Smart Cities
Innovation Accelerator
at Melbourne

Strategies, Sustainability, and Disruption in Innovation

March 18–19, 2019

Convened by the Technology and Entrepreneurship Center at Harvard

www.theinnovatorsforum.org

In collaboration with City Possible, pioneered by Mastercard
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City Leaders Answer 5 Important Questions about Data and Privacy

The word ‘smart cities’ is often associated with technology, but it’s the data that comes from that technology that actually allows cities to make smarter decisions that impact communities. During the Data and Privacy Panel at the Smart Cities Innovation Accelerator at Melbourne, city officials gathered to share their thoughts on a variety of questions related to data. Here are their insights.

What do you think is the number one question people should be asking in a city with respect to data?

When it comes to data, some city leaders stressed the importance of uncovering extra benefits of the data that weren’t actually considered at the onset of collection. For example, the city might collect data for a particular purpose, but how might that data be used by other parties to innovate? Open data supports innovation, so if a city takes pains to collect data, they should also make sure that industry and the community can benefit from that data too.

Other city officials stressed the importance of preserving trust when you collect data. Not only is trust (when collecting and using data) a prevalent question in city councils across the globe, but it has also come to be expected by citizens. It’s up to the government to be more open and transparent regarding what data they are collecting and why. Further, it is important to be transparent about all data collected, even when it does not hold personal information.

Finally, cities should also be concerned about the quality of the data they collect. Data that is used to make decisions in the city should be reliable, and it should fit the intended purpose or question that the city is asking.
Advice for councils starting from scratch—what’s the first step they should take?

Developing a data governance framework was suggested as one of the first things city councils should do when they are planning to work with smart technology and data. This includes stating the overall mission, determining stakeholders, setting up organizational bodies such as a data governance office, and defining goals, rules, and processes.

Other panel members suggested that cities should start out with a simple open data policy that incorporates a data trust framework. This way the data collected will be available to citizens and private innovators, and they will understand what data is being collected, what it is being used for, and why the city is doing it.

Although setting up a data governance framework and an open data policy may sound overwhelming for a city that is just starting out, panel members stressed that a city can always borrow from other cities who already have these things in place. There are data governance frameworks available to replicate, as well as contracts, policies, and pre-written documents from cities across the globe.

What are your thoughts about acquiring data, and what strategy should you take for getting data?

This question gets at the heart of how data is collected and managed, whether it is rolling out sensor networks, working with companies, putting in data platforms to ingest real-time data, building dashboards or other strategies.

One panelist reminded the group about the importance of informed consent with any data that is collected. They also noted that although a city might first focus on the question of what assets will be used to collect data, eventually the city must contemplate more difficult questions such as how the data will be collected, why, and how it can help them understand behavior within the city.

A representative from New South Wales mentioned the possibility of data procurement. The Australian state’s transport department purchased data under a license from a third party. One benefit of the arrangement is that the contract allows the government to use the data but also to share with startups that can use it to develop products that address citizen’s needs and solve city problems.

If a city is looking to create their own new data, some panel members cautioned that the city must make sure they put the right procurement into place to get the maximum benefit. They explained that it can be hard to get data even from inside the council or a government organization if the right procurement wasn’t undertaken.

Finally, one panel member mentioned the option of using crowdsourced data. Although the quality of crowdsourced data is not consistent across the board, it is improving. Cities can tap into crowdsourced data and also contribute to it.
How do you develop a data culture and a government structure around data?

Data collection can have its own challenges, but city governments can also have the problem of not knowing how to use the data once they collect it. To solve this, one city leader suggested setting up a data office (or distributed data office). This gives people a focal point where they can come in and talk about data and uses. The data office can help set and enforce definitions regarding quality, flow, and policies, and get the data in good shape so it can be used by the business community.

It was also suggested that a city could use ‘data champions’ from within the organization to help build a data culture. Getting people together across different sections of government who care about data and information is an optimal way to drive a passionate data culture. To get started, a city can identify individuals who are interested in the data journey and want to help drive it forward by becoming a data champion.

Data and privacy challenges are tricky at this point in time because state and local government policies have not caught up with the massive amounts of data that are being collected and stored. City leaders on the Data and Privacy Panel suggest that collaboration between government, universities, and industry can help push beyond these challenges so cities can get the most out of the data they collect and use it to guide decisions.

“Everything that can be connected will be eventually. It’s just how and when.”

– Adam Beck, Executive Director, Smart Cities Council Australia New Zealand Deputy Chief Operations
Tackling a Once-in-a-Generation Infrastructure Uplift in New South Wales

New South Wales has been doing smart city mobility projects since around 2012, but all of that accelerated in 2016 when the government put together a program called the Future Transportation Program, created in order to plan out a once-in-a-generation infrastructure uplift. With a $100 billion investment on the line, they did not want to go into things blindly.

In planning out mobility systems that will operate into the future, there is a lot to think about. What if the Australian state chose the wrong technology, technology that would soon become obsolete? What mobility solutions would remain future-proof...and how should the government go about implementing those solutions? How would they know that these solutions would be embraced by citizens, both now and in the future?

This is New South Wales’ story of deciding a direction and implementing mobility solutions, as told by Chris Bennetts, Executive Director, Digital products Delivery for the Customer Technology & Services Division at TfNSW.

**Crowdsourcing an Answer**

To determine a direction for their massive infrastructure project, officials in New South Wales first thought about consulting, but they decided to crowdsourced the strategy instead.

“Although you can’t predict for one future, there are actually many futures out there that might come.”

– Chris Bennetts, Executive Director, Digital products Delivery for the Customer Technology & Services Division at TfNSW
First, they held a two-day program called Future Transport Technology. They brought together about 700 leaders in transport and technology from Australia and abroad and also brought in expert speakers to get them excited about the possibility of what’s out there for the future of mobility. In the afternoon, they put the leaders through a design thinking session, asking them to brainstorm what the government should do with their infrastructure budget. Out of that program came thousands of ideas.

They then conducted an ‘entrepreneur hothouse.’ They asked over 26,000 employees ‘if they were the boss of transport, what would they do?’ Thousands of additional ideas came piling in.

Finally, they decided to ask university students from the region and city to answer that question. The younger generation made one thing clear: you can’t predict the future, and in fact, there are several futures that are possible. That said, the students said that they would spend the money on ‘no-regrets initiatives’ – things that would be relevant and useful no matter what future arrives. They also noted that technology itself does not disrupt an industry or sector like mobility; it’s how humans interact with the technology that brings disruption.

From thousands and thousands of crowdsourced answers, New South Wales officials created an official report to summarize the findings. They identified four possible futures, 12 game-changing technologies, and 15 no-regrets initiatives that they could pursue. It was finally time to spend those dollars and implement those mobility solutions full scale.

4 New South Wales Mobility Initiatives

Although New South Wales is moving forward on many infrastructure upgrades at the moment, Chris chose four of them where the Australian state has seen the biggest gains.

1. Open Data

Many cities and states have open data policies, but New South Wales decided to kick it up a gear. They had done hackathons in the past and designed a couple of apps that shared the real-time position of buses across the network. They decided to open up all that data so that all citizens could access the real-time position of every public transport vehicle across that network. To that open data platform, they added data about how full buses were in real time and created a color-coded system to estimate how full every train was in real time. To date, there have been over 2.8 billion API hits, and the data has been accessed by over 14,000 developers, consultants, and researchers, who have created over 3,200 applications in the market. Setting it up as a platform has allowed New South Wales to have a conversation with the startup community about what is possible. They have also been able to quickly scale up new technologies related to the data, including Rita, a bot that is available on Google Assistant, Amazon Alexa, Facebook, Twitter, and other platforms and which gives citizens information about departures, FAQs, and even allows them to plan their journey.

2. Mobility as a Service

The approach for mobility as a service initiatives has been that of a platform because that is what worked for open data. New South Wales has a number of last mile and point-to-point providers that offer mobility services for citizens. Instead of placing bets on which ones will ‘win’ in the future, the government decided to create a platform where all of these providers can exchange information with the state government and with each other—something that has never been done before. By bringing these ecosystems together, New South Wales can enable the whole ecosystem of last-mile providers to thrive. This allows them the upper-level view and the ability to see what is possible in terms of these mobility solutions. As the future plays out, the best kinds will win.
3. Ticketing Platform

New South Wales began the transition to contactless payments for public transportation when they began to roll out Opal, a contactless fare collection system, on December 7, 2011. The process was finished in 2014, and since 2015, the Opal card has become a staple across communities in New South Wales. Customers can use their contactless card on all ferries, lot rails, and trains, and soon the payment system will be brought to buses too. Using Opal is about customer convenience and about driving greater use of public transportation. The system also uses a platform, which the startup community has been excited about because they can imagine things that they can do on top of that system. For example, if customers said they wanted to use Opal on their phones or on their watches, an innovative startup could come up with a solution to make that happen. On top of the Opal card, New South Wales has created an Opal app, which has about 2.2 million customers. With the app, citizens can add money to their card, plan a journey, and even get notifications during their journey about when their stop is coming up.

4. Transport Digital Accelerator

Mobility solutions rely on input and ideas from industry. However, industry had spoken out and admitted that it is hard to work with New South Wales—they weren’t sure how to go about doing that and whom they should talk to. In response, New South Wales created space on the 11th floor of a startup hub in Sydney; with 11 floors of startups in one building, it was a logical place to be. The new space has an open door policy where any startup, anyone from industry, can come to talk to representatives from New South Wales, thus allowing the government and startups to better work together on solving city problems. The state government has also partnered with several larger companies (including Mastercard, Optus, Google, and Amazon Web Services), and established a global alliance in San Francisco featuring a series of talks about what New South Wales is doing in mobility. These moves have allowed the government to foster better working relationships with businesses and startups.

The future of mobility is uncertain, and that is a fact for all cities around the globe. The projects in New South Wales demonstrate how cities can still go boldly into that uncertain future, setting up scalable platforms that will grow alongside the city itself.

“Remember that regardless of what happens with technology, it’s always how humans interact with technology that drives disruption in an industry; it’s not the technology itself.”

– Chris Bennetts, Executive Director, Digital products Delivery for the Customer Technology & Services Division at

2019 Smart Cities Innovation Accelerator, Melbourne
Cities around the world are all facing similar pressures:
- Rapid urbanization
- The pressure that growing populations have on systems, infrastructure and housing
- Mobility challenges and congestion
- Climate change
- Air pollution, water, and sanitation
- Energy and sustainability
- Rapidly changing technology
- Competitiveness and ability to attract global talent

A smart city strategy can help solve and overcome these challenges, but only if it is carefully and strategically thought out. At the Smart Cities Innovation Accelerator at Melbourne, representatives from cities around the globe gathered to share ideas about smart city planning during a panel session on Smart City Strategy. Here are their suggestions.

“The key to this is, you’re never going to solve those problems alone—it’s about collaboration.”

– Jamie Cudden, Smart City Program Manager, Dublin City Council
Write It Down

Several panel members mentioned the importance of putting the smart city plan on paper so it can guide future endeavors. Some of the foundational pillars a city may consider include:

- **Strategic Documents**: An overview of what the city is looking to achieve with its smart city efforts. This is an aspirational document that outlines the big outcomes a city is looking to achieve in the community—specific targets such as housing, sustainability, transport, governance, or whatever other outcomes are important for the city. All smart city efforts are guided by the strategic document.

- **Digital Strategy**: A principles-based roadmap for how the city will approach digital and technology projects. This may include things like how the city will use technology to support businesses, create a customer-centric service design, carry out ethical innovation, and digitally engage the community.

- **Resiliency Strategy**: A resiliency strategy is aimed at identifying the city's vulnerabilities. It is where the main problems in the city are defined, which will inform the smart city projects the city will pursue.

- **Tech/Startup Plan**: A successful smart city strategy will require input and solutions from the city's tech and startup ecosystem. This plan identifies how the city will support that ecosystem and foster innovation.

Choose a Governance Model

While there was no definitive answer of what governance model is ‘right’ for a smart cities strategy, all panel members agreed that you have to research and choose a model that will help your city carry out smart city projects.

For example, the City of Melbourne has created a Smart City Office, a central unit that helps to support the delivery of the council’s plan using smart technology. The Smart Dublin model involves representatives from four local authorities and the Dublin City Council coming together to decide what is best for the city. Meanwhile, Sydney has taken a more distributed, decentralized approach, although admittedly this makes it a little harder to get buy-in for smart city projects across the organization.

There are many governance models that a city can choose. Thus, it is important that cities do their research on what models are out there, and which will work best for that particular city.

Focus on People and Problems

All panel members agreed that a smart city strategy should be focused on who is the customer and how smart city projects are going to benefit them.

This involves working with citizens and communities to identify the ‘menu of challenges’—those problems that are most important for the people in the city.

Technology and solutions are then judged based on what the use case is, and how it may solve the challenges of the people.

“The role of technology, how you define a smart city and use data, I think it needs to come back to that global agenda, and that’s whether the utility of this data is going to reinforce inequalities or is going to actually help combat them.”

– Michael Nolan
A citizen-focused or people-based approach means every smart city project is evaluated, at all stages, based on how it will genuinely benefit the citizens.

**See Where Technology Fits In**

As mentioned above, a solid smart city strategy should always focus on the people and the problems first. Only then do you evaluate the technology to see where it fits.

It used to be that cities approached things as technology looking for a solution. Big companies forced their proprietary systems on top of cities without city officials truly considering what the city really needs, what the citizens want, and how that technology would benefit and impact communities.

A wise smart city strategy requires that cities fight back against this. They must first ask what problems they are trying to solve and only then consider how those solutions may come from existing and immersing technology.

In terms of technology, a smart city strategy also requires the city to define what ’smart city’ means to them since there is no single definition. The city must also determine how it will gather data and how it will use that data to benefit citizens and to combat inequalities rather than reinforce them.

**Take a Collaborative Approach**

The challenges of the city cannot be solved by the city alone, a point that was made several times throughout the panel session.

Melbourne has created the Melbourne Innovation Districts, a partnership between the City of Melbourne, RMIT University and the University of Melbourne, aimed at developing urban innovations that will benefit citizens.

Meanwhile, Dublin has engaged the market through an Innovation Research Program. The city runs challenges where they put a particular city problem out to the market to see what solutions businesses can come up with. So far the city has worked with 42 startups and funded $1.5 million by giving these innovators a small amount of money to run a pilot and a bigger amount to do more if that pilot is successful.

Similarly, the UN Global Compact runs a city program to try to bring the private sector together with cities to find common solutions to challenges, and then find investments so that those solutions can be executed on the ground.

Collaboration is key to a successful smart city strategy, although panel members say that the city always has to be the heart of it. The city is an independent voice that doesn't have a vested interest in the tech company, research center or industry partner. With the city in the center, the citizens will remain the focus of all smart city projects. As one panel member remarked, “Put the city in the center and collaborate to succeed.”
Create a Testbed

With collaborators on board, the next step in many smart city strategies is to create a testbed to test out new technology and assess its ability to solve city challenges.

Melbourne has a City Lab that explores opportunities then builds and tests solutions. For example, they have been working with a range of hardware and software companies, startups, and researchers to explore 5G and ROT and what it means for the city.

Similarly, Dublin created the Docklands, a $3 billion investment to create a district that can explore new technology and opportunities. It took several years to do so and required a lot of collaboration, but the results have been promising.

Learn and Share

Finally, many panelists mentioned that a smart city strategy should always include sharing what the city has learned and learning from other cities as well.

As mentioned, cities are facing a lot of common challenges, so what works in one city might be successfully applied in other cities too, without each city trying to ‘reinvent the wheel.’

Learning from mistakes and sharing successes is how cities can move forward together to a bold new world full of smart city innovation.

The Smart Cities Innovation Accelerator at Melbourne is one event that allowed city officials from around the world to come together to learn and to share. As one panelist put it, “These are the types of events that make a difference—the conversations, the partnership that you build out.”

“What is the right way to do it?
I don’t think that any of us know or have that answer.”

– Kate Deacon, Executive Manager, Strategy & Urban Analytics, City of Sydney
Case Study: An Innovative Model for Boosting 5G Connectivity in Smart Cities

5G will open up a world of possibilities for cities that want to explore use cases and find smart solutions to city problems. But what should cities do to make sure they are prepared for the 5G revolution? At the Smart Cities Innovation Accelerator at Melbourne, city leaders gathered to hear about one case study aimed at solving connectivity issues. This model, developed by a company called Dense Air, is currently being explored in 6 countries, and it has already been implemented in the Docklands in Dublin, Ireland. Here is an explanation of that case study, as described by Dense Air CEO Paul Senior and Jamie Cudden, who leads the Dublin City Council Smart City program.

Identifying the Problem and Solution

One of the main assumptions in this model is that there are actually connectivity issues within the city. Therefore, a city must first scientifically determine if connectivity issues exist, and this can be done by using big data.

How it works at Dense Air is that the company works with partners that have embedded SDKs in smartphone apps that are geo-located and geo-enabled. They collect those measurements, from both iOS and Android devices. When enough data points come in, they have adequate evidence to conclude if a location has poor coverage.

If problem areas pinpointed, it is time to move toward a solution. The Dense Air model involves adding small cell base stations around the city to improve connectivity.

“5G seems a long way out, but you need to start thinking about it now.”

– Jamie Cudden, Smart City Program Manager, Dublin City Council
As Paul explains, cities are scattered with macrocells, but how macrocells work is that you get the best connectivity when you're standing right under it (hundreds of megabytes per second) and less as you move away from it until you come to the cell edge. The cell edge is typically in a building, and you get dramatically worse performance on the edge—a thousand to one ratio between the best condition and the worst condition. Thus, their solution is to put small cells in locations at the cell edge.

The technology used by Dense Air has already been mass deployed and validated in the United States, where Sprint deployed 300 thousand small cell boxes. Paul explains, “Just by deploying these small cells, they almost doubled the capacity of their network, which is a phenomenal thing because macrocell networks cost billions and billions of dollars to build.”

In the Dense Air model, the small cell extension is a shared network. That is, once it is installed in a city, any mobile carrier can adopt the shared infrastructure and integrate it into their own networks to better serve their customers. In addition, any other entity that has a specific use case or wants to have its own private network can join in too, including businesses within the city and the city itself.

**Deployment in Dublin**

Dense Air’s technology has already been mass deployed in Dublin, Ireland, in a location known as the Docklands. Jamie Cudden, who leads the Dublin City Council Smart City program, says it was done because connectivity is fundamental to all the different use cases and opportunities for smart cities. “We’re thinking from a city perspective, ‘how can we be at the forefront of this?’” says Jamie. “Planning our smart district project, we’re thinking ‘how can we just flood this district with every bit of connectivity possible and then build use cases and have a global living lab testbed.’”

Of course, deployment required a few things to happen first. One of them was to gather data to uncover the scope and location of connectivity issues. As explained above, Dense Air gathered data from individual smartphones, mapped out the city, and found that in Dublin 27 percent of buildings had issues that could be improved or fixed with small cells.

The other requirement was to get buy-in from potential users of the shared infrastructure because the costs of deploying the technology have to be offset from revenue by people and entities that want to adopt the shared network. In Dublin, city officials talked about the stakeholders they’d need to bring in to make the project a success, then pitched to developers and building owners. The pitch was essentially “We’re doing something that’s first in the world. Why don’t you be part of it with us and help us?” The issue of connectivity is important for businesses in the tourism industry, as well as real estate companies that want to sell to tech companies.

The deployment of small cell base stations corresponded to a city project to replace 45,000 street lights. The small cells were put on the lights and street poles, as well as

“We’re thinking from a city perspective, ‘how can we be at the forefront of this?’ Planning our smart district project, we’re thinking ‘how can we just flood this district with every bit of connectivity possible and then build use cases and have a global living lab testbed.’”

— Jamie Cudden, Smart City Program Manager, Dublin City Council
inside buildings in the Docklands area. “And now, over the last 18 months, we built the test bed, we put in the assets and the infrastructure, and we’re now globally a place to play, to try and test 5G technology in one of the first cities in the world,” says Jamie. He adds that in 2020 they will be hosting a couple of games for a big soccer tournament in Europe, so he is excited to see how the city can manage connectivity with such a high density of people attending the games.

Will Mobile Carriers Join In

While this case study shows one option for how a city can embrace the 5G future, many participants at the Accelerator pointed out that this particular model relies on mobile carriers joining in on the shared network. From his experience, Paul says that mobile carriers typically react negatively when their connectivity issues are pointed out, but soon realize that there isn’t much to dispute about coverage problems after they see the data.

But is that enough to get mobile carriers to buy in? Some participants argued that there is a strong possibility they will not because of their cultural history and the challenge of always wanting to own and be in control of their own assets.

That said, some city leaders had examples of carriers working together. For example, in New Zealand, three carriers came together to roll out macrocells in relatively extreme rural conditions, using government funding. Further, in Melbourne, when city officials invited telecommunications companies to discuss connectivity in the city, the companies said that they wanted the city to lead the experience, as a neutral host that cares about the city and the citizens.

The general feeling was that if a city leaves connectivity up to mobile carriers, they’ll push their infrastructure as far as their business case allows, cluttering the city and leading to more of what we have today, with lots of areas where coverage is poor. Therefore, the solution just may come from cities taking the lead on connectivity within its borders, whether it is the Dense Air model or something else aimed at improving city connectivity.

“5G is actually about doing more than just getting faster mobile data to your smartphone,” explains Paul. “5G was architected to enable a whole bunch of different use cases.” If cities want to be on the forefront of this movement, it is vital that they start examining connectivity issues and contemplating solutions today.

“The step from 4G to 5G is absolutely nothing like the steps we’ve been through already.”

– Geof Heydon, Astrolabe Group
The Many Angles of Sustainability: Waste Management, Trees, and Traffic

The Smart Cities Innovation Accelerator at Melbourne included a Sustainability and Environment Panel that was deliberately vague in scope. Sustainability is a huge area for smart cities, and although a particular topic could have been chosen, it is also valuable to go into the discussion without bias. What does sustainability mean to each city? What projects are they focusing on, in the universe of possibilities? During the Panel, three city officials spoke about their approach to sustainability with projects that included waste, trees, and traffic.

Sustainability in Waste Management

Troy Leedham works for Canterbury Bankstown Council in the Waste and Cleansing Team. He spoke about sustainability as it relates to the city’s waste and recovery teams. This includes a Waste and Cleansing Team of 140 employees who are in charge of picking up about 1 million bins, doing 6,000 household cleanups, and around 7,500 thousand kilometers of streets swept each month, as well as a Resource Recovery Team of 78 employees who manually inspect 2,500 bins and do 80 engagements with residents each month as well as educational programs.

These teams face several challenges in their quest to manage city waste effectively and efficiently. Other city officials may also relate to the following challenges:

- **Manual Process:** The process of picking up and inspecting bins is very manual with little automation, which makes it quite time-consuming.
- **Real-Time Issues:** The process is not well equipped to deal with real-time operations. For example, if an urgent job comes in, it requires phone calls to find someone who can handle it. There is also not a very good view of where all the trucks are in real-time throughout the day.
- **Data Accuracy**: The city knows how many properties they service, but not exactly how many bins are picked up. Bins are also inspected manually, which can result in data errors.

- **Communication with the Community**: The system currently doesn’t allow for proactive communication with citizens to let them know what is happening; instead, they react to citizen requests after they come in, which have to come in by phone call because online/mobile reporting is not set up.

Troy and his team members are trying to solve these challenges using smart city technology. They have secured $2 million in funding under the Smart Cities and Suburbs Program. Their project is called Closing the Loop on Waste, and it is all about investigating how the city can deliver superior customer experience using technology.

The idea is to improve waste management by using things like GPS for trucks, cameras, sensors, and artificial intelligence. Thinking big picture, the team is also looking into how the data they gather in this project can improve other aspects of the city. For example, cameras on trucks can scan the conditions of roads, line markings, missing signs, furniture that needs an inspection, and dumped rubbish that needs to be removed. Although the project is about waste management and sustainability, the main goal is always to improve the overall operations and quality of life in the city.

**Sustainability and the Green City**

Deb Cals, from the City of Melbourne, approached sustainability from a different angle when she discussed her work to make the city green, improve the canopy coverage, and increase biodiversity. The work is based around an ambitious target to get 40 percent canopy cover in Melbourne by 2040. She explains how her team has done this using a data approach.

To plan out the project, Deb says they started by thinking of a specific end in mind – that 40 percent goal by 2040. From there, they worked backward to determine what they would need to do every year to get to that point. While they planned it out as a linear progression, she admits it could be exponential, with the project potentially getting increasingly difficult over time as they encounter struggles with finding new places to put trees, particularly in difficult areas with a lot of buildings and hard surfaces. However, the linear model gives them a base of about 2,400 trees per year plus replacements, which, in practice, has meant about 3000-3200 per year.

Data is then used to determine what to plant and where. The city is aiming for biodiversity, so they aren’t just planting lines of the same trees. Diversity is better for ecology corridors, for climate adaptations through climate change, and for resiliency when disease comes through. With information about growing conditions, the city can choose the right variety of trees that will thrive where planted, and by using tree life expectancy data, they can predict how long the trees will last and when they will have to be replaced.

There are also several offshoots that are helping to boost the tree planting program. For one, the city is collecting qualitative data from the community by allowing citizens to ‘email’ a tree (and even get a personal response back!) All data used in the project is open, allowing the community to participate in innovation as well. By partnering with entities in the private realm, they are able to get a 4-fold reinvestment on green initiatives for every one dollar of money from trees being removed. They also have an Exceptional Tree Register, where people can nominate trees with significant canopy and beauty to protect them from future removal.

Through a combination of data, input from the community, and initiatives from the private sector, Melbourne is moving toward its sustainability goals with regards to tree planting and canopy coverage.

**Sustainable Traffic Management**

A third area of sustainability that was discussed during the panel was understanding and managing traffic within the city, a topic brought up by Nicole Wood from the City of Casey. Her team is also using data to understand what is going on so they can plan solutions that will improve traffic flow in the city.
The city of Casey is located southeast of Melbourne. Nicole describes it as a ‘dormitory suburb’ which is a way to capture the normal flow of traffic. Many city residents work west of the city, in the Dandenong area. As such, the traffic typically follows a pattern where, in the morning, everyone uses westbound roads to get to work, and in the evening, the eastbound roads get busy as everyone heads home.

This is the assumption anyway, but Nicole explains that they used data to test these assumptions. What they found was that while this is the reality for many city residents, there are also other interesting traffic patterns that should be explored.

For example, the flow is simply not ‘away’ from Casey in the morning. Data also show a significant inward movement of people coming into Casey in the A.M., particularly into the Fountain Gate area. The data also show a lot of flow into the Clyde North area, which is counterintuitive because there is not much housing in that area.

What is bringing people into Casey in the morning hours? What is happening that Clyde North is a destination for so many? The transport network planners have never really thought about these things because they went on the assumption of west flow in the morning and east flow in the evening. Thus, this data is essential from a service perspective, an asset-management perspective, and an environmental planning perspective. The city is continuing to analyze these patterns and plans on using the data to better optimize traffic – both outbound and that which is happening on their own rural roads.

Waste management, trees, and traffic are three unique areas that touch upon sustainability in the city. While each city is exploring solutions using smart technology, there is one other common thread that runs through them, which is: even if you find a solution, how do you get the people on board, including people within the government and people outside in the communities? During the panel, this thread ran through all presentations. Here were some of the solutions that were proposed:

- Doing trials to gradually bring new technology with the underlying message of inevitability—this is coming, and you can’t stop it.
- Conducting community engagement all the time to see what people want in their city, because if residents don’t use a solution, it will be a waste of money.
- Allowing citizens the chance to participate in solutions and the innovation process as a whole so they feel included and not like something was simply ‘done to them.’
- Nudging people in sustainable directions simply by making them aware that there are other options out there.

Smart city solutions require more than just the implementation of new technology. When it comes to sustainability, other changes also determine success: changes in culture, mindset, and behavior. Whatever sustainability initiative a city is working on, whether it is waste management, trees, traffic, or something else, the project should also include plans to facilitate and encourage these necessary changes in the community.

“A lot of our strategy was just about those nudges along the way, rather than ‘We’re going to be the world’s most sustainable city.’”

– Nicola Ward, Senior Advisor, City Planning and Regional Partnerships, City of Casey
Cities today are having to deal with the issue of adding technology to an already-built environment, requiring city leaders to plan around and work with the existing infrastructure and layout of the city.

At the Smart Cities Innovation Accelerator at Melbourne, the head of the City Lab team in Melbourne, and representatives from Estrella Group who are working on the master planning process in Campbelltown (55 kilometers outside of Sydney) shared insights on how they are tackling smart city projects in the built environment.

Gathering their ideas together, one gets a sense of four important principles that should guide these smart projects in the built environment. Here are the four main elements of success.

**Lay Out Guiding Principles**

Both the Melbourne and Campbelltown speakers mentioned the importance of laying out principles to guide and inform smart projects and planning. Some of these principles may include:

- **Delivering Impact**: Making sure that the city chooses projects that are not only desirable for the community but also those that are feasible and viable to make happen in reality.

- **Asking Why**: Being committed to test every assumption and dig down to understand the root causes of the problems the city is exploring.

“Our purpose is to help make government better for everybody.”

– Brenden Carriker, CityLab Lead, City of Melbourne
• **Creating New Realities**: Pushing the boundaries of what people think is possible and creating new realities in the city.

• **Design for All**: Making sure that smart city solutions are planned and designed with every single person in the community in mind; the principles of universal design and accessibility are essential.

• **Learn by Doing**: Taking an action-oriented strategy, including building prototypes, testing solutions, and being prepared to fail fast.

• **Bigger than Ourselves**: Realizing that the best ideas won’t always come from small internal teams. Leveraging the great ideas within and across the organization, networks, and cities nationally and internationally.

Of course, the exact principles chosen by a city will vary by the specific goals that the city is pursuing in its smart projects. The important point is to contemplate these principles before starting projects, and use them as a guiding light along the way.

### Get the Council on Board

With guiding principles laid out, it is important to then get the council on board because it is hard to move forward with smart city ventures without the buy-in from councilmembers.

Of course, this can be tricky because smart projects involve technology and data that might be foreign to those on the council, plus it requires a shift in mindset, where it is okay to take risks, think outside the box, and even fail from time to time.

In Campbelltown’s master planning process, they arranged several council leadership workshops in order to help council members understand what they are trying to do and embrace the process. They used the metaphor of the cookbook, where data are the ingredients, and the recipe includes some sort of magic behind it, which may be algorithms, calculations, dashboards, etc. They also explored examples so councilmembers could learn while contemplating different scenarios about how data may or may not be used to solve the problem at hand.

Taking time to get the council members on board is helpful because it sets a standard of ‘this is how we do things’ that can be replicated in all smart projects. It also helps the council understand data from a practical sense, so the data can be used effectively to find solutions to city problems.

### Test Assumptions

With everyone on board, it is time to get to work on the first smart city project, but that doesn’t mean diving in with solutions that have not been validated yet.

One example in Melbourne is that the City Lab was tasked with the challenge of tackling the disruption problem in Melbourne. The city is currently booming, with cranes and construction projects, road closures, events (both planned and unplanned), and infrastructure upgrades happening all over the city. This leads to a significant amount of activity across the city that may impact residents. Government officials asked for the City Lab’s help in solving this problem, but more specifically, they asked them to develop

“Just trying to define the problem is a challenge. We may not even know the questions we need to ask or the inherent solutions until we uncover it and test it ourselves.”

– Brenden Carriker, CityLab Lead, City of Melbourne
digital tools to inform city users, businesses, residents, and partners of all significant road closures and disruptions within the municipality in real time.

The City Lab did not get right to work creating those digital tools. They first took the time to test the assumptions of their assignment. The assumptions include that it should be a digital solution, that the solution is for specific people in the city, that it should use real-time data, that the disruption is impacting the community, and that the city has a role in providing a solution.

To find out if these assumptions were correct, the team spent four weeks engaging with over 70 city users across the municipality to get answers and validate some of those assumptions. In the process, they found that some assumptions were correct—for example, the community was indeed being negatively impacted by the disruptions, and they expected the city to play a role in solving that problem.

However, other assumptions were not necessarily correct. For example, city users said that real-time data is not necessarily helpful or critical because they'd actually have to know about disruptions in advance so they can plan. They also learned that solutions don't need to be exclusively digital, because when people first experience disruptions, it's a non-digital, real-life experience. Thus they needed to also consider solutions that could help residents if they didn't have a screen in front of them at the moment.

**Design Solutions**

Testing assumptions gives a lot of insight into what possible solutions might actually help city residents and business owners. From the data gathered in that phase, the Melbourne team was equipped to brainstorm and design several solutions that could help ease the burden of city disruptions:

- **In-Place Signage**: This non-digital solution can help people when they first encounter a disruption within the city. Signage can provide better communication about what is happening and why, and it can also be used as a channel to make people aware of (and get them to use) the digital tools the team was proposing to develop.

- **ChatBot**: The chatbot is a two-way tool because it can help inform residents about disruptions that the city knew about in advance. However, there is a lot going on in the city that is not known in advance. When that happens, the chatbot can be used by residents to report the disruption in real time and improve the city's data on current disruptions.

- **Directory**: The directory is also a digital tool, one which will help people explore disruptions by place and plan their journey. It is a map-based tool that allows people to see the nature of disruptions within a location, as well as city services and local activities.

- **Aggregating Data**: The City Lab also decided that it would be helpful to aggregate strong disruption data and push it into the solutions that people are already using. These are the apps, tools, and platforms that are already being used on people's mobile and smart devices, so it would offer an even more convenient means of accessing information about local disruptions.

These four principles set up the structure for how city leaders can implement technology and smart solutions in the built environment to improve decision making and quality of life in the city. We are at a moment in time when cities around the world are changing drastically and rapidly. These examples from Melbourne and Campbelltown demonstrate that city leaders don't have to wait passively by while changes happen to the city...instead, they can proactively seek change, approach it in a calculated manner, and use it to create a better future.
City Leaders Identify 5 Mobility Opportunities on the Horizon

The distant future of mobility may be uncertain at this point, but at the Smart Cities Innovation Accelerator at Melbourne, members of the Transportation Panel were asked a more proximate question: What are the biggest opportunities for cities in mobility within the next 2 to 5 years?

Representatives from cities around the globe, along with industry leaders, weighed in on this question, identifying and discussing some of the major opportunities on the horizon. Here are some of the main themes:

1. **Focus on Last-Mile Transit**

First, it should be noted that 1-hour long panel session focused almost exclusively on last-mile transit—once citizens make it into the city, what forms of transportation do they use to journey the last mile of their commute to their exact destination?

Panel members did not target one particular form of mobility for last-mile transit solutions but instead advocated offering citizens a range of convenient options. Bikes, e-scooters, shuttle systems, ride-sharing, buses and more are all options that cities are exploring. For example, one city is offering electric vehicle on-demand shuttle systems that are funded by parking meter revenue, while others are focusing on making buses more convenient with real-time data, or contemplating how to make curbside more efficient in the city.

Focusing on last-mile transit means that city officials have to get engineers, operators, and other tech people inside the transportation sector to think differently about how mobility in the city works. A representative from New South Wales, who has done a lot of work in this area, says there is no secret to making this happen. It just takes lots and lots of hard conversations, and strong leadership.
2. Payment Systems

One topic that took up a good portion of the panel session was the need to upgrade payment systems for public transit. Many panel members advocated the use of contactless payments because it allows the city to shift away from traditional big ticketing companies, and it keeps them open for whatever innovation will come out in the market next.

There are so many different vendors in the market of contactless payments, and the possibilities are vast. While contactless currently requires the use of a credit card, in the future, cities could look into how to incorporate payment into something citizens are already carrying, such as phones, jewelry, or devices. Panel members also dream of the day when payment systems move beyond city boundaries—a future where it doesn’t matter where you are, you just tap and go.

3. Making Transit Accessible

Contactless payment systems are convenient and take advantage of the fact that humans are creatures of habit who also want to walk the path of least resistance. However, some panel members argued that contactless systems are exclusive. You either have a card, or you don't, and if you don't, you are singled and you have to use the paper ticket line. Some people are either unable or unwilling to open a bank account for whatever reason. “If public transit is contactless, how do you ensure that you’re looking out for everyone—that public transport is truly for the public?” mused one panel member.

Other panel members suggested that cities could create city ID cards which can verify a person’s identity and address while also having payment functionality as well as safety measures in place that protect the user in case the card is lost. They argued that contactless is a positive step forward; it’s convenient, safe, clean, reliable, and offers a better user experience. Instead of holding back because contactless payments may be exclusionary at the current time, they recommended that true inclusion would be finding a way to help all citizens participate in the contactless payment system.

On the topic of accessibility for all, panel members also suggested that mobility solutions should always be focused around human-centered design. City officials should look to reduce friction in urban transportation, improve efficiency so that a variety of mobility options are appealing to citizens, and always remember that comfort is a big part of the user experience that residents are expecting.

4. Sustainable Mobility

There was also some discussion about sustainable mobility—providing cleaner transport and making sure that cities explore bikes, walking, and other sustainable options.

Most cities have experience with lime green docked and dockless bikes as well as e-scooters; these are popular forms of last-mile transit that citizens love. However, many city officials have mixed feelings about these mobility solutions.

Some cities have opted to take a free approach, with no regulations for the first several months, allowing many companies which offer these solutions to try them out in the city to see what

“Cities have a really important role to play in that ecosystem of making sure their services are accessible to all the people that live and reside in them.”

– Maddie Callis, Director, City Possible, Mastercard
happens. This trial period allows the cities to get data on utilization and feedback from citizens while having time to think about use cases.

That said, many city officials stress the need to have regulations regarding these mobility solutions. Bikes and scooters being dumped everywhere can create disorder and impact safety. Some cities have limited the number of providers who can roll out their mobility solutions in the city and required them to adopt certain rules of engagement. Other leaders recommend licensing and registration requirements.

In terms of managing shared bikes, cities leaders also mentioned the need to contemplate accessibility, such as ensuring that there are safe bike lanes to use. Panel members also discussed using apps that would allow the public to submit a picture if a bike was in left in an undesignated area, a sort of self-enforcing solution that would help ensure that bikes stay where they should be and do not crowd and clutter the city.

5. Sharing Experiences

Panel members spoke passionately about the importance of cities sharing their smart city mobility experiences with one another, and there is a lot of hope that sharing and learning from one another will become easier in the next 2-5 years.

City officials are often caught in their day jobs, and they don’t have time for collaboration—nor is it in the city budget. Thus, collaboration only tends to happen if a leader takes the initiative to do it in his/her own time, or when they have formed a personal relationship with another city leader.

“You can see this huge shift toward micro transit, local transit, and getting that right really requires close collaboration with the council.”

– Jamie Cudden, Smart City Program Manager, Dublin City Council
About the Strategic Innovation Summits and Symposia

The Strategic Innovation Summit and Symposia series was convened to enable multi-disciplinary discussions of senior leaders on relevant topics of the year. Unlike conventional, discipline-specific conferences, where topical content is narrow and participants are generally from the same discipline, the Summits bring together people from many sectors. These include government, business, education, non-profit, and the arts and sciences.

The goal is to create and stimulate conversation that would normally not take place elsewhere, between senior leaders on important topics related to innovation and society.

**The Summits and Symposia provide three important benefits to participants:**

1. **Education** – As experts in their fields, participants learn from one another through interactive sessions and dedicated talks. These aim to educate, raise important questions, and present the latest data on trends and the current state of the Summit topic.

2. **Multi-disciplinary Engagement** – The Summits are sized such that even during the main session, a conversation can occur amongst all participants. Questions and answers are not only between the speakers, but also the participants. Facilitators and moderators from HBS, TECH, and other centers are brought in to ensure engagement and to be a catalyst for the conversation.

3. **Action** – The ultimate goal of the Summits is impact. For this to happen, action is a critical component. The summits dedicate approximately 25 percent of the time to action sessions with the participants. That format drives the discussion and ideas presented into an action set for both the participants and the broader community.

Attendance is by application only, and senior leaders from any discipline that is relevant to the topic are encouraged to apply. Summits are generally convened on the campus of Harvard University; however off-campus Summits do occur when the topic and location enhance the opportunity for conversation and engagement of the participants.

Topics are proposed by participants, senior leaders in industry and government, and the Fellows in TECH. Topics are chosen based upon relevance and potential for impact in a broad sense, to include economic, societal, and environmental benefits.

For more information about the Strategic Innovation Summit series, please contact the Program Chair, Dr. David S. Ricketts (ricketts@seas.harvard.edu).