, which is critical given the wide range of stakeholders involved.

Standards facilitate integration between physical systems as well as digital ones. Moreover, standards can add interoperability and coherence between separate systems and services, and can help to define those points of interoperability. In particular, reliable integration between technology and physical infrastructure is required, which can only occur if standards are developed and agreed. In addition, standards guarantee scalability and ensure that cities follow a path taken by many others; this, in turn, will stimulate the market to further support this path.

Standards will support risk management and guard against vendor lock-in

Standards can support developing a framework for risk management, which would include risks inherent in the digital delivery of public services, such as issues of data protection and privacy, and the inappropriate use of data. The risk of unintentionally excluding those unable to easily access services because of infirmity or impaired learning ability is also included. Data transfer and subsequent success from adopting technology will be inextricably linked to the resilience of digital infrastructure. A comprehensive set of data management standards will result in public confidence in the urban services being developed.

The extent of vendor lock-in is reduced because of standards. When built to widely agreed standards, products and services can be broken down into their smaller parts, and the best provider of each can be identified; this avoids having to contract a single company to offer the whole product. It also allows much easier substitution of one provider for another, and thus maintains a competitive market.

Example: The World Council on City Data is implementing ISO 37120 Sustainable Development of Communities – Indicators for city services and quality of life. The standard allows cities to measure and benchmark their performance on 17 themes of city service and quality of life, with five levels of certification offered. A few cities, such as Amsterdam, Johannesburg, Shanghai, Dubai and Los Angeles, have already started their journey towards adopting the standards and reaching the highest levels of certification.³⁶

Example: The International Telecommunication Union's Telecommunication Standardization Sector (ITU-T) Focus Group on Smart Sustainable Cities defines a smart sustainable city as an innovative one that "uses information and telecommunication technologies (ICTs) and other means to improve quality of life, efficiency of urban operation and services, and competitiveness, while ensuring that it meets the needs of present and future generations with respect to economic, social and environmental aspects".³⁷ In May 2015, Dubai became the world's first city to assess the efficiency and sustainability of its operations using the key performance indicators developed by the focus group. A new study group is addressing the standardization requirements of IoT technologies, with an initial focus on IoT applications in smart cities.³⁸



2.2.7 Integrated Planning

Achieve balance between overplanning and underplanning

Dense urban structures promote an easy exchange of ideas, goods and services; are considered good for business, innovation, arts and culture; and are environmentally friendly. They contrast with suburban structures, which have an increased reliance on personal transport and are not considered efficient. Urban spaces, also a source of wealth for a city, are often not monetized to maximum potential, yet frequently preserve a city's heritage, values and distinct character. City government plays a leading role in establishing a city's infrastructure (physical, social and economic) through urban planning. Two extremes often exist: overplanning, where every aspect of the urban realm is strictly defined and is executed per the city or master plan; and underplanning, which favours decentralized market solutions and organic growth that often result in informal dwellings and large gaps in demand and supply. Cities need to achieve the right mix in order to attain a balance between organic growth and rigid plans.

Example: Cities need a mix of planning and organic growth. The borough of Manhattan in New York City is an apt example; its grid structure established a general right of way for roads, public transport, water and sewage systems, as well as public spaces such as parks and squares, while allowing for organic growth within this realm.

Adopt a cross-domain approach and involve citizens

As urbanization is accelerating in developing economies, a dire need exists to plan cities and ensure that the needs of the vulnerable sections of society are met. Cities often create plans for specific urban domains, such as for land-

use, mobility, water and sanitation, resulting in silos where expectations of the other urban domains are often not captured. The traditional boundaries created by silos need to be overcome if a common vision touching on all aspects of citizen's lives is to be developed. In order to create an integrated view, discussions on urban development should involve citizens across various social groups and cross-domain teams from the city administration, the private sector and academic institutions. Such an integrated approach requires governance structures, committed leadership, a robust regulatory framework and adequate citizen participation as described in the earlier section. Initiatives in the urban context must also factor in the city's wider ecological footprint to create a sustainable relationship between the city and its hinterland, which often is a source of goods and services for the urban area.

Example: The London Infrastructure Plan 2050 holistically considers transportation, green infrastructure, digital connectivity, energy, water, housing, social infrastructure and the circular economy in the overall vision for 2050. It does this while calling for more devolution and innovative funding mechanisms, such as crowdfunding and voluntary fees for developing select infrastructure.³⁹

Key considerations while planning

While cities update their master plans or create new development plans, they must address climate change and develop plans that look holistically at the environment, while considering its impact on society and a city's economy. Planners could use the public realm as a tool to reduce social segregation and develop social cohesion among a diverse population. While advocating a compact city with appropriate transit mechanisms, they need to preserve and give due consideration to the distinctive characters of cities when renewing those that are in decline.



London's Approach to Integrated Development

In the midst of the crisis in Europe, London's position is going to become more critical with higher migration and pressure on infrastructure from a household and business perspective. The City Hall found difficulties in addressing London's growing infrastructure needs independently. Fragmented infrastructure governance made realization of common goals difficult and reduced efficiency in delivery and funding. As a result, the London Infrastructure Development Body (LIDB) was established. It brings together infrastructure providing bodies and aims to provide integrated and innovative infrastructure solutions to develop and achieve a future vision. The London Infrastructure Plan 2050 creates an integrated vision for London, encompassing sectors such as transport, green infrastructure, digital connectivity, water, energy and social infrastructure.

The LIDB was set up under London Infrastructure Plan 2050 by the mayor and comprises senior representatives from London's main infrastructure providers. The plan identifies the challenges within the city through a consultation process, provides for an integrated approach to urban planning, identifies funding sources for the project, proposes fiscal devolution and, more importantly, recognizes the need to efficiently use the existing infrastructure.

The project conveners also identified that change in political leadership could displace the project strategy and hence a cross-party consensus for the LIP 2050 was sought and reached. The commitment of all political parties to achieve this vision enables consistency in the project roadmap. Regulatory hurdles in infrastructure development are planned to be dealt with by having representation from three of the main regulators for the city.

This case study highlights that most cities challenged by urbanization need to address the problem of siloed function, which leads to lower return on infrastructure investment, lack of innovation and replication of work. City administrators across the globe can refer to London's strategy to realize common city goals and save costs.

(This case study was developed on the basis of the London Infrastructure Plan 2050 Update)



Vancouver: Developing a City's Digital Strategy through Public-Private Collaboration

Vancouver on the West coast of Canada enjoys the reputation of a technology hub with a fast-growing technology market. The city wanted to leverage its image to strengthen its e-governance initiatives and connect citizens, business and government through multiple digital channels to enable effective service delivery. The city embarked on developing a digital strategy aimed at encouraging economic and social development. The digital strategy covered aspects such as a roadmap for public service delivery, citizen participation, digital infrastructure, and development of the city's technology sector to convert the city administration into a digitally-driven organization.

The strategy was made through consultations with the Vancouver Public Library and Vancouver Economic Commission to ensure that the social and economic development goals were achieved through digital programmes. City council staff and industry leaders were included to build on the expertise and experience of qualified professionals.

As a starting point, the city tried to pick the best practices from digital capabilities of other top global cities such as New York and Chicago. Once the digital strategy was approved, a chief digital officer from the private sector was appointed to execute the strategy and coordinate with stakeholders. The acceptance of the strategy has brought city agencies on to the same page regarding projects and initiatives.

The digital strategy was enabled by a realistic assessment of the city's capabilities initially. As Vancouver's digital capabilities have improved, other cities across Canada are increasingly looking to replicate the digital initiatives in public space as a best practice.

(This case was developed based on the report, iUrban, inspire, innovate, implement, published by Euricur, PwC, IHS)



Melbourne: Rejuvenating the City's Central Business District

Melbourne faced rapid decentralization and decongestion in its central business district. In 1986, the population of Melbourne was approximately 3 million, with less than 700 people living in the central business district (CBD). The CBD population declined as people opted to migrate to the suburbs. This led to large tracts of land remaining unused. This was exacerbated by recession and national budget cuts, creating the need to revitalize the CBD of Melbourne.

Several initiatives such as Postcode 3000, Federation Square or Swanston Walk have played a key role in promoting centralization and rejuvenating the city's cultural and economic characteristics. The vision for these projects was to reverse the trend of decentralization and create a positive image of the CBD. The rejuvenation programmes emphasized pedestrians, who play a key role in improving the image of the CBD, and encouraged spending on footpaths. Now, most of the 230 lanes in the CBD have at least a café, restaurant and entertainment venue as a result of these efforts. Alfresco dining can be found across the footpath in the CBD, which adds to the ambience. The city has converted over 35 hectares of road asphalt for pedestrian use in the last 20 years. More than 20 shared traffic zones, an 1,100-metre pedestrian mall and an eight-hectare park have been developed to infuse life into the CBD.

The integration of projects provided consistent, incremental application of specific initiatives aimed at making the CBD a more pleasant place for people to live, work and play. The focus has been on achieving tangible outcomes that break down old stereotypes and reimagine the CBD as the "place to be". Collaboration between city agencies dealing with urban design and transport helped to implement integrated projects and achieve a common city vision. Cities battling deprecating inner cores could adopt a strategy similar to that of Melbourne and develop social and economic infrastructure around the public realm that the city offers.

(This case was developed based on the report, iUrban, inspire, innovate, implement, published by Euricur, PwC, IHS)



Japan: Using Geographical Information Systems for Urban Planning

This case study describes how geographic information system (GIS) technologies facilitate urban planning in Japan. It draws on examples from three components of urban planning: city master planning, regulation revision and city planning ordinance revision.

City master planning: A city master plan governs all subsidiary plans in a district, city, town or village. It typically describes the municipality's overall policies governing land use and urban physical structures, rationality of traffic systems, placement of elements that affect community welfare, green belts, bodies of water, landscape and the environment and disaster management. In Japan, current patterns of land and building use are gauged from data collected through a municipality's Basic Survey for City Planning (which is conducted once every five years and developed in GIS format) together with census data. The GIS technology enables different maps to be laid over each other for comparison and analysis, facilitating the identification of gaps and issues to be addressed. For example, a predominance of both narrow roads and irregular parcel sizes may indicate an older neighbourhood where urban infrastructure needs upgrading or improvement.

Regulation revision: "District use regulations" define the purpose of a building (e.g. commercial or residential), as well as the permitted floor area ratio, building-to-land ratio, maximum height allowed, minimum parcel size and so forth. As any changes to these district use regulations impact the rights of private land and building owners, the reasoning behind revisions must be meticulously analysed and documented. The results of GIS analysis show the effects of a change in regulation both numerically and visually, contributing to consensus building. Further, airborne laser scanning (capturing 3D data of large areas) is helping local governments measure and map the height of existing buildings. Combining this data with land use, parcel size, roads and other information using GIS enables the generation of multiple scenarios based on different height control parameters that can be examined before adopting or revising height control regulations.

City planning ordinance revision: To ensure locally appropriate urban planning, city planning ordinances in Japan are set by local governments within the parameters of national legislation. As a general rule, an ordinance is required when rights are restricted or when administrative obligations or duties are created.

GIS technologies also support local governments in the preparation of compound ordinances.

(This case study was provided by Kokusai Kogyo Co. Ltd, Japan)

3. Accelerating Public-Private Partnerships for Urban Services

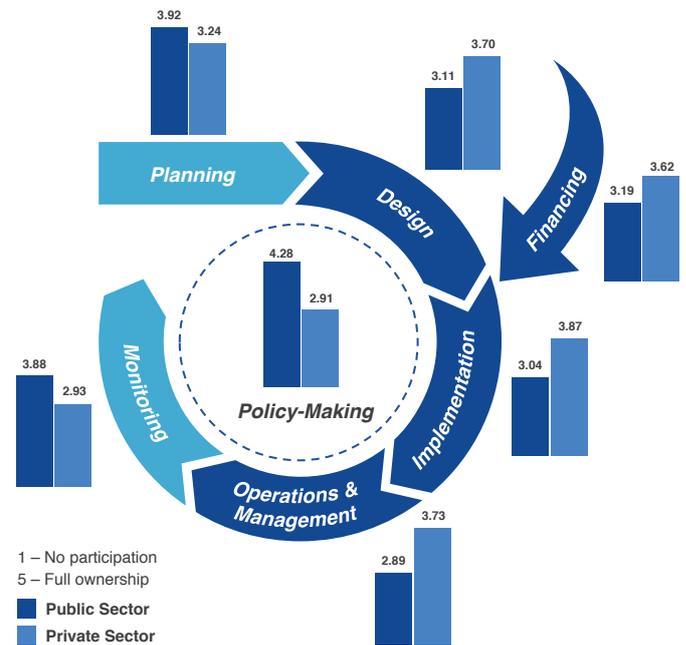
3.1. The Need for Collaboraton

The World Economic Forum's Global Survey on Urban Services revealed that private- and public-sector collaboration (as identified in the levers Collaboration and Business Models in Figure 5) is required for all aspects of the urban value chain (Figure 8), which includes policy-making, planning, design, implementation, operation and maintenance, and monitoring, as well as the financing of urban development projects. The survey identified the private sector as being better prepared than government agencies to drive the transformation (Figure 9), and respondents suggested greater private-sector participation in design, implementation, operation and maintenance, and financing. However, a public-private partnership (PPP) often does not materialize because of inherent mistrust between the public and private sectors, a perception that emerges owing to:

- The private sector's need for immediate returns, which are not in line with the long-term nature of urban development projects
- Private-sector parties who navigate the policy decision in their own interest, and appropriate public resources in the process
- Private-sector parties who pick only the most profitable projects and leave the government with those for the social good that have inadequate returns

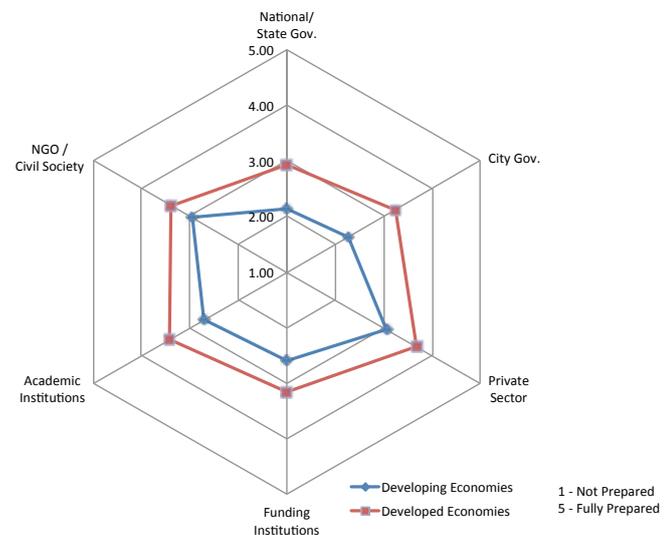
The private sector's role has been instrumental in several urban development projects around the world, indicating that the preceding arguments should not be taken as an excuse for excluding the sector. It, too, will need to increasingly invest in cities not only to win key urban development projects, but also to develop communities and enhance cities' competitiveness while addressing the reasons for the lack of trust. Greater participation in urban development will enhance the sector's triple bottom line, which includes the planet and people in addition to profits. While engaging the private sector in urban development, the role of citizens must not be ignored; they should be involved during policy-making, planning and monitoring, as has been emphasized earlier. Citizen participation must be not only symbolic, where they are informed at a later date of decisions to avoid the community's rejection of an urban development project; rather, they should be made equal participants along with the private sector in the co-creation process.

Figure 8: Participation across the Urban Value Chain



Source: World Economic Forum, Shaping the Future of Urban Development & Services Initiative, Global Survey on Urban Services (Oct.-Dec. 2015)

Figure 9: Stakeholder Preparedness



Source: World Economic Forum, Shaping the Future of Urban Development & Services Initiative, Global Survey on Urban Services (Oct.-Dec. 2015)

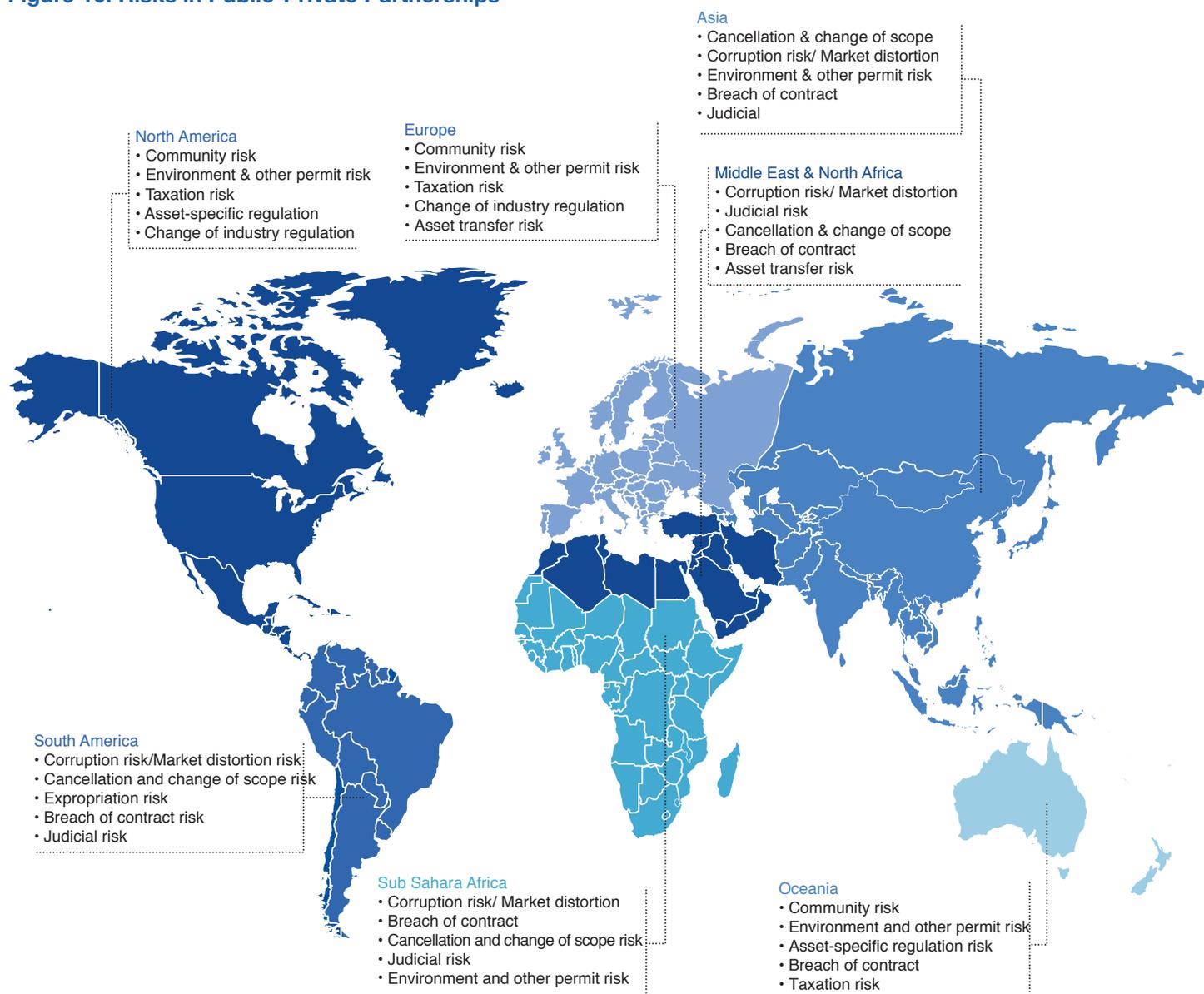
3.2 Risks in Public-Private Partnerships

Each stage in the urban development project life cycle raises a particular risk. The planning and construction phase risks are from change of scope, the environment and other permits, and community opposition. Risks during the project's operating phase are from nationalization, breach of contract and asset-specific regulation; and, in the termination phase, risks are in the duration/renewal of concession, asset transfer and decommissioning of assets. Some risks impact a project across its life cycle, such as the risk of a change of industry regulation, changes in taxation, currency transfer and convertibility, as well as judicial, corruption and market distortion risks.⁴⁰ The survey carried out for the report identified risks (Figure 10) across developed countries that were different from those in the developing world; risks in developed countries centred on the project phases of planning, construction and termination, while those in developing countries were more fundamental and common to the project's entire life cycle.

Common risks in executing urban development projects in developing countries

- **Cancellation or change of scope:** A project is at risk when approvals are sought from politically elected bodies or during a change of regime. The private sector's investment in the project's preparatory activities would be rendered futile, and such changes could have a detrimental effect on project costs and timelines.
- **Environment and other permits:** Delays in obtaining construction permits or environmental clearances can also significantly delay project execution and lead to interest expenses for the private sector; moreover, caveats in the permits can lead to escalating project costs.
- **Breach of contract:** The city or regional government might breach its contractual obligations on the grounds of safety, health or other public concerns, adversely affecting asset values.

Figure 10: Risks in Public-Private Partnerships



Source: World Economic Forum, Shaping the Future of Urban Development & Services Initiative, Global Survey on Urban Services (Oct.-Dec. 2015)



- **Change of industry regulations:** The infrastructure assets' performance is closely linked to regulations governing them. The regulations in question might be sector specific or general laws, and they often put the incumbent infrastructure providers at a disadvantage.
- **Judicial risk:** The lengthy processes and unenforceable decisions could significantly delay the project, and inhibit the private sector's capacity to generate adequate and timely revenue streams from the project.
- **Corruption and market distortion:** These are underlying causes of inefficient political and regulatory decisions; they tarnish the entire pre-project and project execution phase, and could lead to severe legal consequences for both the private and public sectors.

Common risks in executing urban development projects in developed countries

- **Community opposition:** Local communities can impact the permitting process if the project involves land acquisition and rehabilitation. In extreme circumstances, it may result in withdrawal of the project or outright rejection to pay the user charges impacting the infrastructure provider.
- **Asset-specific regulation:** Any changes in asset-specific regulation, such as the purity of water in an urban water supply project or the extent of effluents released in treatment facilities of a sewage treatment project, could impact the project design and technology used, resulting in a large impact on project costs or revenues.
- **Asset transfer:** Dispute over the transfer price and the quality of the asset, or the prevalent regulation at the time of an asset's transfer, could affect its price when transferred to the local administration or other entities.
- **Changes in taxation:** Changes in tax rates or the tax structure could have serious impact on the urban development project's financial health, and could also result in making the project economically unsustainable.

3.3. Addressing Risks (Government-Initiated Actions)

Stability of the regulatory environment

Many infrastructure contracts are often of long tenure, and investors desire general stability in the legal architecture and in the way decisions are reached under the governance mechanism. While the sector-specific regulations may change during the contract's tenure, investors need reassurance that such changes will be moderate, and that flexibility will be built into the contract to address them. Infrastructure laws and regulations should be transparent to ensure predictable outcomes of regulatory decisions, even during unstable economic and political conditions. The government must stress-test new regulations by simulating various scenarios and allowing the private sector to participate in such simulations.

Example: The Dutch Ministry of Infrastructure and the Environment developed a PPP simulation, run jointly by the private and public sectors, to test contracts and learn the principles of PPP arrangements covering sectors such as roads, buildings and water. The simulation is being implemented in United States.⁴¹

The stability of general laws at a city level is also important, and administrators can give some laws a special status to enhance stability. Moreover, policy-makers should seek higher consensus and non-partisan alignment for key regulations and strategic infrastructure.

Example: For EU member states, European primary law and secondary law have a stabilizing effect, and individual member states cannot easily bypass them.⁴²

Efficient administration

Based on the governance structure, a city's administration and the national or regional administration have to implement the laws impacting infrastructure in a reliable and consistent manner. Clear roles, responsibilities and cooperation are required among various actors within the city to support infrastructure development. A transparent and efficient procurement process is required to create industry confidence, and an efficient permitting process is needed to accelerate delivery once the project is awarded.

Example: Canada's "one project, one review" process ensures a single point of contact and a strict timeframe for reviews. The average approval time for large energy projects was reduced from four years to 22 months between 2007 and 2011.⁴³

Lawmakers should design and implement laws, institutions and practices that prevent and penalize corrupt behaviour, and thereby enhance transparency in decision-making and in enforcing compliance. International rules, such as the United Nations Convention against Corruption, can be adopted by countries and further taken up by local administrations.

Example: The UK Bribery Act, enacted in 2010, specifies that a company's failure to prevent bribery by employees and associates is a corporate offence, and allows for prosecution of an individual or a company with links to the United Kingdom. Penalties include up to 10 years in prison and unlimited fines.⁴⁴

An independent regulator must be encouraged to mitigate political and regulatory risks. The key to independence is separating a body's funding from public budgets, selecting officials without political consideration and creating a proper term for them, independent of the political cycle.

Example: The Office of Gas and Electricity Markets, the UK electricity and gas regulator, is funded by licence fees from regulated companies. Appointment of board members is staggered over time and based on competence.⁴⁵

Reliable dispute resolution mechanism

The likelihood of disputes arising will diminish if the right process is followed during the project preparation, contracting and implementation phases. However, disputes may still crop up, given stakeholders' long tenure and varied interests. Such disputes require prompt and efficient resolution, and an array of options can be applied to resolve them, from mediation and non-binding expert panels to national regulators and arbitration. The courtroom should be the last resort, and used when all other mechanisms fail.

Example: Chile uses permanent expert panels to resolve disputes in the electricity sector. Initially, panels have a conciliatory function, but cases can be escalated to the arbitration level where the panels' decisions are binding.⁴⁶

An effective judicial system is required that can hear and resolve disputes on a timely basis; it needs to be independent from government, and have adequate resources and training. The decisions must be predictable, clear, well-reasoned and, most importantly, able to be implemented and enforced.

Example: The Environment Court of New Zealand is a specialist court and, as such, sits outside the judicial pyramid for courts of general jurisdiction. Most of its work involves issues arising under the Resource Management Act. Such issues largely deal with appeals about the contents of regional and district statements and plans, as well as appeals developing from applications for resource consents.

3.4 Addressing Risks (Private-Sector-Initiated Actions)

Engagement with the public sector

Private companies should facilitate constructive conversation with the public sector to prevent mistrust and present their point of view on the impact of regulations. Communication between the private and public sectors must go beyond the project level and extend to industry-wide regulations to make their views count when formulating policy. External industry experts from industry bodies can engage proactively with government bodies in developing a target regulation. The private sector should refuse to give any misleading information during the bidding process, and should be open about any problems it may have regarding bidding conditions and project risks. Conscientious communication required for the delivery process is important to reinforce trust.

Example: The International Air Transport Association engaged with stakeholders after 9/11 to standardize previously unregulated international rules in airport security procedures.⁴⁷

Engagement with local communities

Although most infrastructure projects benefit the community at the city level, they may adversely impact a local community. Consultation with the community early on during the planning phase will ease local anxieties and improve the project design by taking the community's concerns into account. The consultation process may also help reduce disruptions affecting the local community during the construction phase by creating a balanced schedule and addressing its needs. Such communication should continue during the entire project phase to reduce the concerns and address the justified fears that local communities may have. The private sector must also facilitate transparent communication on the infrastructure projects' social and environmental impact. The key consideration when engaging with communities is to keep communication succinct, and identify champions within the community who create deeper engagement.

Example: The redevelopment of the Potsdamer Platz area and traffic junction in Berlin (Germany) was supported by the "Infobox", a temporary building where people could get details about the project. The Infobox initiative attracted over 9 million visitors between 1995 and 2001.⁴⁸

Ethical conduct

Unethical behaviour is not only unacceptable, but also presents a big risk to the private sector. Companies must establish internal procedures to guard against unethical practices, and have a framework to take legal action against any violations. When engaging with a third party, rules should be in place to perform due diligence. The private sector should take steps collectively, as a community, to ensure a corruption-free environment is created

Example: The high-level reporting mechanism (HLRM), developed by the Basel Institute on Governance and the Organisation for Economic Co-operation and Development, provides companies with a high-level institution to report any soliciting of bribes during the public procurement process. Colombia became the first country to introduce the HLRM as a pilot in mid-2013.⁴⁹



Caracas: Public Transport System for Inclusive Development

Venezuela's capital, Caracas, is the country's primary centre of industry, commerce and culture. Over the years, private vehicles have increased while the public transport facilities have diminished, leaving vulnerable populations with reduced mobility alternatives. The local administrators acknowledged this challenge and conceived various sustainable urban mobility projects (TransBaruta, TransChacao and TransHatillo in the municipalities of Baruta, Chacao and El Hatillo in Caracas) to facilitate urban mobility and reduce fuel consumption, transit time, overcrowding and pollution.

The project was championed by the city's mayor, and the private sector was involved in the design, implementation and operation of the system. The vehicles for the transport network were chosen based on due consideration of demand, accessibility needs and environmental impact. Multi-criteria analysis was used to evaluate the alternatives and fares were balanced to achieve the desired social benefits and ensure project profitability. Citizens were involved throughout the project to improve the awareness and acceptance of the solution.

While awarding the project, consideration was given to the needs of the private sector through a negotiation process whereby agreement was obtained on payment mechanisms, operations and maintenance, and on the overall solution. The key learning from the case study was the approach taken to address the concerns of the private sector and develop a funding model (from user charges) that makes the project economically viable.

(This case study was provided by ViKua Grupo InTech)



Barcelona: A Collaborative Approach for Addressing Urban Challenges

Barcelona – Spain’s primary industrial hub – is a global leader in leveraging technology for efficient city operations and improving quality of life. The road to this pedestal requires meticulous planning and focused steps to achieve the smart city vision. Barcelona’s vision is to achieve a high quality of life for its citizens, create a platform for continuous social development and promote a green and sustainable economy. The Smart Barcelona strategy amalgamated the continental Europe 2020 framework and local “City Model” and “City Council Strategy”. All three frameworks enabled the city to develop a holistic strategy that encompasses social, physical, economic and governance aspects by using ICT as a lever for transformation.

The city acknowledged the need for collaboration while undertaking a transformative journey, and established a non-profit organization, City Protocol Society, with 200 participants from 33 cities. The primary purpose of the society was to identify means of standardizing a city’s foundation to enable seamless interaction between urban domains across sectors through a plug-and-play mechanism. The council realized that, while data was flowing in from multiple sources, the lack of common standards barred interaction between datasets leading to diminishing value of information. This impacted city government and the economy due to limited free flow of potentially valuable data.

The City OS was conceptualized to offer a common platform enabling interaction between different technologies and creating a free flow of information due to improved interoperability. The city council intended to use the City OS to integrate services and platforms through a secure and consistent system. This approach was very different from the traditional style of trying to link different platforms and technologies, which often leads to interoperability issues. This extraordinary goal required a very different procurement process, which in this case was a competitive dialogue. The dialogue process involved leading ICT companies where the solutions and integration elements were discussed while maintaining equality, transparency and confidentiality.

The competitive dialogue process enabled:

- Competitors to be partners
- Private sector to understand future business models for the city and identify their own value propositions
- Private sector to pursue research to provide solutions for challenges faced by cities

This case study highlights that the paradigm of a “smart city” does not exist in isolation within the boundaries of city hall, and requires a cross-sector collaborative process to address core urban development and operation issues.

(This case study was based on one published by IESE Business School – Barcelona: A Roman Village Becoming a Smart City)



3.5 Attracting Private Sector

Municipal financing usually entails:

- Transfers from regional or national governments
- Grant funding from bilateral and multilateral donor organizations
- The ability to raise local taxes and user charges
- Finances raised from the debt or capital market to provide loan and debt-based financing where the capital rating is high

Sources of public financing, however, are scarce; cities face difficulties in raising taxes, and grants from national governments as well as grants/loans from international organizations are not sufficient to close the gap. Cities are thus relying increasingly on the private sector to finance projects, and are seeking financing from both domestic and foreign sources, such as domestic banks, institutions and capital markets, overseas sovereign wealth, pension funds, bilateral and multilateral institutions, and equipment suppliers, as well as through PPPs. When investors consider urban development projects for evaluation, close consideration is given to a city's ability to make a contribution to the project after allowing for other budgeted financial commitments.

Funding and financing

While the terms “funding” and “financing” are used interchangeably, financing refers to the time-shifting of the costs involved, whereas funding is about how the costs of a project will be repaid. The sources of funding include property taxes, business rates, tolls and user charges, asset disposal, budget allocations and grants. The sources of financing include banks, bonds, pension funds, development banks, equity investments and vendor financing.

General models for funding and financing are:

- **Devolved funding:** City authorities retain locally sourced funds (taxes and user charges), and then borrow against the future receipt of these funds.
- **Centralized funding:** The national or regional government allocates budgets to cities, or guarantees of local borrowing against transfer of revenue from the city government to the national or regional government.
- **Asset-specific cash flows:** Cities dispose of assets to recycle capital into new projects and link specific cash flows (user charges, such as tolls) to projects.

Value capture

Civic bodies often need to find a way to bridge the gap between the returns from new urban infrastructure and the costs of developing that infrastructure. The options available for value capture include:

- **Development consents:** Cities can define a mechanism for granting development consents to projects that will benefit from infrastructure development.
- **Taxes:** Cities can levy supplementary taxes on the properties that stand to benefit from the infrastructure.
- **Land-based value capture:** Cities can create a land bank that would benefit from new infrastructure development to capture revenue through property rights.
- **Joint venture (JV) arrangements:** Cities can create a JV with the private sector to retain long-term financial interest in the project.

Example: London's Crossrail project uses a mix of user charges (60% through collection of fares) and value capture (compulsory development contributions and Crossrail business rate supplement).⁵⁰

Example: The Hudson Yards redevelopment in New York City used tax incremental financing (TIF), where the city opted for TIF on the 150-hectare site. The City of New York agreed to cover interest on the TIF bonds in the event that dedicated TIF-related revenue flows were insufficient to do so.⁵¹

Example: The financing for the cable car in Medellin (Colombia) was jointly provided by the municipality (55%) and the cable car operator, Metrocable (45%). Metrocable's financial model was based not only on direct revenue, but also on supplements from carbon trading, where savings have been quantified at nearly 20,000 tons of carbon dioxide per year. Additionally, Metrocable operates the wider transport network, which has seen an increase in user activity that further enhances its revenue streams.⁵²

Example: In Australia, "brownfield recycling" was implemented in the state of New South Wales (NSW). The state's government created a capital fund, Restart NSW, which uses the proceeds of asset sales and dividends from the efficiency of delivering public service to invest in new infrastructure. Through this effort, the state government has eased taxpayer concerns, earned public acceptance for recycling capital and driven efficiency to fund new infrastructure.⁵³



Medellin: Mobility for Inclusive Development

An increase in urban to rural migration in Medellin led to informal settlements on the city fringes and precarious hillsides that surround the city, leaving their residents disconnected from the commercial heart of the city and the very employment opportunities they had sought to access. Poor infrastructure and lack of opportunity led to Medellin experiencing some of the highest levels of crime across the globe.

To revive the city and provide access to opportunities equally within the city, Medellin formulated an integrated urban development plan focusing on governance, connectivity, education and use of public spaces. The vision for the plan was to encourage local communities to participate in raising the city's quality of life by enabling access and opportunities.

The Metro Cable project launched in 2004 helped connect the various disconnected communities of the city and provided an easy access to the city for communities in inaccessible areas. The cable car has been integrated with other transport modes through a single fare policy, thus making commuting easier. The project was enabled primarily

by the sound funding model, which consists of a mix of revenue generated from operations and the carbon trading. This has led to savings worth 20,000 tonnes of CO2 per year.

Connectivity with the wider transport network within the city led to increased activity, enhancing the existing revenue streams. The financing was jointly provided by municipality (bearing 55% of the project costs) and cable car operator (bearing 45% of the project cost). Apart from reducing travel time from two hours to seven minutes, the project has led to substantial cost savings as well. Pollution levels have been controlled and the end user saves almost \$100 per month on commuting. Medellin's transport solution sets an example of solving complex urban problems through unique solutions based on city's social, economic and physical characteristics.

(This case was developed based on the report, Investor Ready Cities, How cities can create and deliver infrastructure value, published by Siemens, PwC, Berwin Leighton Paisner)

Attracting Investors

A coherent narrative is needed to deliver sustainable urban infrastructure and attract the necessary investment. The narrative should be supported by an investment-ready legal and regulatory framework. A city's ability to deliver the necessary urban infrastructure is linked to its ability to attract and retain capital, in terms of human resources and talent as well as financial capital. At a time of intense competition between cities, the ability to attract such mobile capital will define success. Cities need to create a thriving investment environment by meeting the needs of the investment community (Table 2).

Table 2: Investor Community Needs and Wants

Investor needs	<ul style="list-style-type: none">– Political and regulatory stability– Property rights (identifiable, transferable and enforceable)– Adherence to contractual framework– Exit mechanism from investment– Transparent procedures
Investor wants	<ul style="list-style-type: none">– Predictable licensing regime– City vision with key projects identified and a project pipeline– Objective and robust city governance procedures– Support from community and community approval– Clearly defined project, its scope, delivery programme and likely budget– Consideration of a project's feasibility and commercial viability, and possible funding options– Identified consents and permits required for project delivery

Source: World Economic Forum, interviews with urban experts; Siemens, PwC and Berwin Leighton Paisner, *Investor Ready Cities: How cities can create and deliver infrastructure value*, 2014

Accelerating PPPs

While the private sector can contribute to urban development projects through financial resources and innovation, only a few PPPs become successful. One of the reasons is the lack of well-developed projects, where the private sector is assured of returns, feasibility and commitment from the public sector. Other reasons include delays from permitting and community participation. The World Economic Forum⁵⁴ suggests adopting best practices for developing a project (Figure 11), and this across key project stages, including project preparation, feasibility study, risk allocation and creation of an enabling environment.

City governments should aim to standardize their PPP approach along best practices, for example:

- Establish a clear gateway/approval process
- Institutionalize project-preparation facilities, viability-gap funding or financing/guarantee facilities
- Provide model documents for contracts and tenders

To maximize the value of PPPs, governments should structure them as long-term programmes aligned with cities' visions, and not as a series of separate projects. City governments also need to recognize that building an enabling environment takes time, and that initial projects are unlikely to excel along all of the identified best practice dimensions. The build-up should proceed at a measured pace; the initial emphasis should be on non-controversial projects, relatively less complex contracting modes, and financially attractive assets. As lessons learned are incorporated and as the enabling environment matures, more complex and demanding PPPs can be undertaken across various urban domains. Well-designed PPP strategies and programmes, complemented by other policies to improve infrastructure prioritization, delivery and operations, can give cities a great opportunity to boost their infrastructure, increase competitiveness and achieve major socio-economic advances.

However, governments should keep their expectations flexible and realistic by also looking beyond PPPs. The PPP approach to infrastructure projects is no failsafe, silver-bullet solution, and if a PPP will not deliver the best value for money, it should be abandoned and perhaps replaced by a better-suited delivery mode (PPP is an option, not an objective).



King Abdullah Economic City: Unique Governance Model Facilitating Increased Public-Private Cooperation

A green-field city – King Abdullah Economic City (Saudi Arabia) – was launched in 2006 with a vision to drive socio-economic development. The city takes privatization in urban domain to the next level with a private municipality and intends to establish the city’s economic character around an industrial valley – a modern port, as logistics hub and as a tourism centre. The city intends to scale up the number of residents (from current levels of 5,000) by focusing on developing quality infrastructure while emphasizing customer-centricity, transparency, sustainability and citizen empowerment.

The city provisions its urban services (public services, city community, city safety and security, landscaping, waste management and utilities) through a private Special Purpose Vehicle (SPV). The stand alone, financially self-sustainable SPV enables city management to:

- Attract and develop joint-ventures/partnerships with service providers that have operational expertise
- Ensure quality control and compliance with public policy norms and guidelines
- Have independent and transparent financial accounts related to city service charges
- Create revenue-generating opportunities

The city administration gives special emphasis to risk management, project financing and structuring while

engaging in joint ventures with private service providers. The model allows for the city to form partnerships with service providers that have technical expertise, maximize operational efficiencies and leverage economies of scale. Further, model allows for services to be bundled and commercialized, ensuring cost recovery and financial sustainability. Capital and operations costs are shared with the partners and service charges are made transparent to overcome challenges of non-existent municipal revenue streams and local taxes in Saudi Arabia.

The main lesson from this case study is that the private provision of public services is an effective operational model that maximizes value to customers. The technical expertise remains with the service providers while the “City Management Company” becomes the custodian of quality control, public policy and guidelines. Support functions and back-office administration are provisioned through shared-service agreements to minimize costs while ensuring compliance. The partnership approach distributes high capital and operational expenditures between the city and the service providers, providing adequate freedom to explore and initiate revenue-generating opportunities to ensure financial sustainability. Some elements of city governance could be used even by traditionally managed cities to further engage the private sector in provisioning of urban services. However the model will have to be adopted based on governance structure, size and development stage of the city.

(This case study was provided by King Abdullah Economic City, Saudi Arabia)

Figure 11: Project Preparation Best Practices

 Rigorous project preparation process	 Team and leadership	1.1. Assemble an experienced, cross-functional team	1.2. Secure buy-in and leadership of high-level political champions and public servants
	 Governance & project mgmt	1.3. Set up a governance structure with clear roles/responsibilities and a coordinator	1.4. Pursue rigorous project management, and devise multi-stage planning
	 Preparation funding	1.5. Secure sufficient preparation funding, and minimize costs through standardization	1.6. Leverage project-preparation facilities (with cost recovery, advisory and monitoring)
 Bankable feasibility study	 Technical scope	2.1. Conduct robust and sophisticated demand forecasting	2.2. Fix contractible, innovation-friendly output specification cross-checked by cost forecast
	 Commercial attractiveness	2.3. Apply user charges, ancillary revenues, land-value capture and government payments	2.4. Test bankability continuously and conduct market sounding early
	 Prerequisites	2.5. Pursue proactive, inclusive and professional stakeholder engagement	2.6. Complete holistic legal feasibility check and expedite permits and land acquisition
 Balanced risk allocation and regulation	 Incentives	3.1. Adopt a life-cycle oriented contract model aligned with the policy objectives	3.2. Apply incentive-based price regulation and evaluate competition options
	 Risk mitigation	3.3. Identify all risks, allocate them to the best-suited party, and apply risk sharing/mitigation	3.4. Adopt regulation that is adaptive to exogenous changes and volatility
	 Safeguards	3.5. Fulfil social objectives via enforced quality regulation and efficient monitoring	3.6. Provide for government intervention options in a predictable and fair way
 Conducive enabling environment	 Public-sector readiness	4.1. Establish a solid legal framework and independent regulators/dispute resolution	4.2. Enhance individual capacity with training, and build institutional capacity in PPP units
	 Private-sector readiness	4.3. Facilitate access to local currency, long-term finance and guarantees	4.4. Develop a competitive and capable local industry/workforce and pursue trade reforms
	 Civil-society readiness	4.5. Insist on transparency and enforce anti-corruption standards	4.6. Optimize public communication, information and participation

Source: World Economic Forum. *Strategic Infrastructure: Steps to Prepare and Accelerate Public-Private Partnerships*, May 2013



4. Roadmap for Urban Transformation

4.1 Approaches

Approaches for spurring urban transformation are differentiated from each other by the parties or groups providing the impetus for investment and action (Figure 12). City governments may channel investment from the top into infrastructure and technology, while activity with less public-sector funding will be driven from the “ground up” and rely on, for example, start-ups and open platforms.

Top-down approach

For this approach (used in several Asian countries), all levels of government quickly identify their own potential “smart cities” and work to channel significant investment in that direction. In such cases, city administrations define the components of technology enablement within the cities, and then procure the software and infrastructure based on the overall design. Room for innovation is limited, as “solutions” are sought instead of opening up the problems and challenges to the private sector.

Example: Singapore is heading towards smart city development with the announcement of its Smart Nation Platform (SNP) and, most importantly, the funds to back it. The SNP, launched in the summer of 2014, is part of the government’s Infocomm Media Masterplan. The first phase is focused on deploying hard infrastructure related especially to connectivity and sensors.⁵⁵

Ground-up approach

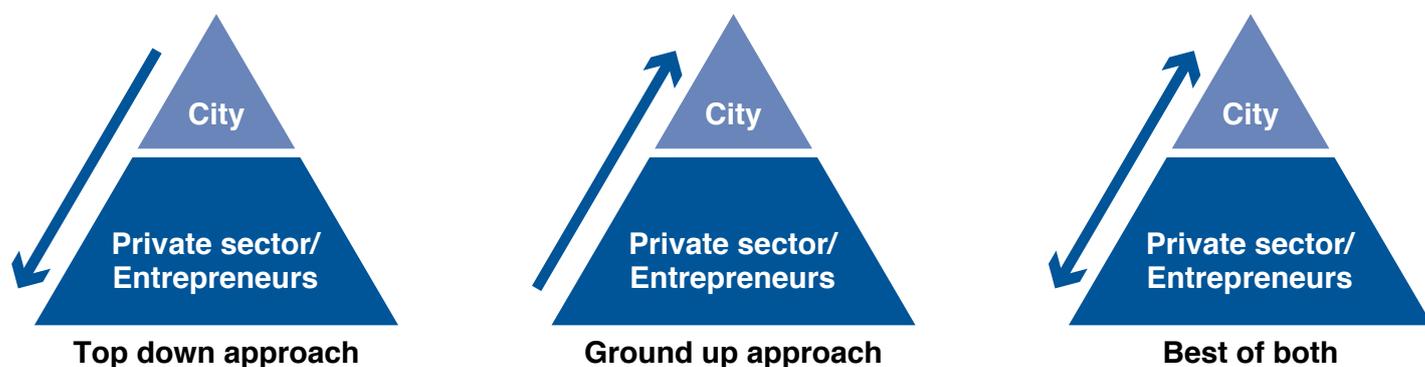
This approach has little public-sector funding, despite that the general idea of smart urban spaces has been central to the current generation of successful start-ups. The government’s role comes into play for promoting applications in fields that might be less appealing to venture capital, but crucial to domains such as municipal waste or water services. The city also promotes the use of open platforms and standards in such projects, which would speed up adoption in cities worldwide.

Example: Rather than relying on public-sector spending, the United States also has private enterprises such as Uber, a smartphone app that lets anyone call a cab or be a driver, and AirBnB, an apartment-sharing website, that represent a new frontier for disrupting the way urban services are delivered. Excess capacities can be leveraged in the system through such digital channels.

Best of both

The city administration is more of a catalyst and can invest in strategic trunk infrastructure that is required to provide urban services. Such infrastructure includes utility corridors and a connectivity backbone. The city administration must adopt open data and standards to exchange data. Using this framework, solutions can be developed as and when required.

Figure 12: Approaches for Urban Transformation



Source: World Economic Forum, Shaping the Future of Urban Development & Services Initiative,

4.2 Call for Action: The 10-Step Action Plan

Urban transformation and adoption of urban services will vary considerably based on a city's state of development. Cities can develop different urban domains simultaneously over a long time horizon to move up and leapfrog stages of development. This will involve making complex choices and dealing with the interests of all stakeholders involved. The two key principles of experimentation and learning from other cities will be imperative to drive success throughout the action plan. The plan contains 10 action items that city managers need to consider when aiming to change the way urban services are delivered.

The journey through the 10-step action plan is not necessarily linear, and cities may have to visit certain preceding stages based on decisions made along the way. For instance, when a city navigates through the "Funding and Financing" step and determines that it does not have sufficient capital budget to undertake a project, it may have to revisit the "Develop Programmes" phase to redefine projects under the programme. The same is true with the "Develop Capacity" phase, in case the city determines that it would not be possible to develop competencies in-house, the city may structure a project differently to leverage the expertise available in academic institutions and the private sector.

Identify DNA

Each city develops a unique set of economic and social characters that often reflects the physical infrastructure, culture and heritage of the city. While it is important that a city identifies its unique characteristics and builds on those, cities have to keep a close watch on the emerging trends. The city may need to redefine its "DNA" if required so that it stays relevant in the new global context. Identifying DNA (or key characteristics that define the city) will be a collaborative bottom-up approach where all citizens should be engaged irrespective of their age, gender, faith or ethnicity. It is important to give due consideration to the de-facto boundary of the city while identifying key characteristics, and then translate those to the boundary of the administrative unit within the city. This implies that administrators will have to reach to stakeholders across the ecological and economic footprint of the city when undertaking this exercise.

Identify Challenges

A city could face multiple challenges across various dimensions such as urban planning, mobility, culture and leisure, environment, institutions, knowledge and skills, urban economy, infrastructure (water, power, waste management, housing and sanitation), e-government services and social infrastructure (healthcare, safety and inclusion). The annex to the report provides a list of top urban issues across each dimension that city leaders could use to identify challenges. While the list provides global issues across each dimension, a city's specific issues might differ based on size, demographics, development stage and governance structure. Additionally, the assessment based on the maturity model (Figure 5) of various levers will also enable a city to identify challenges around fulcrums that can be used for urban transformation, thus enabling cities to take steps in the development journey.

Develop a Shared Vision

A city needs to develop a long-term vision to strengthen the key characteristics and overcome urban challenges. Section 1.3 of the report identifies key outcomes that cities in the future will desire to achieve. Further, a city can create an aspiration vision based on the levers identified in Figure 5. While developing a shared vision, it is important to quantify the outcomes, and cities can use standards such as ISO 37210 (or any other standard) to set the aspirational goals for key performance indicators (KPIs). Several leading cities have already benchmarked themselves on a standard set of parameters, and cities can look up to benchmark parameters as they set realistic KPIs. The citizen must be kept as a central focus while determining the KPIs and active participation must be sought from various government entities operating in the city, private sector, NGOs and academic institutions.

Identify and Prioritize Goals

Once the vision has been established, key priorities among the various urban domains' goals need to be identified. The priorities will depend on factors such as impact of challenge, extent of challenge, transformation desired, propensity to drive change, significance in overall vision, etc. A city cannot achieve all the goals and KPIs at once due to resource constraints. However, based on the development stage, the following goals can be prioritized – for rudimentary cities – water, waste, sanitation and shelter; for functional cities – power, transport, health, education and safety; for integrated cities – green space, cultural aspects, public realm and elderly care; for scalable cities – advanced education, mental and social well-being, and level of independence. Again, each city will have to realize this step through citizen engagement and may have to revisit priorities on a periodic basis after evaluating the benefits of implemented projects.

Develop Programmes

After identifying and prioritizing goals, cities need to develop a programmes and a project pipeline based on the assessment of current infrastructure and facilities and aspirational outcomes. As cities develop programmes and projects to realize their goals, the focus should not be on solution design for those projects that will be outsourced; rather, the focus should be on project outcomes and solution design must be left to the private sector so that innovative solutions can be adopted. Multi-domain programmes that break traditional silos must be preferred over specific projects that just impact one of the urban dimensions. Identifying the right spatial scale is critical to ensuring successful outcomes, and some projects within a programme should be earmarked for experimentation and agile delivery to deliver tangible outcomes quickly and increase stakeholder confidence.

Revisit Regulations

As cities embark upon urban rejuvenation initiatives, they will be leveraging solutions based on disruptive business models that do not seamlessly fit into traditional regulatory frameworks. The regulation and legislation need to be flexible and smart to prevent inertia, navigate change and enable innovation. Cities can benefit from adopting the paradigm of smart regulations elaborated in section 2.2.1 to embrace innovation. Further, cities need to create an enabling environment where the private sector can contribute to urban rejuvenation and section 3.3 highlights some actions that governments (national, regional or local) can take to create a favourable environment for private-sector participation.

Develop Capacity

Urban transformation programmes may require skills beyond those available at the institutional level. Management and technical capacities may have to be augmented through external support to undertake transformation projects in scenarios where internal capacity cannot be developed in a timely manner. Experts such as economists, urban planners, engineers, environment specialists, financial analysts, legal specialists, transaction advisers and contract management specialists may be required for conceiving and managing execution. Cities must ensure that they continue to “manage by knowledge” and not “manage by authority” when using external capacity to reduce the extent of external dependency and avoid lock-in issues.

Financing and Funding

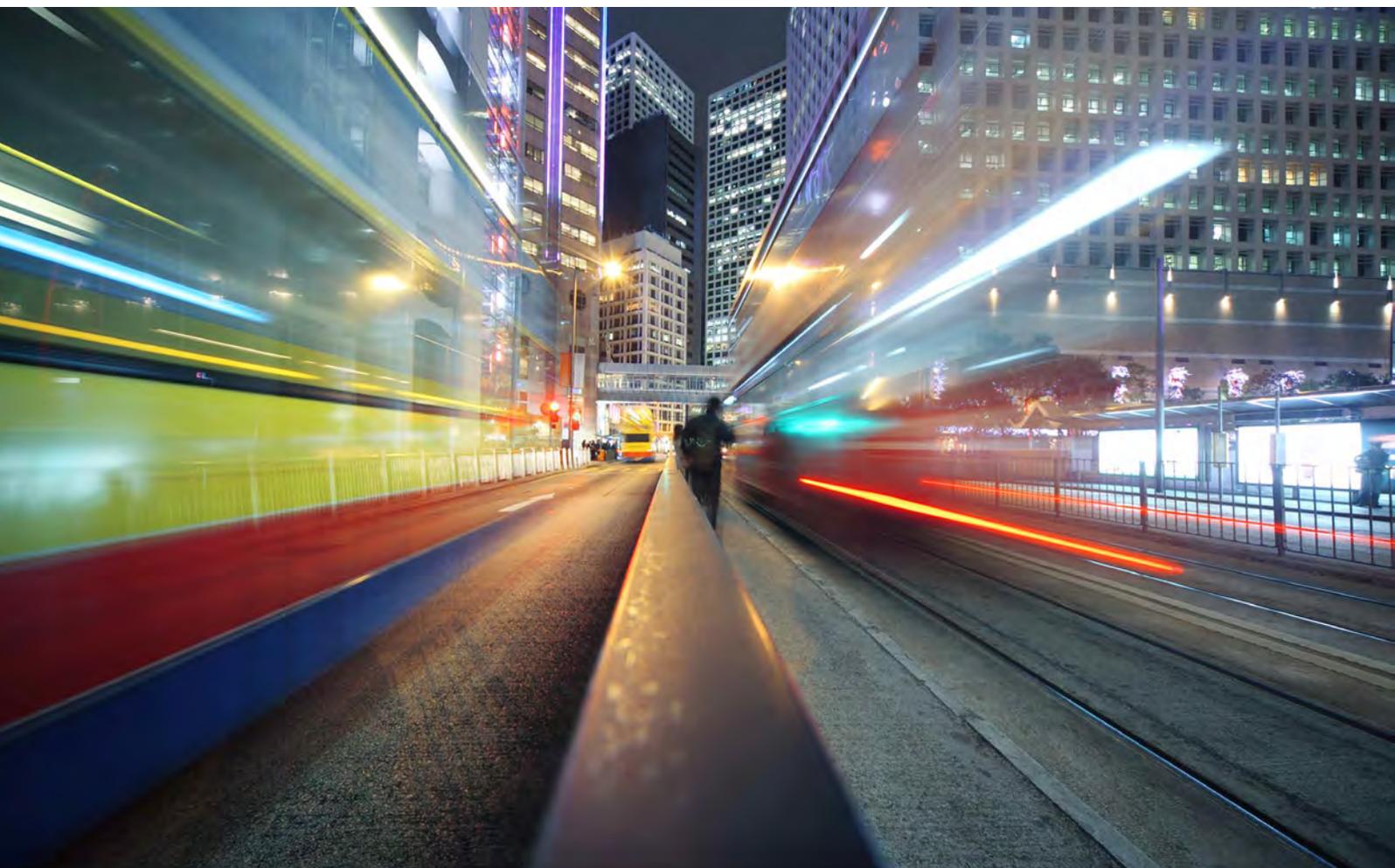
Cities should design urban rejuvenation programmes that are financially sustainable; in a scenario where budgets are constrained and project-specific revenue streams are insufficient to make projects viable, cities will have to evaluate alternate ways of value capture through methods elaborated in section 3.5. Not all projects may generate commensurate rewards based on the risk profile, and for such projects, local governments will have to step in with an adequate viability gap funding mechanism or adopt techniques such as brownfield recycling to new investments in infrastructure development.

Target Quick Wins

Large infrastructure augmentation or implementation of technology solutions are often time-consuming and have large lead times until tangible or intangible benefits can be accrued. Agile project development methods or pilot projects can help to showcase interim results. Such results can enable city brand development, which can serve to attract investment, people and innovative solutions.

Manage Benefits and Monitor

The projects need to be monitored on a regular basis to ensure that cost and schedule overruns are kept to a minimum and the desired quality output is produced. Cities benefit from citizen audit processes and should leverage the power of social media to communicate and monitor the benefits of the projects. If required, mid-course corrections will need to be made and preceding steps revisited to ensure project success, leading to meeting the KPIs.



4.3 Conclusion

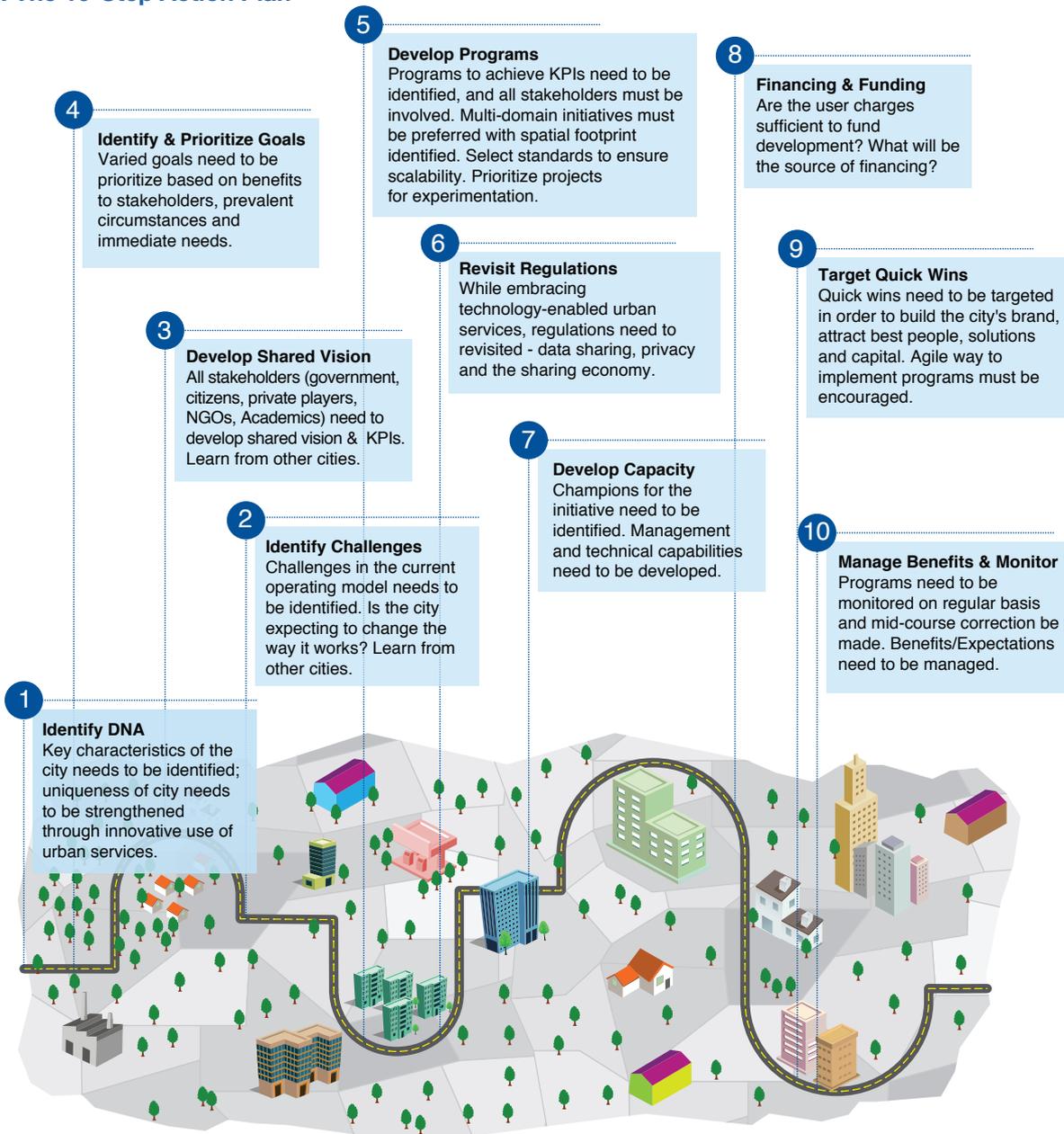
For cities to thrive and continue to attract talent and capital in an increasingly competitive global landscape, they will need to be nimble and focused on several important aspects while they follow the action plan for urban transformation:

- **Be stable, but not stagnant:** Cities must continuously evolve to develop regulations and governance structures that meet stakeholders' needs, which themselves are changing at a rapid rate
- **Nurture and accept innovation:** Cities need to experiment and embrace new technology and new business models that enable them to do more with less
- **Collaborate:** Cities must address the needs of all sections of society and work with communities, NGOs, academia and the private sector; in this way, they can become sustainable, citizen-centric, economically vibrant, accessible, resilient, responsive and well-governed

- **Create a conducive business environment:** It is clear that city governments will require support from the private sector to develop cities, and city government will have to understand and meet the needs of the private sector and create projects that balance risks and rewards
- **Demonstrate leadership:** City leaders need to be both visionary and pragmatic in pushing through the desired transformation; they will need to take calculated and well-informed risks and guard against assuming the default position of risk aversion

We are in a phase of unprecedented urbanization; the challenges are great, but so are the opportunities. We are witnessing extraordinary successes in a few cities in the developed world that have embraced the opportunities provided by new technologies to drive change in the way citizens are engaged and cities are governed. The time is right for other cities to initiate and propel their journey towards becoming sustainable, citizen-centric, economically vibrant, accessible, resilient, well-governed and responsive.

Figure 13: The 10-Step Action Plan



Source: World Economic Forum, Shaping the Future of Urban Development & Services Initiative & PwC Research

Annex

Survey Results

The survey results show the top ranked issues across various urban domains.

Top Issues with Urban Planning

1. Integrated planning
2. Informal dwellings
3. Land-use planning and zoning
4. Sustainable development of buildings
5. Urban regeneration

Top Issues with Mobility

1. Access to mass transit system
2. Quality of mass transit system
3. Affordability of mass transit system
4. Quality of sidewalks and bike ways
5. Access to sidewalks and bike ways

Top Issues with Culture and Leisure

1. Adequacy of public realm and open spaces
2. Access to public realm and open spaces
3. Quality of tourism facilities
4. Access to leisure facilities
5. Quality of leisure facilities

Top Issues with the Environment

1. Avoid emission of air pollutants
2. Prepare for climate change
3. Avoid effluents in water
4. Reduce greenhouse gases
5. Avoid soil contamination

Top Issues with Institutions

1. Public engagement and consultation
2. Balance of power between city and other levels of government
3. City organizational structure, governance and processes
4. Functional competence of city officials
5. Project financing

Top Issues with Knowledge and Skills

1. Quality of school education
2. Quality of higher education
3. Availability of research facilities/innovation hubs
4. Availability of schools
5. Quality of research facilities/innovation hubs

Top Issues with the Urban Economy

1. Educate and Develop workforce
2. Attract talent
3. Availability of finance
4. Promote local businesses and facilitate trade
5. Attract foreign direct investment (FDI)

Top Issues with Infrastructure

1. Access to clean water
2. Uninterrupted access to power/energy
3. Access to affordable housing
4. Reuse and recycling (water)
5. Material reuse and recycling

Top Issues with E-Government Services

1. Availability of public services over digital channels
2. Quality of public services over digital channels
3. Affordability of public services over digital channels

Top Issues with Social Infrastructure

1. Response to terrorism and violence
2. Urbanization and migration to cities
3. Disaster preparedness
4. Ageing population
5. Availability of primary care

Acknowledgements

Steering Board, Shaping the Future of Urban Development and Services Initiative

- Gregory Hodkinson (Chair), Chairman, Arup Group, United Kingdom
- Suparno Banerjee, Vice-President, Public Sector Programmes, Hewlett Packard Enterprise, USA
- Chris Bilton, Director, Research and Technology, BT, United Kingdom
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World Economic Forum

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Endnotes

- 1 United Nations, Department of Economic and Social Affairs, Population Division. "World Urbanization Prospects, the 2014 Revision", Highlights, 2014; "A survey of cities: The world goes to town", *The Economist*, 3 May 2007, <http://www.economist.com/node/9070726>.
- 2 The Global Survey on Urban Services (Oct.-Dec. 2015) was conducted by the World Economic Forum's Shaping the Future of Urban Development and Services Initiative; over 50 urban experts from government, the private sector, civil society and academic institutions participated
- 3 Menon, Anil. "Running cities: the rise of a \$3 trillion industry", World Economic Forum, *Agenda*, 11 November 2014, <https://agenda.weforum.org/2014/11/running-cities-the-rise-of-a-3-trillion-industry/>.
- 4 European Institute for Comparative Urban Research (Euricur), PwC and the Institute for Housing and Urban Development Studies (IHS). *iUrban inspire, innovate, implement: Innovative city strategies for delivering sustainable competitiveness*, 2014.
- 5 HP, Industry Edge. *HP Future Cities: Citizen-centric government delivering public value*, 2014.
- 6 World Economic Forum. *Top Ten Urban Innovations*, 2015.
- 7 World Economic Forum. *Towards the Circular Economy: Accelerating the scale-up across global supply chains*, 2014.
- 8 See <https://www.peerby.com/>.
- 9 See <http://www.zipcar.com/>.
- 10 World Economic Forum, 2014, op. cit.
- 11 Capgemini. *London's buses set for another ten years of cost-saving IT support* [Press release], 31 July 2009, <https://www.uk.capgemini.com/news/pr2020>.
- 12 Siemens, PwC and Berwin Leighton Paisner. *Investor Ready Cities: How cities can create and deliver infrastructure value*, 2014.
- 13 Local Government Denmark. See <http://www.kl.dk/English/Consultancy-Services/>.
- 14 World Economic Forum. *Top Ten Urban Innovations*, 2015.
- 15 New Urban Mechanics. See <http://newurbanmechanics.org/boston/>.
- 16 NEC. "Public Safety: Emergency & Disaster Management", <http://www.nec.com/en/global/solutions/safety/disaster/index.html>), and "Public Safety: Case Studies", (<http://www.nec.com/en/global/solutions/safety/disaster/casestudies.html>).
- 17 Street Bump. See <http://www.streetbump.org/about>.
- 18 HP, 2014, op. cit.
- 19 Euricur, PwC and IHS, 2014, op. cit.
- 20 Australian Government, Department of Infrastructure and Regional Development. "Intelligent Transport Systems", November 2015, <https://infrastructure.gov.au/transport/its/>.
- 21 Singapore Local Transport Authority's Website <http://www.lta.gov.sg/content/ltaweb/en/roads-and-motoring/managing-traffic-and-congestion/electronic-road-pricing-erp.html>
- 22 Euricur, PwC and IHS, 2014, op. cit.
- 23 HP, 2014, op. cit.
- 24 Qualcomm. *Qualcomm Wireless Reach in Japan*, <https://www.qualcomm.com/media/documents/files/wireless-reach-in-japan.pdf>; "Qualcomm launches mobile health service in Japan", *Mobile World Live*, 11 June 2012, <http://www.mobileworldlive.com/qualcomm-launches-mobile-health-service-in-japan/>.
- 25 World Economic Forum. *The Competitiveness of Cities*, 2014.
- 26 European Commission. "Better Regulation", http://ec.europa.eu/smart-regulation/index_en.htm.
- 27 Local Government Denmark. See <http://www.kl.dk/English/Municipal-Responsibilities/>.
- 28 Government Offices of Sweden. See <http://www.government.se/government-policy/mission-the-future/secretariat-for-the-future/>.
- 29 NYCStat Stimulus Tracker. See <http://www.nyc.gov/html/ops/nycstim/html/home/home.shtml>.
- 30 *Where Does My Money Go? Showing you where your taxes get spent*, <http://wheredoesmymoneygo.org/bubbletree-map.html#/~total>.
- 31 Helsinki Region Infoshare. See <http://www.hri.fi/en/news/a-transparent-city/>.
- 32 World Bank Group. "Dealing with Construction Permits", 2015, <http://www.doingbusiness.org/data/exploretopics/dealing-with-construction-permits/good-practices>.
- 33 PwC, Public Sector Research Centre. *Future of Government: Tomorrow's leading public body*, 2013.
- 34 Euricur, PwC and HIS, 2014, op. cit.
- 35 coUrbanize. See <http://www.courbanize.com/>.
- 36 World Economic Forum. *Top Ten Urban Innovations*, 2015.
- 37 World Council on City Data, Global Cities Registry. See <http://www.dataforcities.org/registry>.
- 38 International Telecommunication Union (ITU). "ITU-T in brief", <http://www.itu.int/en/ITU-T/focusgroups/ssc/Pages/default.aspx>.
- 39 ITU. *ITU standards to integrate Internet of Things in Smart Cities* [Press release], 10 June 2015, https://www.itu.int/net/pressoffice/press_releases/2015/22.aspx.
- 40 Mayor of London. *London Infrastructure Plan 2050 Update*, 2015.
- 41 World Economic Forum. *Strategic Infrastructure: Mitigation of Political & Regulatory Risk in Infrastructure Projects*, 2015.
- 42 Ibid.
- 43 Ibid.
- 44 Ibid.
- 45 Ibid.
- 46 Ibid.
- 47 Ibid.
- 48 Ibid.
- 49 Ibid.
- 50 B20 Collective Action Hub. "High Level Reporting Mechanism (HLRM)", <http://www.collective-action.com/initiatives/hlrn>.
- 51 Siemens, PwC, Berwin Leighton Paisner, 2014, op. cit.
- 52 Ibid.
- 53 Ibid.
- 54 Australian Government, Infrastructure Australia. *National Infrastructure Plan June 2013*; NSW Government. *NSW 2013-14 Budget Papers*, 2013.
- 55 World Economic Forum. *Strategic Infrastructure: Steps to Prepare and Accelerate Public-Private Partnerships*, 2013.
- 56 Info-communications Development Authority of Singapore. "Smart Nation Vision", <https://www.ida.gov.sg/Tech-Scene-News/Smart-Nation-Vision>.



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