

Still buffering

Time for a smart city reboot

Executive summary

Building a truly 'smart' city is ambitious and fraught with risk — a significant portion of smart city projects currently underway worldwide are expected to be discontinued by 2023. As governments and city planners look to technological innovation to manage urban growth sustainably, their efforts have been repeatedly hampered by funding bottlenecks, technology-related pitfalls, citizen trust issues, and societal polarization.

For cities burdened by legacy infrastructure, seeking to build an incrementally smarter city may be more achievable. Staging technology projects helps ensure they will be compatible with the complex legacy infrastructure. This approach also ensures that technology capabilities meet community needs, garnering support more easily. Greenfield cities must overcome their own unique challenges as citizens relocate to new urban areas and adapt to technology-enabled lifestyles. City planners are tasked with managing the risks associated with the 'big-bang' delivery model typical of these projects while also planting the cultural green shoots that will entice would-be citizens to move there.

Smart city efforts are often beset by problems late in the project lifecycle, which might have been anticipated earlier. This highlights the importance of effective project planning and funding at the outset. City planners must weigh the merits of various approaches (centralized versus decentralized) in their city context and judge whether control and delivery speed or innovation and vendor diversity will be more important to achieving project ambitions. They must also consider how funding needs will evolve over the entire project lifecycle, setting aside allowances for technology maintenance and future enhancements. Proofs of concept should then be used to demonstrate the achievability of financial projections

and build investor and community confidence. City planners must enhance their capabilities with digital twins, disaster scenario modeling, and emergency resilience hubs to prepare for contingencies.

Technology development and operational risks can drastically slow the rollout of smart solutions. Interoperability frameworks should be established to define compatibility and compliance standards, prioritize future enhancements, and coordinate product development roadmaps across vendors and technologies. City planners must also facilitate essential data sharing arrangements (targeted, mutually beneficial, and fit for purpose) without eroding rigorous governance standards or private parties' competitive advantage. Safeguards like "need-to-know" access restrictions, anonymized and aggregated data sets, privacy protections, and data-sunset guidelines should be transparently codified in a data charter and agreed to by all stakeholders to ensure the integrity of these protections.

City planners frequently find it hard to mobilize the diverse stakeholders (workforce and communities), essential to success. Trust is often central to these community mobilization challenges. Transparency commitments and deepened community engagement — information gathering sessions, open forums, and awareness campaigns — ensure that citizens feel empowered rather than manipulated by smart technologies. Workforce mobilization requires new strategies to recruit and retain the right talent. For greenfield cities, this means providing new, non-financial incentives — on-site facilities like schools, social hubs, and family-focused programs. For legacy cities, investing in training and upskilling is also required — defining mid-career pathways, promoting community education and youth engagement initiatives, and internship programs.

Contents

Introduction	4
Charting the path: Finance and planning	5
Removing roadblocks: Technology enablement and operations	9
Building bridges: Community, stakeholder, and workforce mobilization	13
Acknowledgments	18

Introduction

According to a recent study, while more than half of the world's cities have a smart city roadmap, only 16% have mature projects running and a high proportion of smart city pilots have failed.¹ Despite their technological allure, smart cities have progressed in fits and starts due to funding bottlenecks, technology-related pitfalls, citizen trust issues, and societal polarization across the digital divide. Even though technological advances and convergence have changed business models and upended how societies live, work, and interact, around 30% of current smart city projects will likely be discontinued by 2023.² Rising economic uncertainties, increasing inflation, geopolitical conflicts, and the recent pandemic have only exacerbated these issues.

These findings — echoed elsewhere — are a matter of concern. Home to more than half of the world's population, cities consume 60% of the global energy supply.³ With urban dwelling expected to rise to 70% by 2050, governments have embarked upon bold modernization efforts to manage this growth sustainably while enhancing the quality of urban life and digital interconnectedness.⁴ Delivered effectively, the economic benefits arising from smart cities could approach \$20 trillion by 2026.⁵ So how can existing and future projects learn from both successful and less successful endeavors?

Smart cities seek to leverage the internet and related advanced technologies — such as the Internet of Things (IoT) and artificial intelligence/machine learning — to reduce carbon footprint, improve energy efficiency, and enhance citizens' lifestyles. Smart city projects range from large-scale, hypermodern, nationally branded campaigns led by governments and private investors to less ambitious, incremental initiatives led by public or private entities

or public-private collaborations. These may include Big Tech investments, infrastructure operator projects or upgrades, and community-led initiatives. Building a truly "smart" city is ambitious and fraught with risk. For many cities burdened by legacy infrastructure, the humbler aspiration of an incrementally smarter city is more likely to succeed technologically and more likely to secure sufficient community trust.

Some truisms for smart city development need to be reinforced, while others might be questioned and refreshed. Governments and city planners with aspirations and budgets to shape a city's progress need to work even more closely with other stakeholders — such as technology providers, investors, and industry associations — to build durable partnerships and drive adoption. Outcome-oriented, citizen-centered approaches to technology-enabled city projects are clearly the way forward, with priority given to projects that will have a demonstrable impact on pressing challenges such as managing density and congestion or enhancing public safety with surveillance technology. Obviously, each smart city effort needs to be tailored to its unique context, with "legacy" cities needing to retire depreciated, end-of-life infrastructure and integrate new solutions accordingly. At the same time, less-encumbered "greenfield" endeavors must be sufficiently attractive to entice many citizens with diverse capabilities to relocate.

In the following three core chapters, this report unpacks the most problematic challenges that impede progress and adoption: funding and planning gaps, technology and operational hurdles, and flagging stakeholder motivation and alignment. Each chapter also identifies strategies that define a better way forward.



Charting the path: Finance and planning

As governments, city planners, and businesses embark on the next wave of smart city upgrades, they need to consider the long implementation time that these projects demand and the potential for cost overruns, while taking steps to establish reliable funding mechanisms to support them throughout.

Challenges

Without far-sighted plans and strong, up-front due diligence, city planners may erode business cases and run into funding continuity challenges. Aggressive budget projections, combined with an overly optimistic estimation of investor appetite, often constrain funding availability — a problem compounded by the longer time horizons typical of these projects. City planners have also, at times, failed to grasp the potential for cost overruns (see Exhibit 1).

Exhibit 1: Challenges faced by smart city funding and planning



Declining investor appetite

- Business case uncertainty for unproven technology
- Difficult to account for qualitative factors in a business case



Lengthy project duration

- Difficult to plan for long-term repairs and maintenance
- Legacy cities face the issue of balancing phaseout of infrastructure and retrofitting complexities



Cost overruns

- Failure to anticipate unique contingencies
- Need to prepare for emergency response to external event risks

Source: Marsh McLennan Advantage

Declining investor appetite has compromised the rollout of many smart city projects, causing significant delays and even cancellations. Governments with ambitious smart city plans that focus on very broad objectives often find themselves pressed to implement too many technologies in aggressive timeframes. Novel technologies require thorough testing and planning to scale; the time and expense required to accomplish this are not always well synchronized with budget and project timelines. In addition, qualitative factors such as addressing socioeconomic gaps and equitable access are difficult to account for in a business case. Peterborough's smart city program in the UK was suspended in 2021 due to a \$34 million funding shortfall (for 2022-2023) and an inability to secure further government grants.⁶ Research across 187 city councils in the UK also found that a significant impediment to securing budgets was a lack of investment appetite for unproven technology and business case uncertainty.⁷

The lengthy project duration associated with smart cities presents a planning challenge, since far-sighted maintenance and resource costs still need

to be accurately accounted for in the initial phase of project design. The city of Ontario, Canada, recently discovered a \$52 billion repair backlog of overlooked infrastructure, impacting the functionality of 45% of municipal assets.⁸ High-speed fiber network rollouts in some countries have been similarly hindered by budgetary and resource planning constraints, such as talent scarcity and supply chain bottlenecks.

Cost overruns can also occur because of failure to anticipate unique contingencies associated with smart city technologies — such as failed adoption of technology, project design/planning flaws, and the unexpected withdrawal of investors. Emergency response to external event risks such as civil contingencies (climate-related hazards, pandemics) and financial market shocks have also proved challenging. A design weakness in the seawall outside Nigeria's Eko-Atlantic smart city led to deadly spill-over floods in 2019.⁹ Of course, economic shocks can also disrupt credit markets and result in higher debt-servicing costs and the revaluation of assets, leading to investor attrition and wasted expenditures.

Way forward: Long-term financial viability and contingency planning

Despite these significant challenges, city planners and governments can still take meaningful steps to ensure success through stronger funding and planning discipline. Five proposals are set out below.

Make objectives more tangible at the outset: Early definition and alignment of stakeholder aspirations enables city planners to work back from, and drive towards, clear goals. Of course, each city's unique circumstances must inform the scope and scale of a smart city initiative. City planners for well-funded, greenfield sites may opt for an aggressive approach, targeting several objectives and solutions across a wide span of domains — transport, infrastructure, emergency services, and more. But such ambition brings lock-in to potentially escalating risks that must be addressed throughout the project's lifecycle — technological and operational complexity, ambivalent community support, and finite talent pools for implementation. Cities encumbered by legacy infrastructure or reluctant populations should focus on a narrower set of objectives and scope. This targeted approach allows cities to introduce incremental technological changes while giving existing communities time to engage with and adopt these smart solutions gradually.

Use proof-of-concept (POC) more extensively: This can enhance investor confidence by demonstrating the achievability of financial projections while de-risking the transition to new technologies. Smart solutions must appeal to a diverse stakeholder base with varying objectives: profit for technology providers, fiscal viability and cost reduction for city planners, and data privacy for citizens. POCs demonstrate how a smart solution might succeed within a city's unique context, providing stakeholders with a clearer idea of the solution's benefits and resources required (such as financial, workforce) over a project's lifecycle.

Choose the most appropriate innovation approach:

This decision — centralized versus decentralized innovation — should be made at the outset. With a centralized approach, governmental organizations actively guide development. They play a central role in planning and funding innovation, which often proves more efficient when there is certainty in the technological requirements. Distributed innovation strategies that involve multiple stakeholders competing to produce the best solution can be used to de-risk innovation and avoid blind spots. The private sector generally drives development and innovation, with competitive dynamics determining the most viable solution. This is a sensible strategy when the ultimate objective is clear but the technological path to get there is not. Governments and city planners can use this approach to reduce the burden of attracting the right talent, test solution maturity and scalability, and use a competitive bidding process to select the best vendor(s). There are trade-offs: a centralized approach may stifle innovation; a decentralized approach may lead to inefficient expenditures and more complex vendor management.

City planners should seek to de-risk projects using POC to demonstrate technological feasibility and build investor confidence. POCs provide stakeholders a clearer idea of solution's benefits and resources required.

Expand the scope of private and public sector partnerships: For some time now, governments have de-risked investments by collaborating with investors and technology providers, connecting partners to incubators, and leveraging public-private partnerships (PPPs). But many tech-led initiatives frequently fall short of partner and community expectations. Beyond appreciating the economics of the partnership, constituents should adopt a wider lens for the scope

of these collaborations. Just as the role of the private sector is evolving from “selling technology to cities” to “promoting an outcome-driven business case”, governments can provide valuable community context into which a solution is to be deployed. PPPs can also help address issues such as data privacy, where governments lack technological expertise and where the private sector is not sufficiently incentivized to solve them alone. In 2022, Singapore announced an initial public investment of \$35 million in a Digital Trust Center to foster collaboration between academia, technology providers, and its smart city entities. This will support developments in privacy-enhancing technologies that preserve data privacy in data processing and AI solutions.¹⁰



While the role of the private sector is evolving from “selling technology to cities” to “promoting an outcome-driven business case”, governments can provide valuable community context into which a solution is to be deployed.

Anticipate the unexpected: Given the recent rise in economic and geopolitical instability, smart city projects require a wider lens for risk assessment. This work should include analysis of third-party vendors, event risk modeling (such as climate stress-testing, cyber intrusion), and pilot programs to ensure viability when scaled. Governments and city planners must be prepared for civil contingencies and market event risks. Advanced tools such as digital twins and geographic information system mapping can model disaster scenarios and identify critical pain points. Authorities can then prioritize investments in high-risk areas accordingly. Community emergency resilience hubs should also be introduced to tap into citizen networks and local businesses. Austin, Texas, has announced plans to pilot two such projects in 2022.¹¹ Financial market shocks can be weathered by undertaking economic regulatory reforms, building fiscal and monetary stability through budget deficit reductions, and managing interest rates. Although these efforts are not specific to smart cities, smart city efforts will benefit from the stability they bring.



Removing roadblocks: Technology enablement and operations

Technology suitability and execution-related risks often impede the timely, budget-minded rollout of smart solutions. Governments and city planners must work with technology providers and citizens to minimize cyber risks and interoperability challenges, share technological know-how, and encourage targeted data sharing.

Challenges

With the increasing dependence on technology, cities are becoming more exposed to interoperability bottlenecks, bureaucratic challenges due to thorny issues such as data privacy and sharing, and cyberattacks (see Exhibit 2).

Exhibit 2: Challenges in technology enablement and operations



Network interoperability bottlenecks

- Different solutions from disparate vendors and the challenge of coordinating feature enhancements
- Legacy cities' complications to retrofit new solutions seamlessly



Political and bureaucratic obstacles

- Different stakeholders have access to different types of data and varied agendas for sharing the data
- Legacy cities have complex bureaucratic structures and subsequent data-sharing challenges



Escalating cybersecurity issues

- Expanded attack surface and additional entry points due to rising interconnectedness
- Greenfield cities, a high-reward testbed for hackers piloting new techniques

Source: Marsh McLennan Advantage

Ensuring network interoperability across solutions from disparate vendors is difficult. Each vendor will have their unique product roadmap, and coordinating future feature enhancements across these roadmaps often proves challenging over time. Evolving technology standards also create ambiguity and inefficiency. It is estimated that deploying IoT solutions without interoperability standards could make smart cities \$341 billion more expensive globally by 2025.¹² Legacy cities also face interoperability challenges as existing systems must integrate seamlessly with new, frequently multi-vendor suites of technology solutions. Moreover, sunseting legacy infrastructure and retrofitting new solutions often proves more complex than initially planned. Smart meter rollout in the UK has made slow progress over the past decade as problems were encountered integrating and scaling the technology across existing infrastructure.¹³

Differing political aims and misaligned federal and state agendas create data-sharing and other implementation challenges. According to research, lack of alignment across departments and political barriers are two main reasons for PPP failure in smart cities.¹⁴ Launched in 2018, Lahore's \$250 million smart city development is lagging its 2023 deadline due to bureaucratic roadblocks between different municipal departments.¹⁵ Different smart city stakeholders often have access to different types of data and don't necessarily have aligned incentives to share

data, especially in instances where some services are privatized. Sharing such strategic private sector data is further complicated by competitive business dynamics. Legacy cities have additional data-sharing challenges — competing priorities at the mayoral and jurisdictional levels, fragmented and complex bureaucratic structures, and the risk that achieved data could be unduly politicized.

As is evident from other technologically advanced sectors, the interconnected nature of these solutions expands the available attack surface and creates additional entry points for malicious actors. These solutions are increasingly integrated with critical infrastructure and services — transit, medical services, and public safety, among others — increasing the urgency of addressing such exposures. A 2020 study indicated that 44% of all global ransomware attacks targeted municipalities.¹⁶ Left unaddressed, these vulnerabilities may jeopardize a city's security, eroding stakeholder trust. In 2019, Baltimore, Maryland, suffered an \$18.2 million ransomware attack that locked municipal employees out of their email accounts and prevented citizens from accessing essential city services for several weeks.¹⁷ Cybersecurity is often more challenging for legacy cities with older infrastructure that has often been retrofitted with third-party technologies. On the other hand, greenfield cities present a testbed for hackers piloting new nefarious techniques on high-reward targets.

Way forward: Enabling technological collaboration and strengthening cybersecurity

As governments and city planners align on their smart city goals, they must consider which smart city levers to pull. These levers include mobility assets, infrastructure and utilities, public welfare (health and safety), sustainability, societal (digital education,

trust, and inclusion), and governance (government processes and oversight). In a rapidly changing world, city planners are harnessing advanced technologies to enable smart solutions across these levers and better cater to the needs of their citizens (see Exhibit 3).

Exhibit 3: Technologies that underpin smart applications

Likely total investment in smart cities to reach almost **\$7 TN** globally, by 2030 (CAGR: 24%)*

PRIMARY ENABLING TECHNOLOGY AND ESTIMATED MARKET SIZE (BY 2030)	SMART CITY APPLICATIONS
<p>Fifth-Generation Mobile Network (5G) \$1.7 TN (CAGR: 57%) Enables the high-speed exchange of data between wireless objects essential to obtaining and sending real-time data.</p>	<ul style="list-style-type: none"> ■ Navigation systems and traffic flow management ■ Virtual social services ■ Telehealth options, rapid emergency response
<p>Edge Computing \$156 BN (CAGR: 39%) Involves data processing close to its source to increase efficiency and responsiveness.</p>	<ul style="list-style-type: none"> ■ Emergency dispatch, improved patient response times ■ Traffic flow and parking space availability ■ Real-time energy allocation
<p>Internet of Things (IoT) \$1.7 TN (CAGR: 23%) Devices with sensors and processing capabilities that capture volumes of data which can be exchanged and synthesized into analytical insights.</p>	<ul style="list-style-type: none"> ■ Environmental sensors, waste management ■ Traffic density sensors ■ Personal wearables and health trackers
<p>Artificial Intelligence (AI) / Machine Learning (ML) \$1.8 TN (CAGR: 38%) AI involves training of systems to mimic human cognition and learning. ML is a subset of AI that provides algorithms to enable systems to learn from past scenarios.</p>	<ul style="list-style-type: none"> ■ Utility load management ■ Automated emergency services, smart surveillance ■ Measurement of environmental conditions (pollution, waste)
<p>Augmented Reality (AR)/Virtual Reality (VR) \$598 BN/\$87 BN (CAGR: 41%/15%) AR is a three-dimensional experience that combines real-world settings with virtually-generated elements. VR involves the creation of fully-synthetic worlds where users can interact with virtual elements.</p>	<ul style="list-style-type: none"> ■ Guided utility maintenance, repair, and training ■ AR/VR guided tourism ■ Digital twin-enabled city planning

Smart city levers: ■ Mobility ■ Infrastructure and utilities ■ Public welfare ■ Sustainability ■ Society ■ Governance

* CAGR: 2022-2030)

Source: Marsh McLennan Advantage; Grand View Research, retrieved 12 September, 2022

To address the above challenges, governments, city planners, and technology providers would benefit by working together both to mitigate risks associated with rising systems interconnectedness and to encourage collaboration. Three proposals are set out below.

Incentivize compatibility standards and share lessons learned: Cross-sector platform integration and collaboration initiatives help spur innovation and address interoperability bottlenecks. Regulatory and policy levers can also be used to spur the creation of compatibility standards. The EU's 2021 Proposal for a European Interoperability Framework for Smart Cities and Communities (EIF4SCC) is currently under review. It aims to harmonize smart city delivery across cities, regions, and borders by providing legal and compliance standards.¹⁸ Learning from best practices through success stories from other cities helps minimize implementation risks and builds stakeholder support. International knowledge hubs and open-source platforms also play a similar role in enabling smart city stakeholders to share lessons learned. Finland's 6Aika program has used a \$102 million budget to share and scale smart solutions across its six largest cities while also allowing international innovators access to real-time data.¹⁹ Governments are in a unique position of influence and should play a central role in facilitating communication across these varied stakeholders and establishing clear lines of accountability.

Encourage targeted data sharing: Conflicting incentives for data sharing and privacy protection warrant new collaboration models. Data sharing will not altruistically happen unless mutually beneficial inducements and outcomes exist or can be created. Profit-oriented private-sector participants and politically motivated, bureaucratically complex governing bodies are often encumbered by misaligned motivations within and across the stakeholder ecosystem. Governments, city planners, and industry associations should be selective in identifying opportunities and incentivizing various parties to engage more deeply and share information.

Once an opportunity has been identified, a data charter outlining the conditions by which information can be shared should be agreed upon by all stakeholders. This charter should also lay out the principles for anonymizing data, generating mutually beneficial insights, and protecting private-sector competitive advantage where appropriate. Safety mechanisms such as "need-to-know" data sharing can help minimize reputational and operational risks for all stakeholders, protect national security, and increase citizens' willingness to adopt. Setting clear sunset policies for data, ensuring data policy transparency, and enforcing protections for data usage will also help safeguard against data misuse.

Increase rigor for cybersecurity practices: Governments should enact policies to compel technology providers to undertake "security-by-design" directives such as regular due diligence checks of systems, cyber hygiene practices, and emergency breach protocols. City planners must also ensure all systems, including IoT devices, are regularly patched and up to date. They should assess a city's highest points of vulnerability and its most valuable assets, and then prioritize defense efforts accordingly. The EU has reached a provisional agreement on its Digital Operational Resilience Act (DORA) in 2022, which will require financial institutions to meet new standards for cyber-risk management, including stress testing, incident reporting mechanisms, and disaster recovery procedures.²⁰ Although specific to financial institutions, the principles of the DORA serve as inspiration for how these cyber principles could be expanded to other digital-critical sectors.

Data sharing will not altruistically happen unless mutually beneficial inducements and outcomes exist or can be created. Governmental organizations should be selective in identifying opportunities and incentivizing various parties to engage more deeply and share information.



Building bridges: Community, stakeholder, and workforce mobilization

Governments and city planners frequently find it hard to establish community awareness and trust in smart solutions. At the same time, a widening digital divide and workforce challenges add to their woes. To address these challenges, they should enhance policymaking transparency and governance to encourage citizens to adopt smart solutions and deploy strategies to attract and retain talent.

Challenges

Smart city technology is only effective when the citizens and businesses that comprise a community are sufficiently comfortable with its use and the integrity of the parties providing it. Uneven distribution or access to these technologies and supporting infrastructure often results in inequitable socioeconomic outcomes across communities. City planners and technology providers are also grappling with intensifying workforce shortages and evolving needs (see Exhibit 4).

Exhibit 4: Challenges in addressing community, stakeholder, and workforce mobilization



Source: Marsh McLennan Advantage

Citizens and businesses are understandably reticent to embrace smart city-enabled lifestyles before they are properly aware of their benefits or in situations where governments and providers are not transparent. When city planners or technology vendors push solutions without understanding citizens' actual needs, they can quickly lose community support. Toronto's Sidewalk Labs Quayside project was canceled in 2021 when it faced privacy-related resistance from citizens.²⁴ Greenfield cities have unique adoption challenges, as citizens will be required to move to new urban areas and adapt to the technology-enabled lifestyles provided. Cities are the construct in which we live, but communities are what define how we live. People relocate frequently but usually move into communities that have matured over time. While not exclusively a smart city issue, building a completely new community that reflects the core needs of its potential citizens is a monumental challenge for greenfield cities. An additional complexity — even with user surveys and thorough primary research — is that future inhabitants often don't understand exactly what kind of city they want until they try to live in it.

The digital divide — characterized by the gap between access to connected devices and digital literacy across

community demographics — is also a barrier to full participation. Lack of digital access often exacerbates socioeconomic gaps among the city's most vulnerable communities. Research estimates suggest that even when students are learning in the classroom, the lower lifetime income of the cohort of K-12 students caught in the digital divide will result in a \$22 billion to \$33 billion annual GDP loss.²⁵

Another pervasive challenge for the buildout of smart cities has been the shortage of smart-city urban designers and the aggressive competition for technology and construction talent. The Smart Cities Mission in Vellore, India, began in 2018 but has been delayed due to the pandemic and related labor shortages.²⁶ The pandemic has also influenced employees' preferences for where, how, and why they work. Adding another layer of complexity, some smart-city workers are more willing than those in other industries to forgo pay increases in exchange for additional wellness benefits and quality medical care.²⁷ High attrition rates on projects also drain intellectual capital and valuable expertise. Workforce continuity can be further compromised by the difficult working conditions often present in greenfield city projects, mostly developed in remote areas.

Way forward: Establishing trust and transparency

To address the above challenges, governments and city planners should leverage a citizen-centered, outcome-oriented approach as opposed to a technology-led one. They also need to work closely with stakeholders — technology providers, investors, and industry associations — to cultivate mutually beneficial relationships and ensure that citizens feel empowered rather than controlled by these innovative solutions. Three proposals are set out below.

Build trust and drive adoption through transparent governance and awareness campaigns: Enhanced transparency commitments in policymaking and governance processes, combined with a deepened engagement with citizens' concerns and aspirations, will help to establish trust. Building a participative culture through inclusive policymaking — such as soliciting public works' bond approval via elections and seeking citizens' input for projects in open forums — will generate affirmation for city projects. Governments should also transparently communicate data governance principles — such as "how the data will be used" and "who owns it" — with communities. Obtaining information security certifications like ISO 27001 also builds trust with citizens and business partners. Greenfield cities can use similar strategies to develop their own culture and provide more transparent governance to drive adoption. Governments and city planners should also consider a staged deployment, giving citizens time to familiarize themselves with these solutions. Moreover, with the help of technology providers, they should organize awareness campaigns on the importance of cyber hygiene, the city's strong cyber posture, and data breach fail-safes.

Ensure digital inclusion for all: This includes improving digital access and digital literacy, especially among disadvantaged populations. Motivating businesses to engage these segments early in the process often requires further government

intervention, such as subsidies and fair competition policies. Subsidized or even free technology is a good start, but many of these inclusion initiatives do not go far enough — concerted efforts and personal outreach are still required to educate these groups on how technology can improve their lives. Specific groups, like the elderly, often have insufficient technological literacy and would benefit from personalized outreach.

As technology-led approaches have flagged, governments, city planners, and technology providers must pivot to a more citizen-centered approach. They should also cultivate mutually beneficial relationships and ensure that citizens feel empowered rather than controlled by these innovative solutions.

New employment models to address workforce needs: Youth engagement, non-financial benefits, and knowledge management programs can help attract and retain talent. Youth engagement is an effective way to build a long-term pipeline for future workforce talent to further the smart cities agenda. Internship programs should also be leveraged in areas which lack funding for full-time staffing. Motivating top talent to relocate to greenfield projects may require competitive compensation packages and high-quality on-site facilities such as schools, social hubs, family-focused programs, and transportation infrastructure to allow workers to enjoy life outside of work. Investment in training and upskilling is also required — defining mid-career pathways, promoting community education initiatives, and sponsoring pro-expatriate programs to close domestic talent gaps. Governments and businesses should also consider knowledge management solutions to protect against the loss of intellectual capital due to employee attrition. This knowledge management strategy should include knowledge transfer processes and systems that facilitate the dissemination of expertise.

Given the challenges smart cities face, what is the role of constituents in moving these projects forward and ushering in the next wave of technological innovation? Maintaining a community-oriented focus can lead to greater prosperity and sustainability. That said, governments and city planners need to adopt a realistic, future-proofing mindset as they plan for contingencies, technology integration challenges, and ongoing maintenance needs.



Endnotes

- 1 Williams, M. (2021, November 1). *The Scalability Advantages of Open Systems for Smart Cities* | NMB Technologies.
- 2 Gartner. (2020, March 26). *Establish an Urban Data Exchange for Smart Cities*.
- 3 Carrier, F. (n.d.). *How are Smart Cities meeting the challenges of urbanization in the 21st century?* RBC Wealth Management. Retrieved August 25, 2022.
- 4 Nguyen, L. (2022, March 18). *How Emerging Smart Cities Initiatives are Shaping the Future of Vietnam*. Earth.Org.
- 5 Challawala, A., Ogundiya, K., & Patel, H. (2020, November 13). *The future of Smart Cities* | Barclays Corporate & Investment Bank. Barclays.
- 6 Wray, S. (2021, December 6). *Award-winning smart city programme shelved over lack of funding*. Cities Today.
- 7 Hill, R. (2016, July 5). *Smart cities "doomed to fail" without proper financing and senior buy-in*. PublicTechnology.Net.
- 8 Davey, P. (2021, September 2). *Ontario infrastructure has \$52B repair backlog, FAO report finds*.
- 9 AFP. (2019, July 23). *Lagos, one of the world's fastest growing cities, sinks into the waters*. Batinfo.
- 10 Smart Cities World. (2022, June 1). *Singapore builds digital trust and strengthens data governance*. Smart Cities World.
- 11 Higgins, W. (2021, November 16). *Resilience hub initiative continues to evolve — Austin Monitor*.
- 12 Intelligence Insights. (2016, May 11). *This one problem could cost smart cities hundreds of billions of dollars*. Business Insider.
- 13 Jones, J. S. (2021, December 23). *UK smart meter rollout — bungled, woeful, promising or successful?* Smart Energy International.
- 14 Smart Cities World, & interact. (2019). *Smart cities: Beyond the hype*. Smart Cities World.
- 15 Gabol I. (2022, April 19). *Lahore improvement program lags behind schedule*. Dawn.
- 16 Coker, J. (2020, August 27). *Local Government Organizations Most Frequently Targeted by Ransomware*. Infosecurity Magazine.
- 17 Duncan, I. (2019, May 30). *Baltimore estimates cost of ransomware attack at \$18.2 million as government begins to restore email accounts*. Baltimore Sun.
- 18 European Commission. (2021, July). *Proposal for a European Interoperability Framework for Smart Cities and Communities (EIF4SCC) | Shaping Europe's digital future*.
- 19 Forum Virium Helsinki. (2022). *6Aika — Six Finnish cities join forces to become better and smarter*. Forum Virium Helsinki.
- 20 European Council. (2022, May 11). *Digital finance: Provisional agreement reached on DORA*.
- 21 Kingson, J. A. (2022, April 5). *Smart cities: Public acceptance may take time*. Axios.
- 22 ITU. (2021, November 29). *Facts and Figures 2021: 2.9 billion people still offline*. ITU Hub.
- 23 Mercer. (2022). *2022 Global Talent Trends Study*.
- 24 Warburton, M. (2020, May 7). *Alphabet's Sidewalk Labs cancels Toronto "smart city" project*. Reuters.
- 25 School of Education Online Programs (2020, December 15). *Understanding the Digital Divide in Education*. School of Education Online Programs.
- 26 B, V. (2022, March 23). *Delay in Smart City works irks residents in Vellore — The New Indian Express*. New Indian Express.
- 27 Mercer. (2022). *2022 Global Talent Trends Study*.

Acknowledgements

Authors

Ben Hoster

Director, Marsh McLennan Advantage
ben.hoster@oliverwyman.com

Swati Khurana

Research Manager, Marsh McLennan Advantage
swati.khurana@oliverwyman.com

Rachel Juay

Research Analyst, Marsh McLennan Advantage
rachel.juay@oliverwyman.com

Contributors

Marsh McLennan

Lewis Cannon, Blair Chalmers, Talal Darras, Jad Haddad, Nabil Homsy, Nader Kobrosli, Richard Smith-Bingham

This report has benefited from the experience of a number of smart city experts, but we particularly appreciate the time offered by Noah Budnick, Interim Executive Director, Together for Safer Roads, and Sue McCauley MSc CCISO CSIRP, Cyber Security Consultant, for their contributions to this report.

Design

Ramona Pillai, Eva Lim, Agnieszka Kwapisz

[Marsh McLennan](#) (NYSE: MMC) is the world's leading professional services firm in the areas of risk, strategy and people. The Company's 78,000 colleagues advise clients in 130 countries. With annual revenue over \$18 billion, Marsh McLennan helps clients navigate an increasingly dynamic and complex environment through four market-leading businesses. [Marsh](#) provides data-driven risk advisory services and insurance solutions to commercial and consumer clients. [Guy Carpenter](#) develops advanced risk, reinsurance and capital strategies that help clients grow profitably and pursue emerging opportunities. [Mercer](#) delivers advice and technology-driven solutions that help organizations redefine the world of work, reshape retirement and investment outcomes, and unlock health and well being for a changing workforce. [Oliver Wyman](#) serves as a critical strategic, economic and brand advisor to private sector and governmental clients.

For more information, visit mmc.com, follow us on [LinkedIn](#) and [Twitter](#) or subscribe to [BRINK](#).

Copyright ©2022 Marsh & McLennan Companies Ltd, Inc. All rights reserved.

This report may not be sold, reproduced or redistributed, in whole or in part, without the prior written permission of Marsh & McLennan Companies, Inc.

This report and any recommendations, analysis or advice provided herein (i) are based on our experience as insurance and reinsurance brokers or as consultants, as applicable, (ii) are not intended to be taken as advice or recommendations regarding any individual situation, (iii) should not be relied upon as investment, tax, accounting, actuarial, regulatory or legal advice regarding any individual situation or as a substitute for consultation with professional consultants or accountants or with professional tax, legal, actuarial or financial advisors, and (iv) do not provide an opinion regarding the fairness of any transaction to any party. The opinions expressed herein are valid only for the purpose stated herein and as of the date hereof. We are not responsible for the consequences of any unauthorized use of this report. Its content may not be modified or incorporated into or used in other material, or sold or otherwise provided, in whole or in part, to any other person or entity, without our written permission. No obligation is assumed to revise this report to reflect changes, events or conditions, which occur subsequent to the date hereof. Information furnished by others, as well as public information and industry and statistical data, upon which all or portions of this report may be based, are believed to be reliable but have not been verified. Any modeling, analytics or projections are subject to inherent uncertainty, and any opinions, recommendations, analysis or advice provided herein could be materially affected if any underlying assumptions, conditions, information, or factors are inaccurate or incomplete or should change. We have used what we believe are reliable, up-to-date and comprehensive information and analysis, but all information is provided without warranty of any kind, express or implied, and we disclaim any responsibility for such information or analysis or to update the information or analysis in this report.

We accept no liability for any loss arising from any action taken or refrained from, or any decision made, as a result of or reliance upon anything contained in this report or any reports or sources of information referred to herein, or for actual results or future events or any damages of any kind, including without limitation direct, indirect, consequential, exemplary, special or other damages, even if advised of the possibility of such damages. This report is not an offer to buy or sell securities or a solicitation of an offer to buy or sell securities. No responsibility is taken for changes in market conditions or laws or regulations which occur subsequent to the date hereof.