Attachment B

Smart City Strategic Framework – Final (accessible)

Smart City Strategic Framework

CITY OF SYDNEY

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Acknowledgement
This Smart City Strategic Framework was developed in consultation with KPMG as a trusted advisor to the City.

Terminology
Within this document, the City of Sydney as an organisation is referred to as 'the City'. The geographical local government area which is managed by the City is referred to interchangeably as 'the city' and 'the local area'.

Cover image credit: Vivid Lights, City of Sydney

Lord Mayor's message

Sydney is a dynamic hub of innovation.

As our city experiences rapid change, we are harnessing the opportunities of the digital technology to sustain our reputation as a leading place to live, work, learn and play, now and into the future.

We have developed this Smart City Strategic Framework to set a clear direction for this ongoing transformation to smart Sydney.

We see digital technology as a tool to support our diverse community to address pressing challenges and unlock new opportunities.

By working with our business community, residents, non-government organisations and other specialists to develop this framework, we have developed a shared vision for the future of technology and our city.

We want a future in which technology and data help us make better decisions and respond with agility to deliver a high quality of life for all. We want to enable a robust digital infrastructure to support our thriving knowledge economy and make our city an even more attractive place to work, study and or visit. We want a future of connected and lively villages in which community members participate in creating unique places. And we want to equip the community to adapt to change, including the impacts of accelerating climate change.

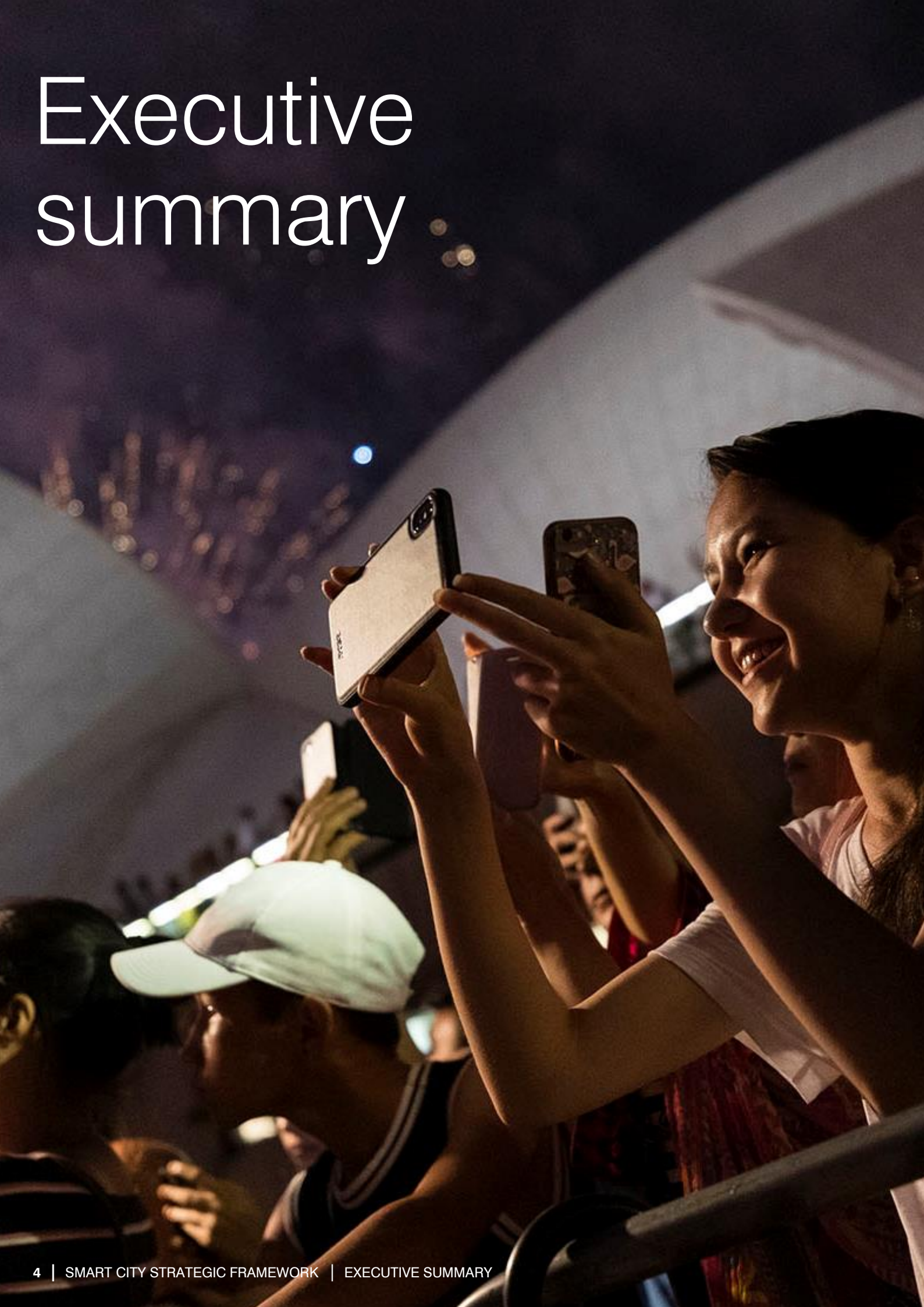
But this framework is just the beginning. Becoming a smart city is a complex process and we need our entire community to work together to shape the policies, processes, technologies and culture that will enable us to deliver this vision.

The City of Sydney is committed to driving the smart transformation of Greater Sydney by sharing knowledge, data and learnings.

I am excited to advance on this journey together to embrace the future with confidence and realise our vision of creating a thriving, inclusive and resilient place for all.

Clover Moore
Lord Mayor

Executive summary



The City of Sydney is experiencing rapid change. Our population and jobs are growing. The needs of our community and environment are intensifying. And, everyday, new technological advancements are disrupting our urban realm.

Against this backdrop, we have developed a Smart City Strategic Framework to harness the opportunities brought about by digital disruption, to plan for uncertainty and to sustain our global reputation as a leading place to live, work, learn and visit, now and into the future.

This framework provides our overarching approach to putting technology and data to work to make better decisions and enhance quality of life for our diverse communities.

This is a bold vision for smart transformation, which puts people at the centre. We are committed to leading a problem-driven, evidence-based approach to ensure the delivery of tangible impact for our communities. Rather than set a static agenda, this framework is a living document that we will regularly review and adapt to meet new challenges and unlock new opportunities as the city evolves.

A smart city cannot be master-planned and this framework is a call to action for the spectrum of stakeholders across our city – to state and federal government, local governments across Greater Sydney, established businesses and growing startups, academic institutions, community organisations and all of the people who use and enjoy our city each day.

Your courage, commitment and collaboration are essential to achieving the vision for our city of the future, and we will work hard to develop the enabling infrastructure and environment to support a thriving innovation ecosystem.

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Image credit: *Sydney New Years Eve, City of Sydney*

Strategic context

The City of Sydney's Community Strategic Plan is a cornerstone for advancing Sydney's global reputation as one of the most beautiful, thriving and liveable cities. It provides a platform to enhance the city's unique places and environment, foster its innovation ecosystem, celebrate its rich cultural diversity and **strengthen the sense of community and belonging across its villages.**

But the city, like similar cities around the world is under increasing pressure.

Rapid urbanisation, globalisation and climate change are challenging the city's ability to keep pace. From 2013 to 2018, the city was the largest growing area in NSW. Around 1.3 million people live, work, learn and visit in our local area each day, and this number is expected to grow to reach 1.7 million by 2036. Densification is putting pressure on essential services, infrastructure and housing. Sydney is experiencing a range of stresses, such as rising inequality and congestion, and shocks, such as extreme weather events and cyber attacks.

At the same time, new and emerging technologies are fundamentally disrupting the economy, reshaping the urban realm, redefining traditional relationships between governments and citizens, and reimagining the human experience of the city.

We are recognised as Australia's premier global city and leading knowledge-based economy, contributing

22% NSW GDP and **7%** of national GDP

We have welcomed more than

67,000

new residents to our area in the last decade and created 116,365 additional jobs

We have created 21 new parks and

163

rain gardens to filter pollution before it reaches our waterways

We have reduced greenhouse gas emissions by

20%

across the local area, based on 2006 levels

We are home to

27%

of Australia's tech startups, representing the largest startup ecosystem in the country

We have planted

13,200

trees, providing shade and making our streets places for enjoyment

The smart city opportunity

The City of Sydney recognises the transformative opportunities of the digital age for improving the delivery of services and enhancing quality of life for its community. The City sees technology and data as key enablers to capitalise on the local area's strengths and rich natural assets, address pressing challenges and unlock new opportunities.

Becoming smart is not about installing technology for technology's sake, or collecting data for data's sake. Smart transformation means putting technology and data to work to make better decisions, navigate uncertainty and deliver better outcomes for the City's diverse community of residents, workers, visitors and businesses. In an environment of constrained resources, becoming smart will enable the City to do more with less and optimise space to accommodate a growing population whilst maintaining the high quality of life for which Sydney is world-renowned.

As such, the City of Sydney has developed a Smart City Strategic Framework to guide the City's smart transformation. The framework does not assume a blank slate. Rather, it is a key tool enabling the City to deliver on the goals of the Community Strategic Plan in collaboration with its diverse stakeholders.

The framework builds on and supports existing strategies, such as the Resilient Sydney strategy, the City's digital strategy and the City's tech startups action plan. Together, these strategies will help Sydney establish the foundations necessary to adapt and thrive in the face of continuous disruption.

Why we need a Smart City Strategic Framework

We are experiencing a global technological revolution, which is disrupting every industry, every organisation and every community. **The time is ripe for the City of Sydney to harness the opportunities** brought about by digital disruption, embrace change and sustain Sydney's reputation as a leading place to live, work, learn and play, now and into the future.

This framework is an approach to guide the design and development of a city which integrates physical, digital and human systems. This will enable collaboration and unlock the city's collective intelligence to solve pressing challenges and discover new opportunities.

Without a clear playbook for smart transformation, the City of Sydney risks losing its global competitiveness and falling behind its peers.

Image credit: *Virtual Reality in Customs House, City of Sydney*

The purpose of the Smart City Strategic Framework

1. **Establish an overarching vision to drive a holistic, sustainable approach to the city's smart transformation**

Organising the urban ecosystem around a shared vision, which has been developed in close alignment with community needs and priorities, will ensure a coordinated, inclusive approach to smart transformation.

2. **Galvanise collaboration across all actors in the city's ecosystem**

By anchoring the city's smart development in a common vocabulary and approach, the framework will enable the sharing of knowledge, data, resources and experience.

3. **Connect the dots**

The framework will connect smart projects and initiatives already underway across the city, helping to sustain and scale them beyond their pilot stage.

4. **Play a key role in driving the smart transformation of Greater Sydney**

By sharing learnings from its own smart city journey, the City can work with other councils of Greater Sydney which are facing similar challenges to champion smart transformation.

The Smart City Strategic Framework puts people at the centre. Rather than prescribing specific technological solutions, the framework promotes an outcomes-focused approach in which technology is woven into the fabric of everyday life to respond to real needs and flexibly adapt as contexts evolve and needs change.

Co-creating the strategic framework

The City of Sydney has anchored its Smart City Strategic Framework in the pressing challenges and needs of the local area and the Greater Sydney region.

The City undertook a highly collaborative process to develop the framework, which comprised **a rich blend of global best practice standards and case studies combined with the ideas, expertise and experience of Sydney's diverse stakeholders.**

Learning from global best practice

Facing similar economic, social and environmental challenges in an age of rapid urbanisation, cities across the globe are increasingly seeking to harness emerging technologies to embrace disruption, do more with less and deliver better outcomes for their communities.

We undertook comparative analysis of global smart cities to identify key insights and learnings to inform the development of this strategic framework. Rather than seeking to reinvent the wheel, this analysis called out characteristics of actionable smart city strategies and programs. These have been tailored to inform the City's strategic framework in order to guide the delivery of transformational value for Sydney.

This framework aligns with ISO 37106:2018, the internationally recognised standard for creating a smart city framework. Consequently, the City has embedded interoperability as an integral part of our smart city transformation, positioning the City to be able to share data, platforms and solutions with other cities, the private sector, academia and our communities.

Collaborating to create an actionable strategic framework

Smart city transformation is a complex process, dependent on the commitment and participation of a broad cohort of City stakeholders. It is not something we can achieve in isolation.

The City views collaboration as a cornerstone to realising its smart City vision. We undertook engagement activities to ensure a diverse representation of stakeholders in the creation of this framework. The co-creation process involved workshops with representatives from across the City, state government, industry, startups, academia, not-for-profits and community.

Participants worked collaboratively in the workshops to:

- ✓ Explore the city's key strengths, challenges and opportunities
- ✓ Step into the shoes of Sydney's future citizens, workers, students and visitors to explore how digital technology could be leveraged to enhance quality of life and unlock new opportunities
- ✓ Contribute to the creation of the smart city vision
- ✓ Identify tangible actions and partnerships to drive smart transformation

This framework stitches together the key ambitions and ideas that emerged during the engagement process. Successful execution relies upon the city's ecosystem taking ownership of the framework and working together.

Representatives from industry, academia and community organisations brainstorm smart city opportunities

Workshop ideation exercise with stakeholders from across the City.

Our vision

Sydney is a dynamic, responsive city, harnessing technology and data to enable collaborative innovation and create a thriving, inclusive and resilient future for all.

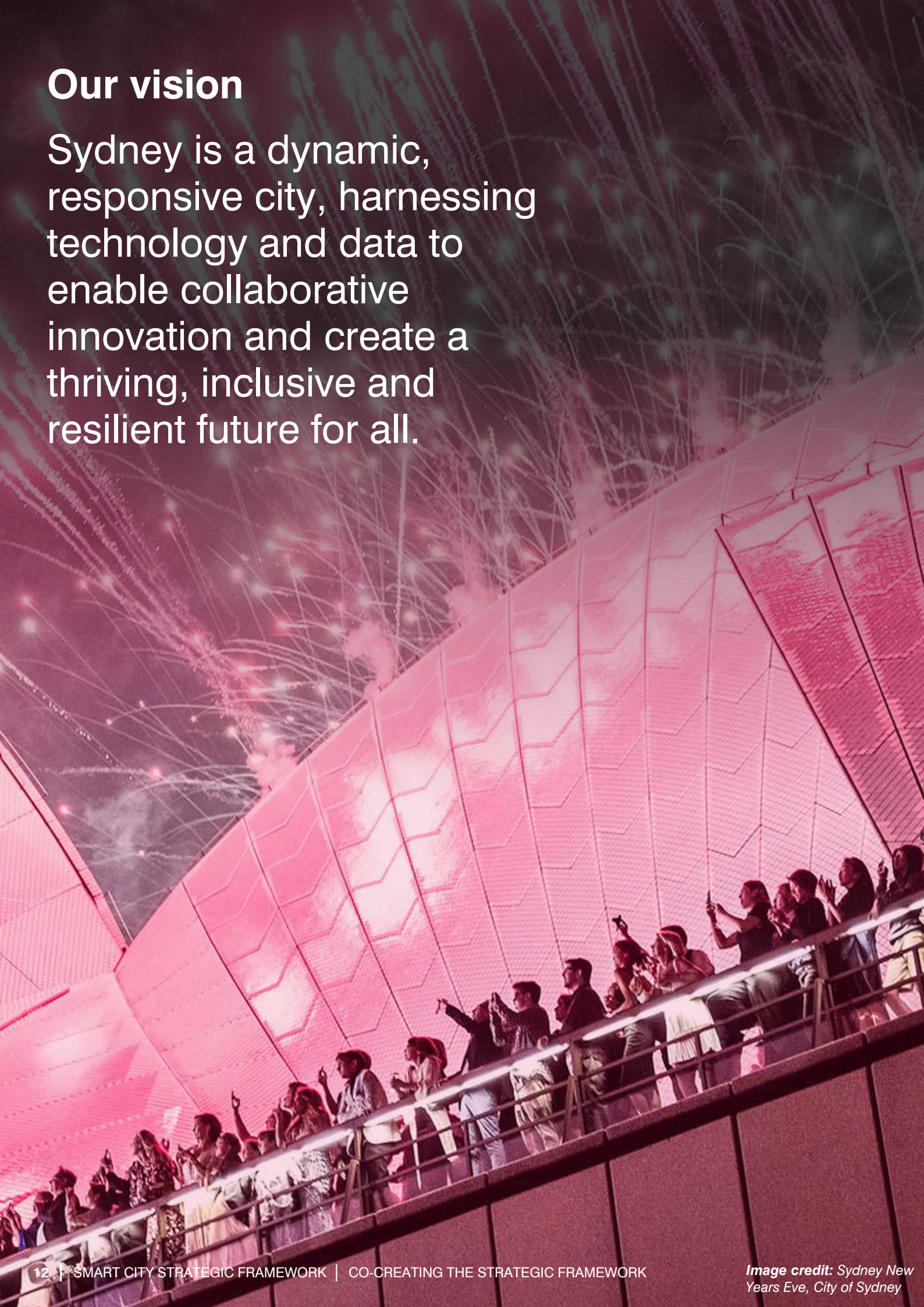

Image credit: *Sydney New Years Eve, City of Sydney*

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A smart city uses information and communications technology to enhance its liveability, workability and sustainability

Smart Cities Council

Guiding principles

A set of principles has been collaboratively developed to underpin the City of Sydney's smart city transformation. By articulating our fundamental values and ethics, these principles will help us to navigate the rapidly evolving urban landscape, address complex challenges and ensure the design, development and deployment of our smart future is grounded in our true purpose.

Community-first

We ensure that our people are at the heart of everything we do, putting technology and data to work to support and empower our communities in their everyday life.

Collaborative

We foster strong connections across our diverse stakeholders, breaking down silos and unlocking the value of our city's collective intelligence.

Innovative

We harness disruption and promote the development of bold ideas to address pressing challenges and unlock new opportunities.

Problem-driven, evidence-based

Our approach is firmly grounded in the challenges facing our local area and the outcomes we want to achieve, and we consistently measure our impact to iterate and improve.

Flexible and adaptive

We embrace a learning by doing approach, flexibly adapting and responding to our rapidly evolving urban landscape and changing community needs.

Secure and ethical by design

We pride ourselves on being an ethical innovator in the information marketplace and we embed security and privacy protocols from the beginning to safeguard digital rights.

Inclusive

We celebrate our rich diversity and ensure everyone can participate and belong.

“

It is refreshing to see a city council take the lead in creating a framework that recognises and includes all parties that are needed to make a city smart

Frank Zeichner
CEO, Internet of Things Alliance Australia

Our Smart City Strategic Framework

Our vision

Sydney is a dynamic, responsive city, harnessing technology and data to enable collaborative innovation and create a thriving, inclusive and resilient future for all.

The Smart City Strategic Framework is structured around **five strategic outcomes**. While each outcome focuses on a specific domain, the success of the city's smart transformation is dependent on a holistic approach, whereby the five outcomes seamlessly integrate and support each other.

The framework in detail

Smart Infrastructure

- User interfaces and delivery channels
- Data integration and analytics platforms
- Communications and connectivity networks
- Sensors
- Physical landscape and infrastructure

Enabling Environment

- Leadership and governance
- Funding and financing
- Culture
- Monitoring and measurement
- Partnerships
- Standards
- Ethical innovation

01 A city supporting
connected, empowered communities

Objective
Equipping communities with the skills and tools required to participate and flourish in the digital future, ensuring that no one is left behind.

Priorities
1. A digital-ready community for a digitally-inclusive future
2. Community co-creation in the design and delivery of the city
3. Open data informing better community decision-making to improve quality of life

02 A city fuelling
global economic competitiveness and attracting and retaining global talent

Objective
Embracing digital disruption to foster an innovation ecosystem and sustain Sydney's position as a global magnet for talent.

Priorities
1. A thriving innovation ecosystem cultivating a culture of experimentation
2. A knowledge economy and workforce equipped with the skills and supporting structures to leverage new technologies, accelerating productivity and scalability
3. A world-class destination with a superior visitor experience and vibrant night-time economy

03 A city future-proofing
its environment and bolstering resilience

Objective
Accelerating the journey towards a sustainable city, able to adapt and thrive in the face of expected and unexpected challenges.

Priorities
1. Data-driven monitoring, prediction and management of city conditions and impacts of shocks and stresses
2. New technologies propelling a greener city and a carbon-neutral future, powered by the circular economy and affordable renewable energy
3. Informed and prepared communities actively participating to strengthen the local area's sustainability and resilience

04 A city cultivating
vibrant, liveable places

Objective
Integrating the digital and physical landscapes to create diverse, safe, inclusive and creative places for people

Priorities
1. An integrated mobility network supporting active transport
2. Real-time visibility across the urban realm to optimise planning, building and maintenance of infrastructure, assets and systems
3. Seamless integration of the physical and digital to strengthen the community's connection to place and to each other, celebrating the unique identity, culture and history of the local area

05 A city providing
customer-centric, efficient services

Objective
Operating as a connected organisation to optimise the customer experience and maximise efficiencies

Priorities
1. Integrated understanding of community needs and preferences across the City of Sydney to inform joined-up design and delivery of services
2. Multi-channel interactions between the City of Sydney and its communities to deliver responsive, inclusive, personalised services and experiences
3. A smart city operating model to capture maximal efficiencies

Image credit: *Green Square Library and Plaza, City of Sydney*

Strategic Outcome 01

A city supporting connected, empowered communities

Objective
Equipping communities with the skills and tools required to participate and flourish in the digital future, ensuring that no one is left behind.

Priority One: A digital-ready community for a digitally-inclusive future

As the pace of technology development accelerates, the divide between the 'digital haves' and the 'digital have-nots' is increasing. Without affordable access to digital tools and platforms, and the skills to harness them, communities are not able to thrive in the digital era.

Supporting communities to successfully transition to a smart future requires orienting educational programs to equip citizens with the skills to leverage digital infrastructure and unlock opportunities.

The traditional model of education, in which learning is front-loaded in early life, is not fit to help citizens keep pace with technological advancement. By providing opportunities for lifelong learning and upskilling, the City has a significant opportunity to bridge the digital divide and design a future urban realm that enables the participation and flourishing of all.

Opportunities

- Accelerate the transformation of the City of Sydney's libraries as digital community learning hubs. By continuing to partner with schools, universities and community organisations, the City can expand its offering of multi-channel digital courses and diffuse the value of lifelong digital learning across the community. This can include initiatives developed to target vulnerable sectors of the community.
- Embed digital inclusion standards and principles in all Smart planning, projects and procurement.
- Use data to identify segments of the community which are not able to access or leverage digital tools and platforms in order to efficiently target resources to promote equal opportunity.

Priority Two: Community co-creation in the design and delivery of the city

Traditionally, the relationship between local governments and citizens has been uni-directional, with local governments delivering information and services to citizens as passive recipients. However, new technologies are increasingly disrupting this paradigm. By leveraging digital technologies and platforms alongside other innovative engagement approaches, cities are seeking to enlist citizens as partners in building the cities of the future.

With a legacy of facilitating genuine community engagement, the City is championing a co-creation approach to smart transformation. The City recognises the significant value that can be realised by using digital civic engagement tools to tap into the knowledge, experience and innovation of its communities to co-create meaningful solutions that address real needs.

New technologies enable the City to continue to build a model of governance that 'truly values the intelligence and dedication of its employees and the imagination and spirit of its citizens'.[1]

Open dialogue builds trust and strengthens the legitimacy of resulting plans.[2] By encouraging open communication, the City is seeking to foster a culture which embraces ethical experimentation. Within this culture, failure is seen as a necessary step to drive learning and adaptation for smart transformation, rather than as an end-state to be avoided by never taking risks.

Opportunities

- Develop digital civic innovation platforms and physical living labs and makerspaces that enable citizens to contribute their knowledge, skills and experience, experiment with new technologies, and collaborate to create new ideas and solutions.
- Support dynamic two-way communication between the City and its diverse communities. Transparent feedback loops enable the community to express particular needs, report issues and share ideas as a way to test and improve Smart solutions, projects and services in partnership with the City.
- Support the development of peer-to-peer digital platforms that promote social cohesion and provide avenues for sharing information and strengthening neighbourhood interactions, both digital and physical.

[1] Goldsmith, S and Crawford, S 2014, *The Responsive City: Engaging Communities through data-smart governance*
[2] The Committee for Sydney 2018, *Smart Engagement: Leveraging Technology for a More Inclusive Sydney*

Priority Three: Open data informing better community decision-making to improve quality of life

By opening up the vast data streams they collect, local governments are fundamentally changing the human experience of cities. Open data empowers communities to make more effective decisions, improve their own quality of life and chart a better future. In this way, cities are creating a 'digital urban commons', whereby communities have the tools and space to innovate and thrive.

However, simply publishing data through a portal or dashboard is insufficient for it to be optimally leveraged. The City is committed to accelerating the transformation of data into actionable knowledge by supporting the development of platforms that structure, integrate and analyse data. This involves building citizen-centric interfaces that visualise data and render it easy to understand and be used by communities.

The City also recognises the imperative of adopting a 'security-by-design' approach to open data. The City's open data policy and governance framework ensures the ethical publication of data, protecting security and privacy and safeguarding digital rights.

Opportunities

- Increase awareness and understanding of the City's open data policy and governance framework to guide the secure and ethical publishing of data for community consumption and transformation.
- Accelerate the publishing of data through the City's open data portal and promote the portal as the central hub for urban data. Continue to explore new ways to transform the data into accessible insights, such as through visualisations and data-driven storytelling. This could also include facilitating challenges to encourage communities to leverage open data to develop new ideas and solutions for the benefit of the city.
- Work with state, federal and other local governments to share data across jurisdictions to enhance outcomes for the community that are not constrained by arbitrary geographical or bureaucratic boundaries.

“

We have a unique opportunity to design for the needs of people with disabilities to ensure they are included in the future urban landscapes - and in doing so, it might just mean better design for everyone.

Pete Horsley
Founder, Remarkable, disability-tech accelerator

Strategic Outcome 02

A city fuelling global economic competitiveness and attracting and retaining global talent

Objective
Embracing digital disruption to foster an innovation ecosystem and sustain Sydney's position as a global magnet for talent

Priority One: A thriving innovation ecosystem cultivating a culture of experimentation

Rapid globalisation, coupled with the speed of technological change, is forcing cities to shift away from traditional economic models and embrace the 'innovation economy'. This shift has spurred the agglomeration of knowledge-intensive industries, organisations and talent in cities across the globe, giving rise to 'innovation districts'.[3] Against this backdrop, smart city transformation has the potential to increase GDP per capita by 21%, but this value can only be reaped if cities foster a strong innovation ecosystem.[4]

The City of Sydney local area is an engine of economic growth and competitiveness, representing over 30% of the Greater Sydney economy and over 22% of the GDP for NSW. The city is home to some of Australia's leading academic institutions, global technology and knowledge-based companies, over 27% of the country's tech startups and a highly diverse community. This ecosystem represents a fertile landscape for the establishment of innovation districts.

The concentration of diverse knowledge, skills and experience within an innovation district is a powerful force for the co-creation of new solutions and the commercialisation of ideas. This creates a virtuous cycle of economic growth as our city strengthens its global reputation and competitiveness, supports the global expansion of local companies and intensifies its magnetic pull on global talent.

Opportunities

- Foster innovation districts to further activate the city's innovation ecosystem, driving collaboration across the city's academic and health institutions, companies, start-ups and community organisations. Open, ubiquitous connectivity networks are an essential foundation to support innovation districts and the culture of experimentation required to thrive. Innovation districts can also be sites for smart city 'sandboxes' where smart solutions, policies and frameworks can be tested and refined, before implementation.
- Embed standards across the city's digital infrastructure to facilitate a seamless flow of data, enabling stakeholders to access and transform it.
- Contribute to the information economy through building a trusted environment to support the sharing of data, both internally across the City and with external parties.

[3] NSW Innovation and Productivity Council 2018, *The Innovation Economy: Implications and Imperatives for States and Regions*
[4] ESI ThoughtLab 2018, *Smarter Cities 2025: Building a sustainable business and financing plan*

Priority Two: A knowledge economy and workforce equipped with the skills and supporting structures to leverage new technologies, accelerating productivity and scalability

Powerful new technologies, including machine learning, artificial intelligence and robotics, are transforming the national and global economies. It is estimated that between 25%-46% of current workplace activities in Australia could be automated by 2030, yielding a boost to the national economy of approximately $1.2 trillion.

By increasing productivity, automation can drive inclusive income growth, and it is estimated that each Australian could reap an additional $4,000 in annual income.[5] Automation represents the opportunity to boost workforce participation by enabling more flexible working arrangements and improving the quality and safety of work.

The City of Sydney can help to create a conducive environment in which established companies can boost productivity by harnessing new technologies, and local entrepreneurs and tech startups can grow and scale.

The City can also help the adoption of new business models, such as the sharing economy, and support workers through job and skill transitions.

Opportunities

- Strengthen the city's entrepreneurial culture and community by accelerating delivery of the five focus areas in the City's tech startups action plan.
- Explore how new technologies can be leveraged to advance productivity in areas of competitive advantage and existing specialisations, including Australia's world-class research and development capabilities, services (in particular education, health care and financial), and quantum computing.
- Continue to provide learning opportunities that build digital and technological skills to enable the city's workers and disadvantaged groups to effectively transition to the economy of the future.

[5] McKinsey & Company 2019, *Australia's Automation Opportunity*

Priority Three: A world-class destination with a superior visitor experience and vibrant night-time economy

A vibrant night-time economy and rich tourist experience are critical factors in ensuring the City of Sydney creates new jobs, attracts and retains a talented workforce, and remains a top destination for international students and visitors.[6]

Evidence shows that providing rich cultural and social experiences is also important for the connectedness, resilience and wellbeing of all Sydneysiders.[7]

The City of Sydney has maintained strong performance for its overall cultural and social amenity. Sydney hosts some of the most high profile cultural and night-time events in the world. For example, Vivid Sydney is the largest night-time arts and cultural festival of its kind. In 2017, Vivid contributed $143 million in economic value, attracting 2.33 million people.[8] The City's night-time economy is estimated to produce $3.64 billion in revenue per year, involving 4,608 businesses and employing 32,411 people.[9]

However, recent benchmarking studies have highlighted disadvantages pertaining to the quality of the city's visitor experience, including overcrowding, lack of inclusive nightlife and under-performing cultural offerings.[10]

A coordinated focus on building the city's brand identity is required to maximise the economic and social potential of being a global metropolis in the innovation economy. This is especially important given the concentration of significant arts and cultural sites and organisations within the local area.

Smart technologies can help accentuate the city's natural and cultural advantages and existing events to provide a superior cultural and social experience, tell a compelling story and grow Sydney's reputation as a global 24-hour city. For example, smart street lighting can simultaneously be a mechanism for enhancing the sense of safety, as well as a channel for creative art and place-making.

Opportunities

- Deploy internet of things sensor networks to improve the management of festivals and events. Data could be used to enhance the effectiveness of crowd management, reducing queue times, and helping businesses capitalise on opportunities for growth by understanding the spread and activity of people during events.
- Explore how new technologies, such as smart lighting, smart CCTV and smart transportation, can improve safety after dark and encourage greater numbers of businesses and creative organisations to participate in the night-time economy.
- Use our extensive digital media channels for creative and compelling storytelling that builds Sydney's reputation globally.

[6] The Committee for Sydney 2018, *Sydney as a 24-Hour City*
[7] City of Sydney 2017, *An Open and Creative City: Discussion Paper*
[8] Destination New South Wales 2017, *Record attendance at Vivid Sydney 2017*
[9] City of Sydney 2017, *An Open and Creative City: Discussion Paper*
[10] The Committee for Sydney 2018, *Sustaining the Advantage: Benchmarking Sydney's Performance 2018*

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With a world that is changing faster than our ability to even understand how to manage it, it has never been more critical to embrace and nurture innovation and the individuals who are dedicating their lives to solving some of our biggest problems.

Our city’s future depends on it, Australia’s economy will be re-built with it. Sydney will thrive because we have invested in ensuring we take care of our community through smart use of the technologies and solutions being developed in our midst. This tech ecosystem, strongly supported, will enable responsible management of a growing population, and economic strength and stability into the future.

Topaz Conway
Director, Cicada Innovations and StartupAus

Strategic Outcome 03

A city future-proofing its environment and bolstering resilience

Objective
Accelerating the journey towards a sustainable city, able to adapt and thrive in the face of expected and unexpected challenges.

Priority One: Data-driven monitoring, prediction and management of city conditions and impacts of shocks and stresses

The City of Sydney has demonstrated significant leadership in championing the development of the Resilient Sydney strategy which sets a vision for Greater Sydney to be a 'metropolis that is connected, inclusive and resilient'.[11] To deliver this vision, we need a deep understanding of the day-to-day conditions of the urban realm. With this knowledge, we will be able to support the community to survive, adapt and thrive in the face of shocks and stresses, such as extreme weather events and increasing pressures on critical infrastructure and services. Importantly, we must gain an understanding of the vulnerabilities and risks experienced by different parts of the city and the likelihood and impacts of various disruptions upon people, infrastructure and systems.

New technologies have the capability to provide real-time data on a diversity of urban health indicators, including carbon emissions, water and air quality, infrastructure functionality, crime incident locations and social cohesion. While risk maps are not new, the vast increase in the availability and quality of data presents the opportunity for us to understand its conditions with a far greater degree of granularity.

New technologies enable us to integrate and overlay disparate data streams, creating an evidence base to inform the development of management plans. Resilience challenges are not confined within council borders and is committed to pursuing a networked approach, sharing data with councils and other key stakeholders across Greater Sydney to drive integrated planning and responsiveness.

Due to the significant value of data, the City sees cyber resilience as a foundational component for overall resilience. Consequently, the City has adopted a 'security by design' approach to its smart transformation, embedding security measures and protocols across its digital infrastructure from the beginning in order to protect long-term integrity.

Opportunities

- Use data to map vulnerabilities, risks and interdependencies across the local area to enable the development of targeted resilience plans and interventions. For example, the City could map temperature variance, informing actions to reduce impacts of extreme heat. Predictive analytics can be applied to anticipate and plan for future disruptions, shocks and stresses. Analysing data on urban conditions before and after a disaster can also provide a valuable evidence base to 'build back better' in the recovery phase, future-proofing against further damage.
- Share data with councils across Greater Sydney, emergency services, state government agencies, utilities and other stakeholders responsible for critical infrastructure, services and assets to enable integrated planning, preparedness and responsiveness.
- Continue to focus on cyber risk management, providing advanced threat monitoring and scanning. This is critical to ensuring an effective response to a cyber security breach, minimising damage and ensuring swift recovery.

[11] Resilient Sydney (2018), *Resilient Sydney: A strategy for city resilience 2018*, published by the City of Sydney on behalf of the metropolitan Councils of Sydney, with the support of 100 Resilient Cities.

Priority Two: New technologies propelling a greener city and a carbon-neutral future, powered by the circular economy and affordable renewable energy

Acting on climate change has long been a top priority for the City of Sydney. We are committed to achieving a target of net-zero carbon emissions across the local area by 2050 and, by mid-2020, will purchase 100% of its operational electricity from renewable energy sources. The City strongly supports the transition away from the traditional, linear model of 'take, make and dispose' to a circular economy approach for resource management.[12]

Technological advancements can support us to accelerate the transition to affordable, renewable energy and a carbon-neutral future. Data and digital technology can help to manage flows of materials and assets across the city, fostering an urban system that is regenerative and restorative.[13]

Smart approaches to precinct and building construction, intensifying installation of solar panels, mobility/transport options (hydrogen and electric vehicles) and community involvement in clean energy initiatives (microgrids), are just some of the potential directions that need to be considered for a carbon-neutral or carbon-positive future.

Trees and green spaces represent some of our local area's most valuable assets. This 'green infrastructure' is critical to minimising urban heat island effect by cooling the city, filtering air pollution, absorbing stormwater and maintaining our prized urban amenity and high quality of life.

Opportunities

- Explore options for accelerating the uptake of clean energy vehicles across our organisation, such as through electric vehicle and hydrogen technologies, including by developing the required supporting infrastructure to deliver on sustainability commitments.
- Expand use of urban canopy mapping technologies to monitor tree location, species and health, as well as to quantify urban forest benefits, enabling us to target low canopy areas and improve urban forest diversity.
- Explore options for developing artificial intelligence capabilities to drive efficient resource use, and advance the circular economy. Machine learning capabilities can analyse data collected from sensor networks to monitor quality of urban conditions and automate decisions. For example, a smart stormwater system could determine cleaning and maintenance schedules and identify flooding risks, or smart irrigation can help us manage water use to green the city.

[12] City of Sydney 2018, *Green Environmental Sustainability Progress Report: July to December 2018*
[13] Ellen Macarthur Foundation & Google 2017, *Cities in the Circular Economy: The Role of Digital Technology*

Priority Three: Informed and prepared communities actively participating to strengthen the local area's sustainability and resilience

The resilience of cities in times of crisis hinges on the preparedness of their communities. In the face of rapid change, resilient cities equip communities with the digital infrastructure and skills required to easily find real-time information as an event unfolds, access resources and communicate with family, neighbours and emergency services.

The Resilient Sydney strategy highlights the opportunities that new technologies can unlock to help strengthen communities. The City of Sydney recognises the 'resilience dividend' to be captured from investing in these new innovations, that is the significant reduction of impacts on people, infrastructure and the environment from acute shocks and chronic stresses. For example, digital platforms, including mobile apps, smart street furniture and social media, can provide valuable channels for pushing out real-time alerts as emergencies happen, arming communities with the information required to make effective decisions.

Data on environmental conditions can also improve public health outcomes. For example, the NSW Government relays real-time data on air pollution levels which can help people who suffer with asthma to make better decisions. Augmented reality, which blends the digital and physical worlds, can also be a powerful tool, enabling citizens to visualise and experience simulated impacts of emergencies or natural disasters and plan accordingly.

Enlisting citizens as partners in sustainability and resilience initiatives helps to raise awareness, foster a sense of community stewardship and prepare communities to face the unexpected. 'Citizen science' programs are becoming increasingly common components of smart city agendas across the world, whereby citizens actively participate in collecting data, such as water quality or sightings of bird species. Such projects have not only resulted in the generation of knowledge, but have also proven to strengthen community connectedness and cohesion, fundamental for city resilience.[14]

Opportunities

- Leverage digital channels to provide stronger support for communities to plan and prepare for emergencies. Examples include promoting the 'Get Prepared' app as a one-stop disaster preparedness tool,[15] as well as by pushing out real-time alerts and updates to help communities make optimal decisions during times of crisis.
- Encourage citizens to participate in activities that build resilience in their local communities, such as by monitoring neighbourhood water consumption and working together to improve water use.
- Explore options for developing virtual and augmented reality apps. These can enable citizens to see and experience proposed developments and projects to inform their feedback. Apps can also enable citizens to experience impacts of emergency events to help them plan accordingly.

[14] Hecker, S et al. UCL Press 2018, *Citizen Science: Innovation in Open Science, Society and Policy*
[15] The 'Get Prepared' app was created by the Red Cross and Insurance Australia Group (IAG). Further information can be found in Resilient Sydney (2018), *Resilient Sydney: A strategy for city resilience 2018*, published by the City of Sydney on behalf of the metropolitan Councils of Sydney, with the support of 100 Resilient Cities.

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When everything in a city is connected, then everything shares system risks. Being a smart city means using tools and technology to understand both how we are interconnected, but also how we can manage risks together. The key is collaboration.

Beck Dawson
Chief Resilience Officer, Resilient Sydney

Strategic Outcome 04

A city cultivating vibrant, liveable places

Objective
Integrating the digital and physical landscapes to create diverse, safe, inclusive and creative places for people

Priority One: An integrated mobility network supporting active transport

Mobility plays a crucial role in shaping the urban realm. Global city centres are served by integrated mobility systems that protect public places and support active transport.[16]

The City of Sydney aims to create a '10-minute neighbourhoods' in which residents are able to meet their everyday needs within a 10-minute walk. The City sees the development of such neighbourhoods as key to realising the vision for Greater Sydney of a network of '30-minute cities' in which home, work and play are all accessible within 30 minutes.[17]

Digital technologies can help the us to optimise street space allocation to prioritise active transport options. By leveraging data, we can develop the pedestrian infrastructure required to improve the walkability of the public domain.

Walkable places have been shown to generate enhanced health and wellbeing outcomes for communities, stimulate the local economy and reduce environmental impact by deprioritising cars. In this way, we can create places for people.

Opportunities

- Analyse data to inform the optimal allocation of street space and the development of pedestrian infrastructure. This will promote active transport and support equitable access of the public domain for all.
- Help to alleviate overcrowding on public transport by working with state government to proactively push out notifications to inform commuters of congested routes and direct them to better alternatives. This could include offering incentives for choosing active transport options.
- Expand the smart pedestrian sensing network to provide information on characteristics of different areas of the city. For example, data from the project could be visualised to map active transport routes with a high degree of walkability, areas with cultural sites or areas considered safe for walking at night.

[16] Transport for NSW 2018, *Future Transport Strategy 2056*
[17] Greater Sydney Commission 2018, *A Metropolis of Three Cities*

Priority Two: Visibility across the urban realm to optimise planning, building and maintenance of infrastructure, assets and systems

A smart city depends on smart planning. The pace of population growth is placing pressure on traditional planning processes, necessitating the adoption of a more agile approach which will enable cities to dynamically respond to changing demands.[18]

Embedding a digital intelligence layer across the city will provide visibility over the conditions and operations of infrastructure, assets and systems. This layer will not only enable us to watch events as they unfold but will generate a range of multiplier effects. By tracking and assessing performance, we have the opportunity to reap more from existing assets, target resources and identify gaps.

We can develop this layer into a 'digital twin' to simulate proposed developments and test for impacts to optimise land use planning and ensure the city's future liveability. We can also open this information up to the public by visualising the digital twin as a virtual model to help communities understand, contribute to and plan for future developments.

This is particularly important in the face of increasing housing affordability challenges. By modelling different housing mix scenarios, we can help shape an inclusive future which provides a diversity of housing options.

Opportunities

- Develop a city activity layer project providing detailed visibility of activity across the city, including both real-time activity, e.g. movement across transport networks, and planned activity, e.g. slated roadworks. Using predictive data analytics, the layer can alert the City when public assets and systems require maintenance in order to forestall interruptions or break-downs.
- Use the city activity layer as a base to develop a digital twin which can visualise the impacts of proposed developments and determine their desirability and feasibility. The digital twin can help us understand the local spatial impacts of growth across the city to drive better planning decisions, improve the sequencing of infrastructure development and maintain liveability as the city grows. In addition, the digital twin can run computer-generated simulations, for example simulations of emergency situations, in order to establish a map of potential impacts and target preparations accordingly.
- Maximise the benefits captured when creating liveable, connected places by creating a common vocabulary and sharing data with the property sector to ensure seamless integration across smart buildings, smart precincts and, ultimately, the smart city.

[18] Infrastructure Australia 2018, *Planning Liveable Cities: A place-based approach to sequencing infrastructure and growth*

Priority Three: Seamless integration of the physical and digital to strengthen the community's connection to place and to each other, celebrating the unique identity, culture and history of the local area

The City of Sydney has a unique combination of people, history, culture and place. As the traditional custodians of the land, the First Nations people have retained a strong connection to the local area. Today, the city's community is a melting pot of cultures, with the majority of residents having been born overseas. It is also home to a vast array of arts and cultural organisations.

New technologies hold the potential for the city to preserve, strengthen and celebrate its rich cultural diversity. This is fundamental to the concept of 'digital place-making' whereby digital platforms provide opportunities for supporting the community to develop meaningful connections to place and to each other.[19]

By leveraging new technologies, we can provide greater opportunities for local artistic and cultural expression, and activate a network of vibrant public places. While technology is often perceived to be a homogenising force, we have the opportunity to use it for the opposite effect and tell our city's unique story.

Seamlessly embedding smart technology into the physical landscape is important to prevent it from adding further clutter to the public domain, which would undermine its amenity and appeal as a place for communities to meet and explore.

Ultimately the City can foster a stronger sense of belonging by bringing people together and can enhance the city's lovability, as well as its liveability, for all who experience it.

Opportunities

- Leverage the City's wayfinding network as a platform for interactive art installations, such as virtual/augmented reality and digital city walks, enabling communities to experience local art and architecture as well as the history and culture of the First Nations people. Working with the local area's art and cultural institutions can help promote the digital amplification of their assets across the community.
- Expand the deployment of free wifi across the local area. This can unlock a range of opportunities to enhance the city's liveability and social connectedness. For example, the network can help tourists navigate the city and support communities to create online groups, share ideas and resources and organise meet-ups.
- Support the creation of immersive experiences for communities to use technology to creatively interact with the physical landscape and with each other.

[19] Iyer, J. Carnegie Mellon University 2017, *The Heart of Smart Cites: A case for the relevance of art in data driven cities*

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Great places are made when artistic, cultural and creative works are visible, valued, distinctive and accessible.

Greater Sydney Commission

Strategic Outcome 05

A city providing customer-centric, efficient services

Objective
Operating as a connected organisation to optimise the customer experience and maximise efficiencies

Priority One: Integrated understanding of community needs and preferences across the City of Sydney to inform joined-up design and delivery of services

A key barrier impeding smart transformation for cities globally is the traditional service delivery model which is oriented around local government federated organisational structure, rather than centred on the customer. This model entrenches siloed operations, with each department seeking to gain an understanding of customer needs and preferences in isolation of the rest of the organisation.

The City of Sydney is seeking to build an integrated digital infrastructure which overcomes silos and legacy systems to enable the sharing of data across the organisation. This is imperative to realise the potential of data as a key strategic and operational asset.

The City is an engine for data generation and we have the opportunity to gain a deep understanding of the needs and preferences of its diverse customers by integrating and overlaying different streams of data. This wealth of data entails the responsibility to act as an ethical custodian by applying effective security and privacy controls.

In a time of rapidly changing community needs and expectations, achieving excellence in service delivery and customer experience relies on our ability to use data to know, respond and intuitively adapt.

Establishing a single view of the customer is a key building block for our smart transformation. An integrated approach to data management giving a real-time, holistic understanding of the customer would prevent the duplication and contradiction of data and provide the opportunity for joined-up service design and delivery.

Once the City has established a single source of truth across the organisation, external data sources can be integrated to further deepen insight into the needs and preferences of the City's customers. Crowdsourcing data directly from the community is another effective way we can sharpen our focus on the customer.

Opportunities

- Develop a unified view of the City's customers to provide a frictionless and personalised customer experience. This requires a shift away from legacy and disparate methods of managing data to a culture where data is shared across the City and captured in consistent and interoperable ways that uphold privacy principles.
- Use machine learning and advanced analytics to integrate and transform the City's diverse streams of data for actionable insights, informing the collaborative design and delivery of services.
- Explore options to crowdsource data from the community in order to supplement City data and gain deeper insights into the customer. This data could also be shared with other service providers to improve delivery to the community and develop better, more inclusive services.

Priority Two: Multi-channel interactions between the City of Sydney and its communities to deliver responsive, inclusive, personalised services and experiences

Today's customers expect the same quality of service from governments as they do from the private sector. Across the board, customer satisfaction is dependent on the provision of a seamless user experience.

Transforming service delivery requires a customer-focused approach to the ways in which we interact with customers. Given the vast number of services provided by the City, this approach must be informed by the entire customer journey, rather than by specific touch points.

Developing multiple options for interacting with customers, spanning both face-to-face and digital channels, represents the opportunity to deliver next-generation services, tailored to individual preferences and needs anytime, anywhere.

Coordination of channels is critical to ensure consistent communications and to prevent the need for customers to navigate the City's organisational structure. Customers are increasingly showing a preference for self-service options, and cities are responding by building self-service portals as part of their channel options.[20]

Embracing service delivery transformation is a key component of our smart city vision. The objective is to make service delivery as seamless as possible and render our organisational structures invisible and irrelevant to the customer.

The City not only recognises the opportunity to enhance the customer experience, but also how the use of multiple channels can improve the inclusivity of service delivery by lowering accessibility barriers.[21] Considering the needs of the most vulnerable members of the community in the design of channels can improve equitable access to information and services, closing gaps and redressing disadvantage.[22] Finally, by conducting iterative service delivery reviews, we can drive a culture of continuous improvement and smarter investment in service delivery.

Opportunities

- Continue to map end-to-end customer journeys and create a service blueprint that illustrates the people, process, policy, partners and technology involved at each stage.
- Identify the customer pain points across the journeys, including underlying causes of pain, to inform a redesign of the end-to-end customer experience. We can invoke digital channels and applications to streamline and personalise the customer experience.
- Rationalise the City's digital assets into a focused online environment that supports self-service capability.

[20] McKinsey & Co 2015, *Implementing a citizen-centric approach to delivering government services*
[21] The Committee for Sydney 2017, *#Wethecity3: Towards a Data-driven and Responsive Sydney*
[22] The Ethics Centre 2018, *Ethical by Design: Principles for Good Technology*

Priority Three: A smart city operating model to capture maximal efficiencies

Local governments are often hamstrung by outdated operating models and legacy IT systems, unable to keep pace with the rapid pace of technological change required to support the quality of service delivery expected by citizens.

Shifting to a smart city operating model enables cities to unlock data from individual silos and drive city-wide innovation at speed. This requires a dedicated focus to ensure the City's back and middle offices provide a strong foundation to deliver outcomes through its front-office. As a connected organisation, we will be able to effectively align with customers, employees, suppliers and partners across the City's ecosystem to unlock efficiencies and deliver excellence.[23]

A flexible, integrated digital infrastructure can realise a range of efficiencies, for example by removing duplicative processes across departments, connecting office and field systems and reducing time to serve customers. A connected digital foundation can also support a whole-of-organisation approach to smart city resourcing and budgeting, with a focus on value for money. This includes determining the optimal blend of human and automated capabilities for a future-fit workforce, with automation technologies providing decision-making support that bolsters human capability rather than competes with it.

Opportunities

- Develop a centralised smart city register of projects and an integrated approach to smart city governance, budgeting and resourcing.
- Develop an integrated digital infrastructure architecture at an organisational level to drive a connected enterprise and operating model, share data and improve business intelligence.
- Continue to expand and improve the use of technology across the workforce to fully integrate and digitise internal operations, for example by integrating field workforce activities with in-house systems and eliminating unnecessary manual and paper-based processes.

[23] KPMG 2017, *Competing for growth: Creating a customer-centric connected enterprise*

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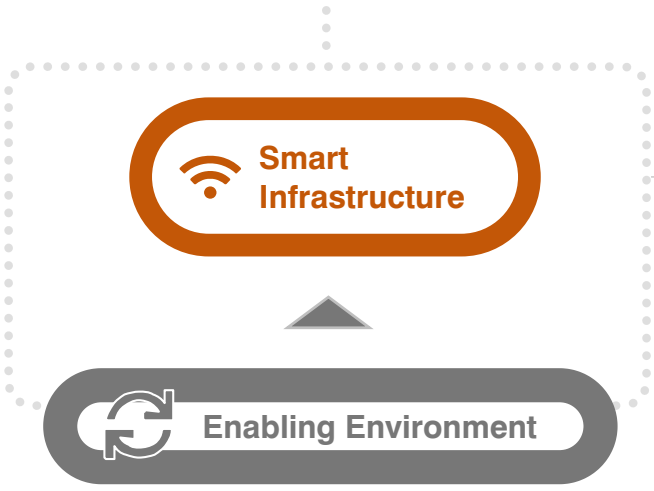
To support a smart Sydney, the City of Sydney as an organisation needs to work smart. We need to be agile, coordinated and lean, and provide our workforce with the skills they need in the digital age. We need to effectively use data and technology to make intelligent decisions and efficiently deliver services and facilities that optimise outcomes for our community.

Monica Barone
CEO, City of Sydney

Smart infrastructure

What success looks like

The city's smart infrastructure comprises five layers.



- User interfaces and delivery channels
- Data integration and analytics platforms
- Communications and connectivity networks
- Sensors
- Physical landscape and infrastructure

The digital instrumentation of the city's physical landscape and infrastructure – its road networks, parks, benches, poles and rubbish bins – is the backbone for smart transformation.

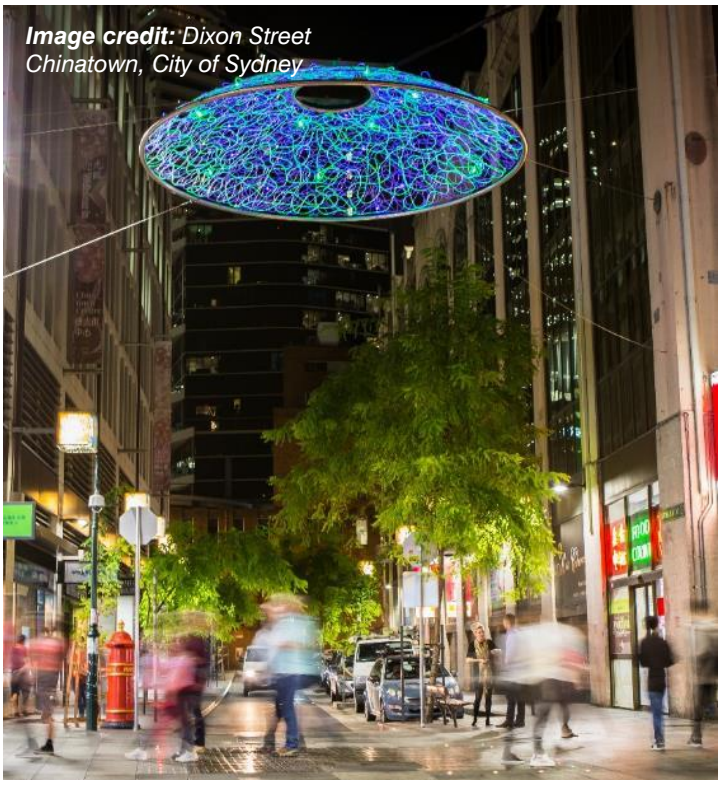


Image credit: *Dixon Street Chinatown, City of Sydney*

Physical landscape and infrastructure

The City of Sydney local area's physical landscape – its structures and assets, including road networks, benches, poles and rubbish bins – represents the backbone for the digital instrumentation driving the smart transformation of the city. In the smart city, each physical component serves multiple purposes for digital connectivity. For example, a rubbish bin is not only a repository for waste, but rather has the capability to be fitted with sensors which can capture data on waste levels, street transport flows, pedestrian movement and more. However as the volume of physical infrastructure increases, the impact on the public domain needs to be managed. The City advocates for interventions, both practical and regulatory, that help to minimise this impact.

Sensors

At the data gathering layer, sensors collect real-time information across the urban realm, for example, temperature, congestion, pedestrian movement, carbon emissions and noise. This layer reveals visibility of the local area's condition, behaviour and change, with an unprecedented degree of granularity.

Communications and connectivity networks

The communications and connectivity networks layer serves as the city's digital plumbing, transporting the vast volumes of data gathered at the sensors layer and enabling communication between different components of the urban realm. There is a range of different networks criss-crossing the local area, including 3G/4G/5G, broadband, wifi and low-power wide-area networks (LPWAN), with additional innovations on the horizon.

Data integration and analytics platforms

The data integration and analytics platforms layer is the hub for all of the data that is gathered by the sensors and transported by the communications and connectivity networks. This layer is where the real value of data is unlocked – through the integration, analysis and transformation of unstructured facts and figures into deep knowledge. Underpinned by a blueprint embedding interoperability standards, platforms can be opened up and serve as the bedrock of the city's innovation ecosystem. Platforms can enable all stakeholders to experiment with data and build new products and services with public value, creating a 'digital urban commons'.

User interfaces and delivery channels

While the data integration and analytics platforms layer can powerfully transform data into knowledge, the user interfaces and delivery channels layer renders that knowledge into an accessible and useable format. Through personalised and fun interfaces, the City can engage the community in meaningful dialogue, understand their needs and intuitively respond. Presenting urban data in clear formats, such as visualisation dashboards, enables communities to make better decisions and builds trust across the city. In this way, communities are enlisted as partners and co-creators in the urban realm.

Unlocking the power of data

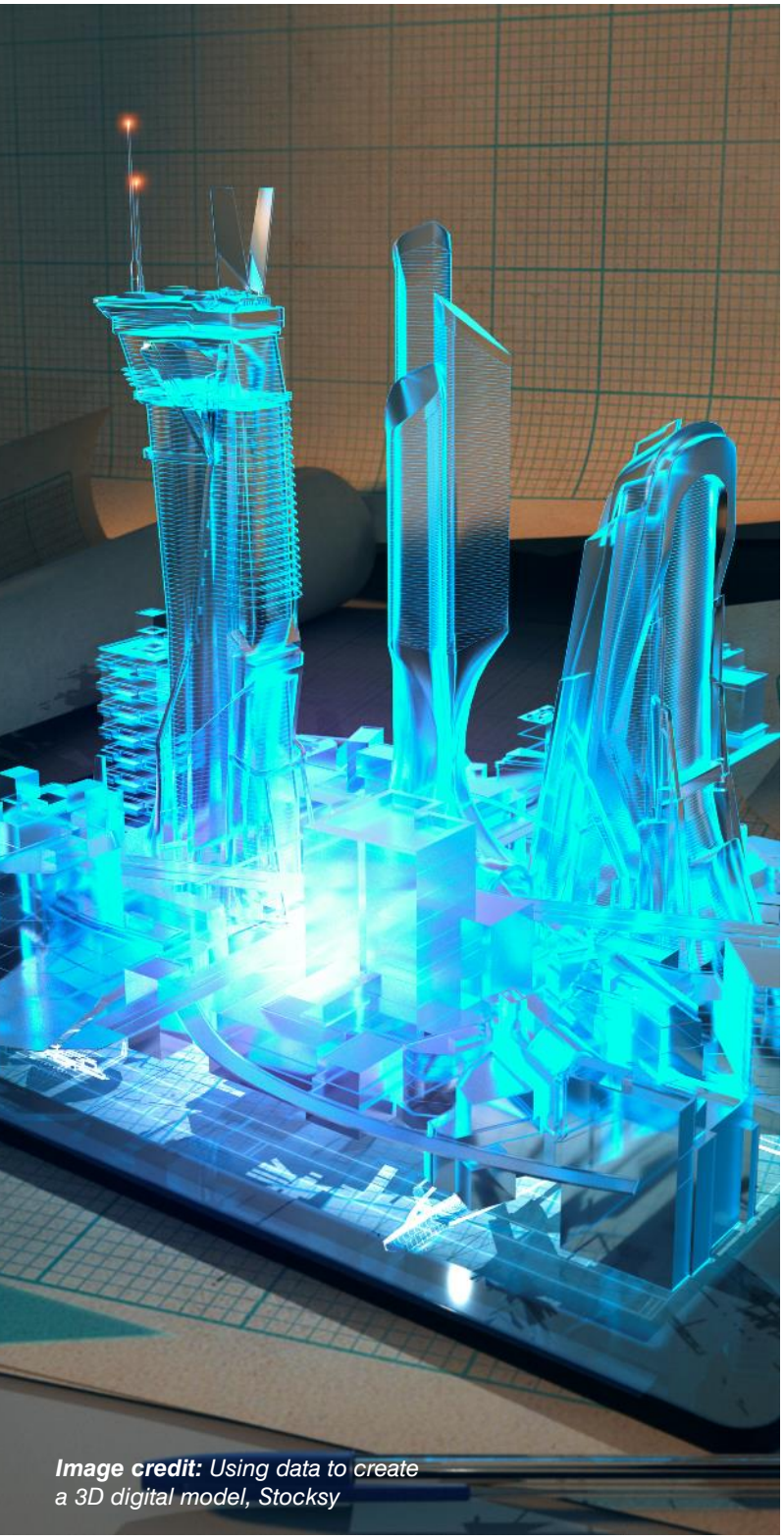


Image credit: *Using data to create a 3D digital model, Stocksy*

As the amount of available data grows exponentially, cities globally are seeking to leverage it in order to drive more effective, evidence-based decision-making and deliver a better quality of life for their communities. Embedding a secure and ethical by design digital layer across the City of Sydney will enable us to harness both existing and new flows of data.

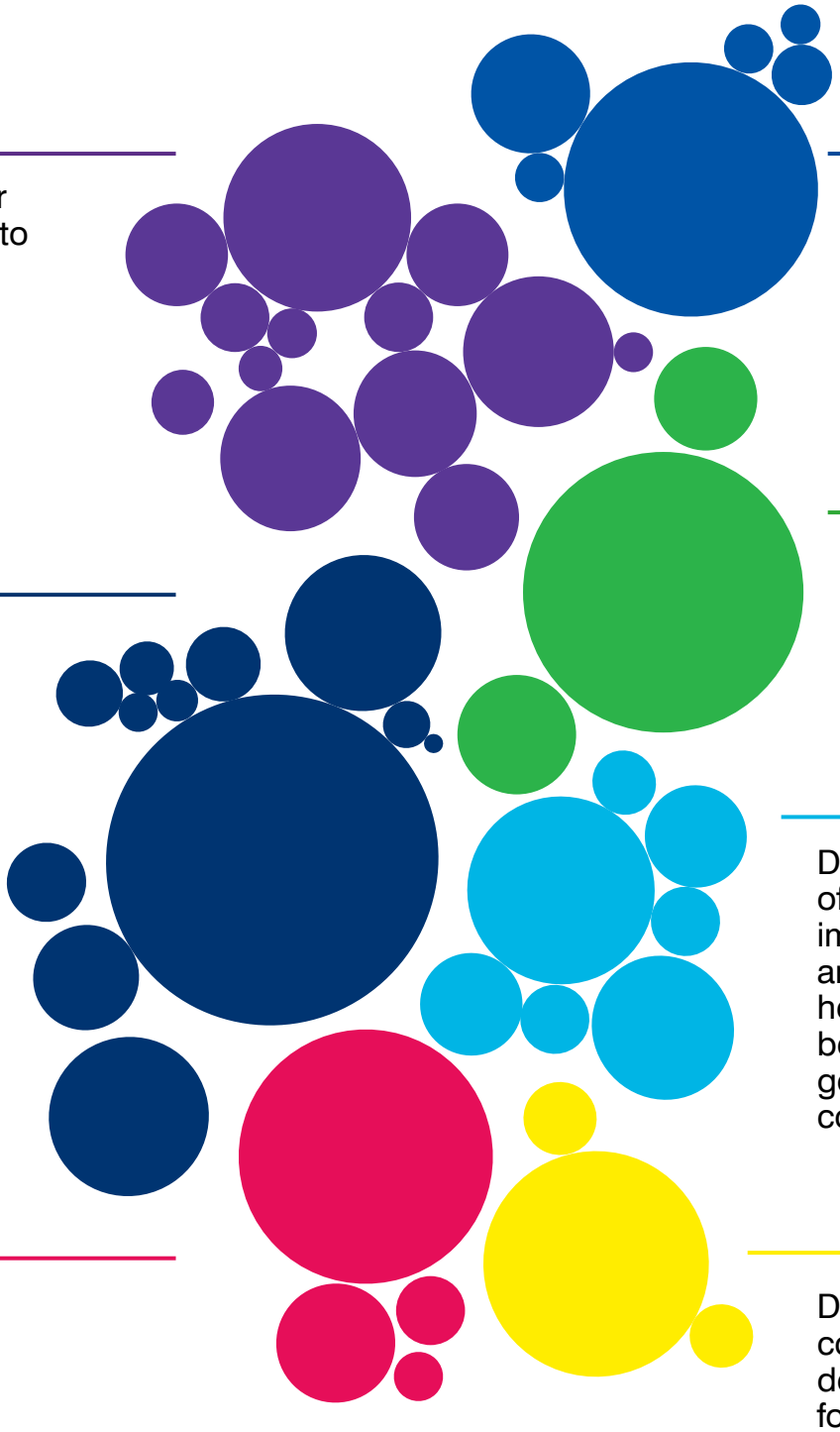
However, merely collecting raw data is insufficient. The real value of data that is collected for a clear purpose is in the stories that it can tell. Transforming raw data into actionable knowledge requires advanced smart infrastructure capable of structuring, integration and analysis, and it also requires an enabling environment and culture.

Critically, the more that data is shared, the more value that can be harnessed. Embedding standards that are adopted by all actors in the smart city ecosystem will facilitate interoperability across the city's smart infrastructure and will enable the seamless flow and exchange of data. This will support stakeholders to leverage the data to unlock new opportunities. Such standards also protect the City from vendor lock-in, ensuring the flexibility required for us to benefit from new data-powered applications and solutions.

The transformative value of data is in the stories that it can tell.

Data drives better decision-making to direct resources more effectively

Data can be used to predict future change and disruption and plan accordingly



Data can be used to understand needs, identify and define problems, and dynamically respond in real-time

Data is a powerful tool to measure performance, driving continuous improvement

Data increases visibility of City operations to improve transparency and accountability, helping to build trust between local government and communities

Data can enhance the utilisation, lifespan and maintenance of assets

Data can empower communities to determine a better future for themselves and participate in building their city of the future

Creating the enabling environment

Whilst a robust technology and data architecture is an essential component of the City's smart transformation, it cannot be seen as a silver bullet. The environment in which the technology and data is used is the key determinant of its success. This environment encompasses the people, processes, policies and politics that either serve to enable or impede the use of technology and data to deliver upon the smart city vision.

There is a range of components required to create an environment that unlocks the true value of technology and data to drive sustainable, scalable smart city transformation.

Leadership and governance

Strong, long-term commitment from leaders across all three levels of government, industry, academia and community, underpinned by effective governance structures and processes, is imperative to drive a clear smart city agenda. However, in place of traditional top-down governance frameworks, a distributed governance model is required to ensure the broad sharing of accountabilities both across the whole of the City of Sydney as well as the local area.

Clear roles and responsibilities of all ecosystem actors need to be established at two levels:

1. The strategic governance level which focuses on agenda-setting and outcomes definition.

2. The delivery governance level which focuses on implementation that involves the intended beneficiaries via user testing to ensure outcomes are actually realised.

Funding and financing

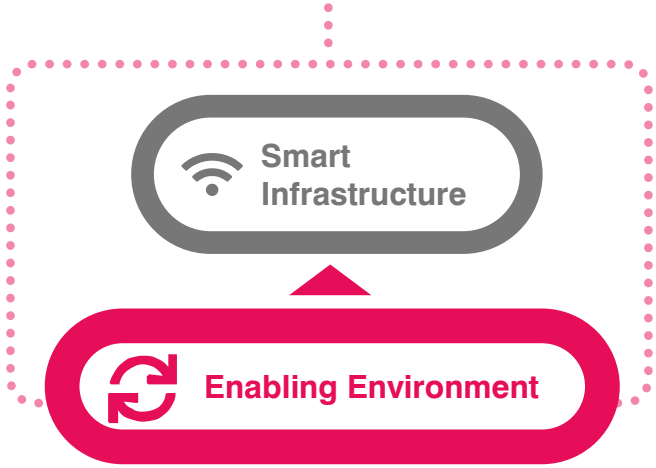
Securing investment is simultaneously one of the biggest opportunities and challenges for the City's smart transformation. The City is committed to exploring creative approaches to procurement as well as collaborative funding mechanisms, including grants that drive innovation and enable the delivery of game-changing solutions to pressing challenges. This requires adopting a problems-based approach and streamlining complex processes in order to attract startups and new entrants to work with the City.

Culture

The City is embracing a culture of experimentation to disrupt traditional risk-aversion which stifles innovation. This culture will promote the City as a test-bed for rapid pilots of new ideas in order to learn, iterate and improve before scaling up.

Monitoring and measurement

Establishing a robust framework for monitoring and measuring outcomes is imperative to drive improvement. The City will define a set of clear goals and KPIs, focused on improved access and outcomes for the community, as well as project outcomes, and develop feedback loops to capture learnings. These learnings will inform scaling of existing projects as well as the development of new projects, so that the City does not have to reinvent the wheel for each Smart project. Committed to transparency of operations, the City will report on its progress and publish learnings.



This environment encompasses the people, processes, policies and politics that either serve to enable or impede the use of technology and data to deliver the smart city vision.

Partnerships

Delivering the smart city vision cannot be achieved without meaningful collaboration. Building a thriving innovation ecosystem open to the full spectrum of city stakeholders is at the heart of the City's approach to smart transformation. This approach values co-creation, recognising the knowledge, skills and experience that each stakeholder can contribute in building the city of the future.

Standards

Standards play a critical role in supporting and fostering the open innovation ecosystem required for smart transformation. The City is driving a standards-based approach to becoming a smart city. This framework is aligned to the internationally-recognised standard released by the International Organization for Standardization – ISO 37106:2018 'Sustainable cities and communities – Guidance on establishing smart city operating models for sustainable communities'.

By providing common vocabularies and frameworks, standards embed interoperability across the city, enabling the sharing of data and avoiding becoming 'locked-in' to a particular solution or vendor.

Ethical innovation

A smart city is built on trust. As outlined in the City's digital strategy, the City is committed to being an ethical innovator in the information marketplace, and has adopted an 'ethical-by-design' approach to its smart transformation. This includes building the principles of ethics, privacy and security into planning new projects and when partnering with others.

In line with the Privacy and Personal Information Protection Act 1998 and the NSW Government Privacy Governance Framework, the City is establishing a foundational ethical infrastructure to drive a system-wide approach, ensuring long-term integrity in the face of disruption. The City will continue to engage with those working on ethics in technology and data and will work to ensure the ethical infrastructure is transparent, clearly understood by the community and delivers a public interest.

Image credit: *Something Else is Alive exhibition at Customs House, City of Sydney*

Protecting the digital rights of citizens is at the heart of the City's ethical infrastructure. The City is developing data policies and guidelines based on the citizen-centric identity management model outlined in ISO 37106:2018, which comprises six principles: 'Consent', 'Checkability', 'Choice', 'Control', 'Convenience' and 'Content'.

The City is also a signatory of the Declaration of Cities Coalition for Digital Rights, which commits to the following evolving principles:

1. Universal and equal access to the internet and global literacy
2. Privacy, data protection and security
3. Transparency, accountability and non-discrimination of data, content and algorithm
4. Participatory democracy, diversity and inclusion
5. Open and ethical digital service standards

Technology and data designs can carry biases which can undermine the fairness of outcomes. In its embrace of new technologies, the City is committed to reducing the likelihood of biases becoming embedded in technology by including diverse teams in the design process and building robust processes for detection and remediation.

The City of Sydney's role

It takes a village to build a smart city

A smart city cannot be master-planned. The City of Sydney is adopting a range of roles in order to help align the interests and expertise of its diverse stakeholders, create a conducive regulatory environment and enable collaborative innovation to drive sustainable smart transformation.

Driver

The City has led the creation of this strategic framework and will help provide strategic direction as the city's smart transformation progresses. The City will work collaboratively to advocate for the creation of a regulatory environment that comprises enabling policy levers, cultivates a culture of innovation and attracts investment. The City will also measure progress and maintain a flexible and future-proofed smart city agenda.

Enabler

The City will support collaborative innovation across the city's diverse stakeholders. We encourage the sharing of data and resources, as well as experimentation and learning. By championing this inclusive approach to smart transformation, we can empower communities with the knowledge and tools required to participate as co-creators in the development of their future city.

Custodian

While a smart city is powered by technology and data, it is sustained by trust. Trust is paramount for the uptake of new technologies, for collaboration and for harnessing data to deliver valuable outcomes. The City will operate as the custodian of the data it manages, maintaining and building trust through an unrelenting commitment to integrity and transparency in the use of that data.

Collaborating to compete: A smart transformation for Greater Sydney

Addressing the complex and interconnectedness of the challenges which cut across the 33 councils comprising Greater Sydney requires deep collaboration across all councils, the Greater Sydney Commission and the state and federal Governments. Sharing data, resources and learnings will drive an integrated approach to building a smart Greater Sydney, serving to bolster global competitiveness, deliver efficiencies of scale, enhance quality of life outcomes and ensure these are spread equitably across the region.

The City is committed to sharing knowledge and learnings from its own smart city journey and from its participation in global city networks, such as the C40 Cities Climate Leadership Group.

Working Smarter:
Building a future-ready City of Sydney

In order to establish the foundation for delivering the smart city vision, the City requires a future-ready workforce. Future-readiness comprises three key components:

1. Structure

Allocating adequate resources and funding is fundamental to enable the execution of the smart city agenda. The joined-up nature of smart city projects requires a focus on value for money beyond standard departmental boundaries. The City believes that successful smart transformation requires involvement from the entire organisation, as well as strong digital leadership across strategy, technology, data, project development, innovation and organisational capability. Working to identify barriers to effective collaboration will be key to the success of the transformation.

2. Skills

Future-ready organisations need the right skills and expertise to adapt to rapid advances in technology and changing community needs. The City will map the skills requirements across the organisation and identify any gaps. The City will support its workforce to develop the knowledge and skills required to thrive in a digital future and accelerate the City's smart transformation. For example, the City is already rolling out human-centred design, agile and LEAN training programs for its staff.

3. Culture

The City is seeking to cultivate a culture of innovation across the entire organisation. This involves overcoming fear of failure to encourage responsible experimentation, providing the space, incentives and environment for staff to discover new solutions to complex challenges.

Image credit: *Visiting Entrepreneur Program seminar, City of Sydney*

The road ahead

Smart transformation will not occur overnight. It requires commitment and energy from stakeholders across the city's ecosystem. This strategic framework provides the foundation and common organising structure to drive an integrated, sustainable smart city program.

A dynamic framework: monitoring and improvement

The City of Sydney is experiencing rapid change. As such, the Smart City Strategic Framework has not been developed to be a static document. Rather, the City sees the framework as a critical enabler to help embrace change and plan for uncertainty. The City is committed to ensuring the smart city agenda delivers tangible impact for its community. Through a collaborative approach of doing, testing, learning, measuring and improving, the City will flexibly adapt the framework to meet new challenges and harness new opportunities as the city evolves.

Activating the strategic framework

The City is bringing this framework to life through an actionable implementation roadmap to direct the operational roll-out of the smart city program. The roadmap is guided by the strategic framework and comprises five key phases, which mirror the ISO 37106:2018 standard.

As part of the roadmap, the City has developed a prioritisation framework to determine the optimal sequencing of projects for maximal value. This framework ensures that a clear problem statement is defined for each smart project considered by the City and that the development of each smart solution is grounded in a robust evidence base. The roadmap is also guiding the City in weighing up costs and benefits and in determining optimal resourcing and funding models. The roadmap will remain dynamic and flexible to accommodate inevitable changes over time.

Smart City Strategic Framework

Our smart city vision

Sydney is a dynamic, responsive city, harnessing technology and data to enable collaborative innovation and create a thriving, inclusive and resilient future for all.

Smart City Implementation Roadmap

Plan

Develop a roadmap which sequences smart projects across a multi-year transformation period, identifying key interdependencies.

Initiate

Commence implementation by focusing on building maximum momentum for projects with minimum delivery risk.

This involves both the identification of 'quick wins' which can serve as proof points to galvanise further action, as well as establishing the building blocks to drive sustainability and scalability.

Deliver

Build on the foundations to shift the focus from driving take-up of pilot smart projects to delivering more significant investment in smart platforms to support a range of projects.

Consolidate

Continually measure performance to improve and iterate. By capturing and sharing learnings, smart projects can be scaled across the city and the greater region, and new initiatives can be developed following a similar smart blueprint.

Transform

Transformation is realised when smart principles, smart policies, smart technology and smart ways of working become embedded as part of the 'DNA' of the City.

Image credit: *Life Under the Freeway, City of Sydney*

Glossary

Artificial Intelligence (AI)

The theory and development of computer systems that can perform tasks that otherwise require human intelligence, such as visual perception, speech recognition and decision-making.

Big data

Large structured and unstructured data sets that can be analysed using computers to identify trends, patterns, associations and interactions. Big data is defined by four key dimensions: volume, variety, velocity and veracity.

Digital divide

The gap in opportunities experienced by those with limited access to technology and control of technology.

Future-proof

Ensuring that planning, services and infrastructure are delivered in such a way that allows for changes or developments to cater for future needs and populations.

Internet of Things (IoT)

A development of the Internet in which objects are instrumented with sensors which have network connectivity, allowing them to send and receive data.

Interoperability

A characteristic of a product or system whose interfaces and processes are able to work seamlessly with a defined set of other products or systems.

Open data

Data that is freely available to everyone to use and republish as they wish, without copyright, patent, or other restrictions.

Predictive analytics

A range of statistical techniques from predictive modelling, machine learning, and data mining that analyse existing data to make predictions about future events.

Smart city

A smart city uses information and communications technology to enhance its liveability, workability and sustainability.

All definitions are based on those contained within the NSW State Infrastructure Strategy 2018-2038: https://insw-sis.visualise.today/documents/INSW_2018SIS_BuildingMomentum.pdf and standard definitions provided by the Smart Cities Council: https://rg.smartcitiescouncil.com/master-glossary

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City of Sydney Documents

- Sustainable Sydney 2030: Community Strategic Plan 2017-2021
- Resilient Sydney: A strategy for city resilience 2018
- City of Sydney Digital Strategy 2017
- An Open and Creative City: Planning for culture and the night time economy Discussion Paper October 2017
- City of Sydney Visitor Profile and Experience Survey Report 2017
- City of Sydney Wellbeing Survey 2018
- City of Sydney Green Environmental Sustainability Progress Report: July to December 2018
- Minute by the Lord Mayor 13 August 2018: Sustainable Sydney 2050

Image credit: Sydney Lunar Festival, City of Sydney

CITY OF SYDNEY

Thank you

We would like to thank all of the participants across our community who contributed their valuable insights, energy and expertise to the creation of this strategic framework.

We look forward to continuing to collaborate with all of you as we progress the implementation of Sydney's smart transformation.