Smart cities

In partnership with ACS

Planning must meet community need

Transformation strategy

Mark Eggleton

With the United Nations predicting nearly 70 per cent of the world’s population to be living in cities by 2050, governments and urban planners face some monumental challenges to create the smart, sustainable cities of the future.

Getting the smart city concept right is going to require a lot of forward thinking. We’ve been building smart cities that reflect their time for millennia whether it be ancient Rome with its aqueducts and road system to the smart planning of Walter Burley Griffin’s Canberra design.

The goal is to create smart cities that are contextualised for their era and to do that we’ve always used the data and technology available to us at the time. New South Wales Minister for Customer Service Victor Dominello says a smart city is where citizens can go about their ‘day-to-day business using data-driven solutions and technology to take time pain points away from their day’.

’It’s about getting from point A to point B with a minimal amount of frass. Every time you use data to take a point of friction out, you’re allocating more time for your brain to be more creative and to do more productive things you want to do,’ Dominello says.

Chief data scientist for NSW and industry professor at UTS Ian Opperman says by all going to work

‘What we’ve seen with COVID-19 is those group behaviours changing.’ We’ve discovered many of us can turn up to work at exactly the same time every day and log on without having travelled great distances and spent resources doing so. Our digital infrastructure has basically held up, although it could be better, and according to Opperman, ‘we’re not moving atoms, we’re moving bits and that’s an incredibly more efficient process’.

And by taking away that need for a vast number of people to be physically somewhere, Opperman says we can concentrate on optimising the industries which need a physical presence such as construction, maintenance and other services.

According to Opperman, using data to create a digital twin (see separate story in this section) that can be used for planning and every city operation allows us to predict and optimise everything.

‘You can do scenario planning in a digital environment which hopefully can be adapted to the physical world depending on how adaptable the real world infrastructure or service actually is.’

For example, garbage collection is a service challenge for every city and if digital twinning allows for solid scenario planning, we can optimise how they operate. You could turn lanes on and off on a smart bridge and map those changes before applying them to the physical world.

By modelling efficient ways to operate all the services together you can create a high maturity smart city.

Opperman says. The key is ensuring we have strong communications infrastructure. Unfortunately, the infrastructure we currently have is still not at the level that we might’ve hoped it would have been, although Opperman states 5G technology will make a big difference as it rolls out and more devices are connected.

Yet while data is touted as the energy that drives the smart city of the future, the chief executive officer and founder of Unleash Live, Hanno Blankenstein, warns we’re in danger of collecting too much that is fairly useless.

‘There are a lot of smart city consultants out there making plenty of money talking up data but are we seeing the positive impact?’ Blankenstein asks.

He says there is a treasure trove of consultant data telling governments they have a problem but most of their data is historical, which isn’t of great help as events happen live.

‘We need to better collaborate on events happening on the ground in real time and they currently have contracts in a number of countries around the world including state governments in the United States and India.

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Continued next page
Easier transport is within reach

Mobility
Ian Grayson

All of the potential benefits offered by smart cities require greatly improved transportation networks.

According to research conducted by KPMG and social enterprise organisation Public Sector Network, smart mobility is one of the top priorities for centres undertaking smart city projects.

Over the past two months (51 per cent) nominated mobility-as-a-service and congestion management as the key objectives for their programs.

Managing director of online automotive marketplace Canales Australia, Ajay Bhatia, says workplace changes outlined in the COVID-19 virus further hastening the need for a smart city approach to transportation.

Bhatia says research conducted by his firm has found people’s preference for using their own car has increased in the past two months because of infection fears around using public transport.

“Our research found that, of those people who don’t own a car, more than half are now considering buying one,” he says.

As more people return to their workplaces in coming weeks, a new fondness for distance and speed in traffic congestion and extended commuting.

This could occur despite previous campaigns mounted by authorities to encourage people to consider public transport alternatives.

“Now, more than ever, we need to marshalling a commitment to perform in a smart city you can do that,” says Bhatia.

Michelle Fitzgerald, says creating an environment where people can drive less urban areas, is critical.

“The City of Melbourne is also proactively working with business and industry leaders across Australia to identify opportunities and challenges in harnessing the potential of new networking technologies including 5G and the Internet of Things,” she says.

European-based transport planner and smart city expert Ian Sacs says having an open approach is critical to ensuring smart cities can be sustainable and offer an improved quality of life.

“It’s really important that data is open and multiple parties can have access to it,” he says.

“With proof of concept, the least number of stakeholders with the smallest amount of effort and least number of dollars get you something. Scaling that up means a lot more stakeholders to convince, and a lot more dollars to throw at it.”

“Instead, in Melbourne we’re working with the community to design, develop and test the best ways for people to live, work and play. Our approach to new technologies is that it demonstrably enhance the lived experience of our people.”

City of Melbourne chief digital officer Michelle Fitzgerald says her city looks to the future.

“Smart bins can hold more waste but with smart technology it means people can point to it and say, ‘This de-centralising energy storage’,” she says.

“Easier transport is within reach.”

Technology’s main purpose is to improve livability

Sustainability
Ian Grayson

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She points to the city’s open data platform that comprises more than 200 datasets. This information is shared with businesses and the broader community with the objective of being used to create new innovations and adapt to changing conditions.

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Data-driven decisions enter the next stage

Science of modelling
Mark Eggleton

If nothing else, COVID-19 has given many Australians a preview of a future where we are driven by data-driven decision-making.

One of the first things everybody has come to understand about the pandemic is the idea of ‘the curve’ and the need to flatten it.

It’s a global data interface and it has become ubiquitous for everyone around the world.

Governments are using a range of data to control and map the virus ranging from documenting where people have been to modelling disease scenarios to contact tracing by electronically retracing the steps of those who have been infected and who they’ve been in contact with.

The Economist magazine calls it the ‘consequence’, derived from English social philosopher Jeremy Bentham’s idea of a panopticon prison where the design supposedly allows for all prisoners to be seen by one ‘all-seeing guard’.

Interestingly, this increased use of data and surveillance is being accepted by the wider community at present because their willingness to do so is being tilted by the pandemic.

What this health crisis presents is an opportunity or an inflection point for how governments use data and how we also create more connected and smarter cities.

NSW chief data scientist Ian Oppermann says the community’s threshold for this enhanced use of data may change in the opposite direction once the worst is over so now is the time to get it right.

“We need to be saying that even in a crisis, even a pandemic, we will spend time building trust, ensuring privacy, being transparent, behaving ethically, and being demonstrable about it,” Oppermann says.

New South Wales Minister for Customer Service Victor Dominello says ‘the best way to bring the public along is through results’.

“We realise now that we cannot solve complex problems such as a pandemic with voodoo. Data must be at the centre of decision-making.

“You can only beat it with science and leading countries around the world have used technology and data to wrestle the curve down,” Dominello says.

Dominello believes COVID-19 has been a ‘cross the Rubicon’ in terms of health and when it comes to technologies such as e-health and telehealth, we’ve been given a glimpse into the future earlier than expected.

GHD Digital’s leader of federal government, Yohan Ramasundara, says the pandemic has given us a glimpse of the future of health services.

“Data-driven decisions are the potential pathway forward in the COVID-19 pandemic,” Ramasundara says.

“I think that we should be making sure we’re seeing the data and leveraging the data to make the biggest impact.”

“They’re not just numbers. They are the potential pathways forward in fighting this pandemic.”

Dominello believes data is a potential solution to not only solving the current crisis, but rather, can be turned into a solution to future crisis.

“Data will massively accelerate our ability to react to a crisis, it’s not just about telling people to stay home. It’s about making sure that the government can give the right response at the right time and the right place.”

The shift in approach to using data-driven decision-making is not only helping governments to respond to the pandemic, but is also creating more connected and smarter cities.

“We’re getting a better understanding of how governments use data and how we also create more connected and smarter cities,” Oppermann says.

“We’re already seeing that through the uptake of wearable devices. Eventually we may see implantable devices if people want to go down that path and see it as the best way to optimise their health. Ultimately though, everything comes back to data.”

When every second counts, ensuring first responders can get there quickly is of paramount importance.

Ramasundara says smart systems can optimise the route of the emergency vehicles and even clear the path along the way in terms of traffic signals and smart cameras working together to give emergency vehicles the right of way.

In the United States, some states are experimenting with the idea of proactive emergency responses rather than reactive responses where essential services examine data of potential accident hotspots for example and are better prepared for accidents.

In other parts of the world, researchers are looking at temperature variations in cities and how they can prioritise public health interventions especially in hotter areas.

These might include opening up more green space or better environmental monitoring around air quality, for example.

Dominello believes the first wave of change will mostly revolve around customer experience and more personalisation.

“We’re already seeing that through the uptake of wearable devices. Eventually we may see implantable devices if people want to go down that path and see it as the best way to optimise their health. Ultimately though, everything comes back to data. Like the human body, it comes back to DNA. Everything is a data piece in the 21st century.”
‘Big brother’ concerns can be addressed

Managing risk

Ian Grayson

Large-scale networks of sensors and video cameras are important components of smart-city infrastructure, but the data they generate raises questions when it comes to the privacy of citizens.

Sensors can detect anything from air quality and temperatures to noise levels and traffic flow rates. Cameras can monitor pedestrian and vehicle movements as well as identifying individuals through facial recognition software.

Data is collected through wired or wireless networks and sent to data centres for storage and analysis. It can be used by authorities and other parties to adjust traffic signals to ease congestion, monitor crowds, and better schedule public transport links. Collected data can also be made available to other parties who can add further value.

For example, a ride-share company could use the cameras to plot the most efficient route for cars as they traverse a city centre.

Town planners could use sensors in footpaths to monitor foot traffic levels and determine the most appropriate locations for new developments.

However, some people have raised concerns that such initiatives are detrimental to privacy.

They argue that “big brother” style monitoring networks strip away anonymity and are an attack on personal liberties.

Last year Australia’s northernmost capital territory paid particular attention when the local council installed a network of video cameras and sensors throughout the central business district.

The sensors track traffic and pedestrian movements as well as measure air quality, temperature, and noise levels.

According to City of Darwin Council, the project represents the largest roll out of surveillance technologies anywhere in Australia.

Acknowledging that personal privacy is an issue within the community, City of Darwin chief executive Scott Waters says his organisation is establishing a framework to guide the management of data gathered by the new infrastructure.

“The privacy framework City of Darwin implements will not only comply with all applicable federal and territory laws, we also aim to achieve global best practice regarding privacy and the use of surveillance devices,” he says.

Privacy within smart cities also becomes an issue when the collected data is shared with private-sector organisations.

Many are keen to build services on top of the data which can then be monetised.

Transportation planner and smart cities expert Ian Sacs says concerns about personal privacy are quite understandable, but it is important for authorities to adopt an “open data” policy to allow smart city initiatives to flourish.

Sacs points to the European Union’s General Data Protection Regulation (GDPR) legislation that was implemented in 2018 as an example of regulations that can provide adequate protection for individuals.

He does acknowledge, however, that there are still issues to be overcome.

Sacs says a bigger challenge now is the desire of private-sector organisations to hold onto their data.

“There might be an e-scooter company or a ride-hailing company that doesn’t like to share their data with the public for commercial reasons.

“This is why (operating) licences and permits are important as they must include specifics about what data has to be shared publicly.”

As smart cities infrastructure are deployed in growing numbers of urban areas around the world, privacy will continue to be an issue that authorities will be increasingly forced to address.

With the volumes of data being generated and analysed growing quickly, ensuring data is kept to expected levels of privacy will be an ongoing challenge.

“It is still very early days when it comes to the issues around data sharing in a smart city,” says Sacs. “GDPR has certainly taken a very progressive step forward and improved lots of things, but we all know that data still leaks and there are new aspects that haven’t been anticipated. We still have a way to go.”

NSW taking the lead in digital twinning

Simulation

Mark Eggleton

New South Wales is well-positioned to become a global leader in digital twin technology through the state government’s Spatial Twin initiative based in Bathurst.

According to LendLease’s chief product officer Daryl Patterson, Australia is leading the way in the development of digital twin technology.

He says LendLease works all around the world with a lot of sophisticated governments and “I have not seen any that are approaching what New South Wales is doing here.”

“There’s a great deal of talk (on digital twins) in the UK, and there’s not this level of sophistication and the United States is kind of nowhere in this continent,” Patterson says.

As to what digital twinning involves, it basically revolves around creating hyper-realistic computer models of complex objects that are capable of simulating the real world function at such a high level of detail that it could function as a real-world scenario for the purposes of planning and modelling.

Put bluntly, it is about the technology of making a digital copy.

It’s actually a pretty old concept with a number of industries such as the property sector, aviation and automotive sectors utilising the technology for decades but applying it to the urban environment is still relatively new.

For LendLease, which has been utilising the technology for some time, its implementation will decrease the cost of construction by up to 20 per cent relative to today’s processes as well as increase speed to market by up to 100 times.

NSW Minister for Customer Service Victor Dominello says LendLease’s numbers are an extraordinary game changer at a time when governments are trying hard to squeeze 3 to 4 per cent in efficiencies out of projects yet “by using a smart city digital twin you can get up to 20 per cent.”

Patterson says the attractions of the technology are pretty obvious on one level in terms of simulating the physics and geometry of the built environment but the second part is important as it is about process.

The ability to capture information around objects in a real-world environment and create a digital copy means you can see how things perform and simulate what happens when you change that environment.

“People will be able to see not only the drawings but the whole concept,” he says.

“What we now have is a very accessible, truthful source of information that they’ve put a huge amount of effort into getting accurate,” Patterson says.

With this huge amount of data, developers and urban planners can simulate the future impacts of development before the first shovel goes into the ground.

Things like traffic movement and how people interact with the built environment can be modelled intricately and digitally.

“What the state government has done is brought everything together and they’ve said, ‘we’ll keep putting stuff on top of it, so now you can see the buses moving in real time through it and they’ve got every tree actually modelled on it.’

“It means we can make decisions with this really holistic data sitting there – it’s pretty mind-blowing.”

What makes it even more exciting for Patterson is digital twinning really offers the scope for more community involvement in how we create the smart cities of the future.

“People will be able to see not only the drawings but the whole concept,” he says.

“What is happening around the world and in the UK is that we will all have the ability to make the smart cities of the future more human.