The Power of Three for smarter, more resilient cities

Government & Public Sector Insights
Cities around the world are growing fast. Between 2014 and 2050, the global urban population is set to increase by about 2.5 billion people. By the time this century reaches its halfway point, two-thirds of the world’s 9 billion people will live in urban areas.

This unprecedented level of urbanization brings both opportunities and risks to businesses, governments and society at large. Technology will be crucial to meeting these challenges, with the global smart city market estimated to reach US$1.3 trillion by 2020.1 But technology alone can’t solve the social, environmental and logistical issues that growing cities face.

How well entrepreneurs, corporations and governments work together will determine how effectively cities can transform to build a better working urban world. At EY, we call this the “Power of Three.” For government and business to collaborate on smart, sustainable solutions to urban development, the citizen must be at the center. Cities, after all, are for their citizens and cannot grow and thrive without them. Citizens should feel connected to their city — through infrastructure and digital delivery, physical and social interaction, and emotional engagement.

The impact of the Power of Three for smarter and more resilient cities will rest on codeveloping innovative initiatives for connected citizens so that citizens, and the cities they inhabit, can prosper long term.


Cities at a tipping point

Cities are the most important economic, geographic and administrative entities in today’s world. And their prevalence, as well as the opportunities and risks they present, will only intensify in the coming decades. Large populations, scarce natural resources, demographic shifts and limited funds are increasingly forcing cities to find new solutions to survive, adapt and grow. For this reason, cities are at a tipping point.

Widespread urbanization characterizes economic and social development this century, with more than 50% of the world’s population already living in cities. Urbanization is more extensive in advanced economies. In countries aligned with the Organisation for Economic Co-operation and Development (OECD), around two-thirds of people live in cities. The proportion is slightly lower in emerging economies, though urbanization is progressing rapidly. The urban share of the global population is expected to climb to 60% by 2030 and to 85% by 2100.2

As centers for people and economic activity, cities are substantial drivers of economic performance. OECD estimates suggest that metropolitan areas with more than 500,000 residents drive 55% of GDP and more than 60% of economic growth in OECD countries. These contributions are only expected to increase in the coming years. High levels of human capital and agglomeration effects, including knowledge spillovers and financing activity, mean many cities have high productivity levels relative to the country as a whole. These trends are also self-reinforcing. For example, looking to OECD countries once again, studies indicate that for each doubling in population, the productivity level of a city increases 2% to 5%. This suggests that greater competition, deeper labor markets and higher knowledge transfers in densely populated cities can have a material impact on economic outcomes.

Reference: oecd.org/gov/cities.htm

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Importantly, beyond productivity and economic gains, cities provide a crucial platform for sustainable and inclusive growth. They play a critical role in generating greater well-being for their residents, including through access to skills and employment opportunities, social and civic engagement, and environmental sustainability. This is recognized in the new, globally endorsed United Nations Sustainable Development Goals. Sustainable Development Goal 11 calls for cities to be “inclusive, safe, resilient and sustainable.”

Multiple examples illustrate that cities can achieve these outcomes—from transport services and social infrastructure to cultural diversity and job prospects.

With their growth, economic potential, and opportunities for sustainable and inclusive development, why are cities at a tipping point? Greater opportunity also brings greater risk. Dense populations and rising economic activity elevate costs for housing and services. The non-monetary costs—air pollution, congestion, longer commute times and reduced safety—are all detrimental to residents’ well-being. Furthermore, sector concentration, such as in financial services and technology, can drive economic vulnerabilities.

These pressure points are expected to emerge around the world in the coming decades, taking several forms. In developed economies, urban populations are expected to increase modestly, with incremental changes to cities and their urban form. The task for policymakers will be to modify and expand structures to drive greater efficiency and resilience against external threats, and to promote better well-being for residents, including a rapidly aging population. By contrast, developing economies are expected to experience rapid urbanization, with more than 90% of it taking place from 1950 to 2050. These economies are likely to encounter significant challenges in urban planning, infrastructure development, social cohesion and environmental mitigation.

In advanced and emerging economies alike, the policy priority is achieving sustainable, inclusive growth. To have sufficient horsepower, this effort must combine technology and collaborative governance to help cities survive, adapt and grow.

Cities of the future will soon account for 90% of the world’s population growth, 80% of its carbon emissions and 75% of its energy consumption.

Figure 1: Differences in GDP growth by distance to large cities highlight their significant impact on the economy.
Figure 3: Rising population densities suggest that cities will need to find new solutions.

Median population density in OECD economies (persons per square kilometer)

Figure 4: Increasing pressure on infrastructure indicates that existing models are moving closer to a tipping point.

Median annual growth in commuting population by metropolitan area, %, OECD economies

Source: OECD, March 2016

Source: OECD, March 2016
Smart means resilient

To meet their development challenges, cities must deepen their productivity and economic capabilities and broaden their support for residents’ well-being. They need to function well during normal times and in the face of adverse shocks. In other words, cities of the future are resilient cities.

What is resilience?

Urban resilience is “the capacity of individuals, communities, institutions, businesses and systems within a city to survive, adapt and thrive, no matter what kinds of chronic stresses and acute shocks they experience.”

Beck Dawson
Chief Resilience Officer, City of Sydney, Australia, Rockefeller Foundation

Smart technology is a critical enabler for resilience in cities. Cities, as discussed, can generate significant benefits, including higher incomes and productivity and greater access to social and civic opportunities. But they are also vulnerable to the negative effects of agglomeration, including pollution and congestion. A city that is resilient, driving better economic and social outcomes over the long term, needs to decouple the positive effects from the negative. This is where technology can play an important role.

Being smart can result in a resilient and prosperous city. Embedded in new solutions, or in the activation of existing infrastructure and services, smart cuts across all aspects of urban development. For example, smart technologies, such as data analytics and cybersecurity, underpin a city’s infrastructure and services, including transport and utilities, which ultimately serve its social and economic goals. In other words, smart is a means to an end, enabling new approaches that can improve citizens’ well-being and, ultimately, help the city prosper.

Viewed from another angle, smart is about creating resilience in a proactive way. It is one thing to build adaptability to risks such as flooding and other environmental changes. Smart and resilient solutions take a longer-term, transformational perspective to support better outcomes for residents. Policies for smart and resilient cities should focus on understanding how cities’ challenges and needs are changing; anticipating demands and risks; and then using technology to provide more effective and affordable solutions.

Spotlight: Amsterdam – smart as resilient:

The city of Amsterdam offers a leading-practice example of a policy initiative for smart and resilient cities. The Amsterdam Smart City program is structured around four pillars: cooperation; smart technology and behavior change; knowledge exchange; and the quest for economically viable initiatives. Notably, Amsterdam is driving progress toward a smarter city to support a “sustainable city.” The initial investment is in infrastructure, including large-scale electricity generation and distribution, transport infrastructure, and water and waste, providing the foundation for a smart transformation to a more resilient city.

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Smart transportation systems and traffic management are key examples of applying smart solutions to achieve more resilient outcomes for a city. Many cities are mining big data and using sensors to reduce traffic congestion, improving walkability and the overall quality of life. This shows that the impact of such strategies reaches far beyond the immediate effect of the technology being introduced. These initiatives also engage citizens in co-developing solutions — through crowdsourcing data and app development — that can support their uptake and sustainability.11

Smart interventions can also drive flow-on effects for resilience. A city that is well-planned and designed and that uses technology effectively can be more resilient to climate change and can support sustained contributions to economic growth. In turn, this can drive greater productivity and efficiency and support investment, further bolstering economic activity.

Figure 5: The EY smart cities framework shows that smart cuts across all aspects of urban development.

Source: EY, 2016

Citizens are the heart of smart and resilient cities

Smart and resilient cities can take many forms, with technology providing multiple avenues for sustainable economic and social performance. To think about what makes a smart city an effective one, take a step back and consider the ultimate purpose of smart and resilient cities.

Cities are more than a combination of buildings and infrastructure assets. They are living organisms whose major hallmarks are the people who live there and how they interact. So the overarching objective of any smart intervention is to increase the well-being of residents – and to sustain that change. A successful smart and resilient initiative would be evident in shorter commute times, less pollution, accessible employment and social services, and quality leisure activities.

“A city without people is just a building site or an historical site.”

Toby Kent
Chief Resilience Officer, City of Melbourne, Australia, Rockefeller Foundation

For the Power of Three, this ultimate focus on smart for advancing residents’ well-being provides a clear common purpose. With the citizen at the center, governments, entrepreneurs and corporations have aligned goals in working to help cities thrive. No entity exists in a vacuum; government, business and entrepreneurs are all residents, employers and civic participants. All stakeholders want the same outcome: a better quality of life and a more productive, prosperous city.

Having citizens’ well-being as a common purpose can inform the design and execution of smart and resilient cities. It also highlights the importance of how citizens engage with their city. They need to be connected through infrastructure and digital delivery, physical and social interaction, and emotional ties. They also need the opportunity to collaborate and to co-design strategies. This is an important consideration for policymakers because it moves beyond simply consulting citizens and has an important bearing on the quality of life. Any smart and resilient solutions for cities must take this qualitative dimension into account; driving a deeper connection will be important for well-being.

Spotlight: Community and connection

EY sees citizens as a huge and engaged asset that can be tapped to help shape the future of cities. EY Sweeney research found that citizens relish the idea that their city is unique and has characteristics that set it apart. The Australia-focused study found that citizens are inspired by the build environment and the atmosphere of a city and its status. It’s not just about what the city presents to them but what it says to the world. Citizens highly value the stimulation of an active and evolving city.

Citizens who were most positive about their city had a strong emotional connection. They didn’t just speak of the physical environment, but rather the qualities that made them feel part of the city and resonated deeply with how they wanted to live. They had a pronounced sense of belonging to their community and the city at large. Citizen engagement with city leadership was also critical.

Redefining connection

EY Sweeney research identified six drivers for establishing a sense of belonging, community and genuine connection with a city:

1. **Parity** ... do I have equal opportunity to the quality of life I want as others in the city?
2. **Agility** ... can I easily move around the city and be part of the full city experience?
3. **Affinity** ... do I relate to the people and personality of the city?
4. **Pride** ... do I feel good about my city as part of its country and the international community?
5. **Stimulation** ... does the city inspire me and enrich my world?
6. **Leadership** ... do I trust the decisions being made; are they for the future benefit of the city?

13. Ibid.
Connection redefined – collaborative solutions for smarter, more resilient cities

If effective outcomes for smart and resilient cities focus on citizens’ well-being, collaborative solutions are critical for a prosperous future. In fact, smart cannot solve everything alone. Entrenched policies, rules and regulations, and existing relationships among government departments, across jurisdictions, and with the private sector and nonprofit organizations are all significant factors in play. It is also telling that cities within the same country can face different urban development costs and experience vastly different productivity levels, indicating that policy and citizen interaction can certainly influence outcomes.

As a result, successful initiatives for smart and resilient cities are homegrown and developed across government, business and civil society. Cities need to consider a strategy to work across all stakeholder groups to drive the best outcomes for their residents. This is where the Power of Three comes in. Government, business and entrepreneurs can work together to redefine connection – to each other and to the city’s infrastructure, for example – to drive smart strategies for resilient growth.

In these collaborations, government, business and entrepreneurs each have several burning considerations. These different dimensions of smart and resilient cities focus on outcomes for residents, including their connection to their city. They cut across the physical, digital and community elements of the challenges facing cities today, and they provide a common playbook for investment and collaboration in the years to come.

“Pursuing greater collaboration and integration can have a dramatic impact on a city’s resilience. Every city’s take on these qualities differs, but it’s clear that when cities work together with their citizens, local businesses, and other stakeholders, and promote collaboration between agencies, the result is better outcomes with longer-lasting benefits. When diverse groups organize, share ideas and communicate, decisions draw from a broader insight base, priorities are better aligned and outcomes achieve multiple goals instead of one – often producing a cascade of benefits.”

The Rockefeller 100 Resilient Cities initiative

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1. How can big data and agile development have a role in improving public service delivery and resilience?

Big data and predictive analytics can be transformative for city governments. New data and analytical tools let municipalities take a granular look at their populations’ demands and behavioral patterns, then rapidly test and iterate solutions for serving their constituents, at a lower cost. Effective use of real-time information can also support service delivery and resilience against shocks. However, the potential is much greater. Data and analytics, including predictive models, and behavioral approaches to policy, can drive more effective investment and resource allocation. For example, municipalities can use behavioral microsimulation techniques to test whether their target “future state” is the most desirable outcome – before policy interventions are even designed and tested. This is powerful for key work streams. With transportation, for instance, knowing how behaviors would shift in a future scenario, such as if autonomous buses were commonplace, can inform decisions on whether to pursue a pilot program or investment and can shape the policy initiatives needed to get there. The implications for service delivery and effective policy design to increase a city’s resilience are substantial. As another example, a city could use data and analytics to predict residents’ behaviors around the introduction of a new tech hub, then tailor policy interventions to drive job creation accordingly. That could have huge implications for economic development and sustainability.

Data and analytics can also form the backbone of new governance structures for city governments. The varied and overlapping nature of crowdsourced data and other new information provides a snapshot of the realities of urban life and citizens’ interactions with the city government. In some cases, this information does not match up with existing silos in government. For example, people’s health may not be separate from their mobility needs. City governments can use new data and new tools to redraw organizational structures, breaking down barriers and encouraging collaboration across government, to meet residents’ actual service demands.
2. What institutional settings could improve the quality of smart infrastructure decision-making?

The development of organizational structures in city government to support the use of new data and decision-making tools is important to the impact of smart. This includes governance and systems for cross-functional collaboration in a municipality. It also includes significant investment in talent and internal capacity to use new tools and techniques and adopt emerging capabilities.

At the same time, the architecture and settings for collaboration with the private sector, and with citizens, will be necessary for effective use of new, open data sets and digital platforms. This could include an “open data by default” policy to support innovation and collaboration. Privacy, cybersecurity and clear governance will be vital to maintaining the integrity of the data, promoting proper use, and encouraging wider adoption and contribution from businesses and residents.

3. How can real-time and granular data better inform pricing and community payoffs?

The effort to contain costs and enhance service delivery could mean that city governments use data-driven decision-making by default, with rigorous monitoring and benchmarking. This is a critical enabler for process improvement. It is also the foundation for emerging attempts to measure public sector productivity, capturing not only cost drivers but also outcomes, as measured in new, fragmented data sets. Benchmarks and outcomes are also the basis for effective commissioning, contestability and managed services models. With data and analytics, city governments can also drive compliance and counter fraud across many areas of their jurisdiction, including taxation, waste and water, and urban development. This has significant potential impact on waste, cost containment and community issues, including crime and environmental externalities. Critical considerations include verifying that the right information is captured and used in decision-making and effectively communicating the findings to senior leadership.

Smart City Gran Concepcion

The Gran Concepcion metropolitan area in Chile launched a “Smart City Gran Concepcion” pilot that includes a series of initiatives to improve local and municipal service delivery by introducing open innovation and information and communications technology tools. It also seeks to establish the framework for developing a local and sustainable innovation ecosystem. This includes the co-creation of a strategy for using technology to improve local and municipal services, alongside the city’s major stakeholder groups.

4. How can you use smart assets to drive superior return on investment (ROI)?

Smart has important applications for infrastructure, with significant implications for citizens’ mobility, activity and well-being. Although discussion on big data ROI for the private sector typically centers on customer retention, community building and segmentation,18 its uses in managing and optimizing physical assets will also be crucial. For example, real-time information on asset conditions, including temperature and usage, can result in cheaper and predictive maintenance, reduced operational costs, and greater energy efficiency. Using this data to inform funding and financing decisions could drive commercial advantages and have a significant impact on city infrastructure in the coming years.

5. What specific changes to planning rules and regulations can incentivize businesses to drive development of smart and resilient solutions for cities?

Municipal support for research and development, pilot programs and innovation is likely to have a significant impact on private sector investment in next-generation smart technologies. As with other large-scale infrastructure and real estate investment initiatives, businesses will need to partner with municipalities in designing risk-sharing structures and incentive schemes with mutual payoff. The right mix of collaboration, as well as tax incentives, and clarity on transport, urban development and other policy planning will be important for businesses to invest in smart at scale.

6. What are the major investment and financing concerns for smart initiatives?

The investment risk for developing new technology, and the financial implications of building out investment at scale, are fundamental issues for private sector players to resolve so that smart cities are a sound investment proposition. Clear public-private partnership models, loan guarantees, clarity on value capture and tax increment financing could all be important avenues to explore in cities.20

7. What are the emerging trends in citizens’ demands of their city infrastructure and social systems, and where are the gaps in existing commercial offerings?

This is about completely reimagining how things are done in urban environments, with new data providing a springboard for start-ups to launch and scale new businesses. How a city’s residents generate and use data, including through digital applications and social media, offers clues on behavior and emerging demands, such as in transport, utilities and social services. At the same time, digital platforms, data and analytics provide rapid and scalable paths to market for new offerings. For entrepreneurs, leveraging this data to find gaps in the market will drive new commercial opportunity in smart cities. For example, the next evolution of the sharing economy in cities is ripe for entrepreneurs to seize and shape into viable smart and resilient products and services. The surge in urban living and environmental pressures, as well as the changing citizen demands that accompany these trends, are also critical problems that entrepreneurs can address through solutions that rethink how cities meet residents’ demands.

Business: the smart commercial proposition

A shared smart vision: the American Center for Mobility

In the US state of Michigan, government and private sector are collaborating on an integrated mobility initiative for connected and autonomous vehicles. The Michigan Department of Transportation has founded a public-private partnership to lead development in smart-enabled mobility and support the build-out of a commercially viable ecosystem for connected and automated vehicles, with the state University of Michigan playing a central role. The objective is to develop real-world smart solutions to improve benefits to society. The initiative’s “Leadership Circle” includes government, universities and private sector participants from the automotive, telecommunications and engineering sectors.19

Entrepreneurs: disrupting cities through smart

8. How can early stage smart and resilient ventures attract sufficient venture capital and other alternative finance to scale up?

With no clearly dominant business model for a smart city entrepreneurial venture, the broad range of entrepreneurs working in the “civic tech” space will need to develop a strong narrative on emerging trends in smart cities; build metrics on user profiles and revenue streams; and establish a solid position in the vendor pipeline. The necessary strategy and governance to work with corporate venture partners will also be a key consideration for entrepreneurs working to scale in smart and resilient cities.

9. Which emerging technologies have real potential for deployment in smart cities?

True disruption could come from nascent technologies in key sectors, such as transport, or from a wider, less-expected set of sectors, including health. Using new technologies to transform how citizens engage with their city — how they move around, where and how they work, and how they spend leisure time — is the sweet spot for entrepreneurs in the smart landscape.

A seamless mobility offering for a smart user

RideScout21 is a transit app that allows users to view the full range of transport options to get from point A to point B. Users can decide how they want to move through their city, supporting an integrated and customizable mobility experience. Further integration across transport options, and the inclusion of payment functions, could even better match demands and increase the use of such apps.

From the citizen to the city level, the Power of Three can collaborate on smart and resilient strategies for cities

Smart and resilient approaches to urban development demand the Power of Three. The shared mission is to create a city of well-connected, prospering citizens to support the city’s long-term growth and sustainability. With residents’ experience and well-being as a starting point, government, business and entrepreneurs can work together to redefine citizens’ connection with their cities. These strategies leverage technology in every aspect to make cities smarter and more resilient.


Smart and resilient cities are a critical enabler for economic growth and competitiveness, positioning cities for the 21st century. At EY, we have capabilities across economic, physical, social and environmental resilience to advise on smart and resilient city projects in diverse settings. EY is the most globally integrated professional services organization – in our mindset, actions and structure. We are building a practice that can support the efficient, effective and economic delivery of smart and resilient city programs around the world.
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<td>Advice and support on developing and providing multi-modal, multi-operator urban transport strategies</td>
<td>Driving value from data within the built environment and across infrastructure</td>
<td>Advice on smart homes – the automation of energy efficiency and comfort in the home</td>
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<td>Smart transport infrastructure is a critical enabler for economic growth and competitiveness and should be the backbone of any effective smart city strategy. EY works with the public and private sector across the whole project life cycle, from planning and procurement to delivery, operations and exit, to provide the largest and most complex smart transport projects.</td>
<td>Digital information is transforming the built environment, providing substantial economic, social, safety and performance benefits. Infrastructure intelligence enables significant outcomes for citizens, transport, construction and infrastructure management organizations. This is done through better generation, collection, management and exploitation of information to support technology-enabled transformation.</td>
<td>A three-stage approach to developing and implementing a strategy for smart homes: building aspirational customer segmentation, investigating and evaluating innovative services, and mapping the ecosystem, assessing and assist with determining the best models.</td>
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<td>Advice and support on smart meter rollouts in many different markets</td>
<td>Addressing the challenges of information and cybersecurity risks to business operations</td>
<td>Advising cities on designing, building, financing and operating infrastructure</td>
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<td>Smart transformation presents major strategic, operational and technical challenges for clients. EY’s multidisciplinary approach encompasses strategy and business case management; project financing; regulatory control; supply chain and procurement; complex IT strategy definition and deployment; and customer management.</td>
<td>EY works with clients in the following key areas: transforming information security programs; identifying and responding to cyberthreats; advising on identity and access; mitigating the risk of information loss; and addressing privacy regulations.</td>
<td>EY provides robust financial advice to cities on major capital infrastructure projects. This includes capital transformation – valuations and business modeling; lead advisory; transaction integration; restructuring; transaction support; and transaction tax.</td>
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<td>Assisting cities with financial recovery after disasters</td>
<td>Advice and provision of investment strategies, growth projects and innovation drivers</td>
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<td>EY advises clients in a range of areas, from digital growth to optimization and protection. Services include digital enterprise strategies; incubation and innovation; customer support supply chain and operations support and digital risk, cyber, governance and audit confidence. This includes advising on business models and operating models that are fit for purpose in a digital world, along with clear road maps and benefits cases.</td>
<td>Supporting cities as they recover financially after disasters through insurance claims and federal disaster grant programs. This also includes advice on other funding sources and insurance policy reviews to identify gaps prior to a loss event. EY provides technical knowledge, from full-service accounting and claim preparation to consulting advice addressing current needs.</td>
<td>EY advises organizations and local and central governments on innovation, growth and entrepreneurship to help them plan for the future and deliver sustainable economic development in an increasingly competitive environment. Our four key services are competitiveness and attractiveness strategies; sector studies and benchmarking; organization performance and governance; and urban projects, feasibility and financing.</td>
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<td>End-to-end help with designing and providing e-government systems</td>
<td>Advice and support on driving job creation and economic growth</td>
<td>Demystifying the highly complex world of sustainability to help identify competitive advantages, increase operational efficiency and mitigate risk</td>
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<tr>
<td>EY advises city governments on strategy development; target group identification and expectation gathering; blueprint creation; process re-engineering; information technology development; and audit and implementation.</td>
<td>EY has created a framework to help governments harness private sector development. The framework helps federal and provincial governments, donor agencies, and international economic development agencies and not-for-profit organizations to drive inclusive growth through job creation. It is designed to encourage entrepreneurial activity in organizations of all sizes and attract domestic and international investment.</td>
<td>EY advises clients on assessing and understanding environmental and social metrics that are material to managing their operations. We help them make better business decisions by bringing sustainability into strategic risk, supply chain, marketing, product development, finance and internal audit. We also assist them in managing compliance and operational changes using a pragmatic business approach focusing on cost-effective approaches to material risks.</td>
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EYG no. 01075-163GBL

BMC Agency
GA 0000_06149

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