

2017 Smart Cities Innovation Accelerator

Developing an Actionable Strategic Plan for Your City

January 19–21, 2017

Harvard University
Cambridge, Massachusetts



Hosted by the Technology and Entrepreneurship Center at Harvard



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).



Contents

Integration on the Large Scale	4
Case in Point: Solutions in Action – San Diego.	7
Governance: An International Perspective.	10
IoT: What Works, What Doesn't and What We Care About	13
Case in Point: Solutions in Action – Boston	16
Partial List of 2017 Speakers and Participants	19





Integration on the Large Scale

Miguel Gamiño, Chief Technology Officer, City of New York

New York City is currently in the process of reorganizing the Office of Technology and Innovation with a significant focus on smart cities. We are looking to scale fast, which means accepting significant risk and being prepared to fail fast, recover, and manage that risk in a smart manner. As such, we are intentionally trying to be bold about what we're thinking about in the smart cities space.

Like many other smart cities projects, we are taking a human-centered approach with a focus on improving citizens' experiences in the city. As we contemplate what a smarter New York might look at, we take a hyper-focused view in order to understand current realities, possible smart city applications, and the challenges of implementing these innovative ideas.

Creating a Better City Experience

John is a typical New Yorker, a hard worker who puts in a lot of hours. He lives in Queens, but in the morning must drive to the Bronx to pick up his food truck because that's where his employer stores it. From there he must travel to where the customers are—midtown or around Central Park—where he can sell his food and make his living. In a best-case scenario, the commute takes 45 minutes, but in a typical day it takes up to 2 hours. At night, John has to do it all again, in reverse, to get home.

We are currently not doing enough to make John's experience better and easier. Admittedly there are a lot of private sector entities in his daily routine—he likely lives in a privately-

*"We are very
intentionally
being bold
about what
we're thinking
about."*

—Miguel Gamiño
Chief Technology Officer,
City of New York

owned building, the food truck is stored in a private warehouse, and his employer is a privately-owned company. However, along the way he is interacting with the public domain, so we do have a role. In fact, we have the opportunity to be the guardians of public experience and to deliver a better experience to John and our fellow New Yorkers.

In contemplating potential smart cities projects, we can see how such projects could improve John's experience on the commute home.

- What if we knew that the Department of Sanitation was picking up Christmas trees on his typical route and could re-route him to avoid the disruption?
- What if we knew the street sweeping schedule so we could adapt his route in the direction to put him on the correct side of the street?
- What if when he finds a spot and parks, the parking meter knows that he has arrived and automatically takes his payment?
- What if the street lights also know he has arrived and therefore increase in intensity so he can safely navigate to the sidewalk?
- What if the sidewalks themselves were safer because they were being monitored and maintained regularly?
- What if when he went inside his home, he knew his car was being guarded by the smart meter and smart lighting fixture, so if his car was vandalized they could notify the authorities and also notify John because they know it was him parked there?

With this thought experiment, you can start to see how John's quality of life might be significantly improved through better commutes, more convenient experiences, and a safer environment. He's interacted with streets; he's interacted with parking; he's interacted with sanitation; he's interacted with potential public safety. All these experiences now feel like one intelligent orchestrated experience.

"He's interacted with streets; he's interacted with parking; he's interacted with sanitation; he's interacted with potential public safety. All these experiences now feel like one intelligent orchestrated experience."

—Miguel Gamiño

Chief Technology Officer, City of New York



Challenges in Implementing Smart City Solutions

This is the kind of bold thinking that we are doing when we contemplate future smart cities projects in New York City. However, before we dive in, we know there is a lot more thinking to do. As we break it into three main questions, we see that there are a lot of challenges to address.

1. What are the relevant systems, data sources, and their owners?

First, we have to think about the potential players in each of the scenarios and determine who the critical parties are. In a route optimization scenario, there are Department of Transportation traffic cameras, and there are government fleet vehicles like sanitation trucks, police cars, and fire trucks. Should these be inputs or just receivers of information? What about private sector fleets? What role do current navigation apps, like Waze, play? Of all these players, are some data sources more important than others and what parts are needed to sufficiently optimize the route?

There is similarly a web of potential players when we look at the other scenarios such as parking, street lighting, public safety and automated service requests. The Department of Transportation controls the street lights, the Department of Finance takes parking payments, the IT department runs the city's wireless network, 311 takes service requests, the police department enforces parking rules and responds to vandalism calls. So again, which things do we prioritize and how can we make all these various departments work together?

2. What are the critical infrastructure and technical needs?

Another question we must ask ourselves is about our infrastructure and technical needs. Regarding connectivity, we must have fast, cheap and ubiquitous connectivity, potentially V2V and V2I connectivity, secure internal networks to protect personal information, and fiber backhaul.

In terms of data collection and management, we will have to deploy sensors and integrate them with existing city data. We'll have to know city schedules and norms so we have a baseline and can spot deviations and abnormalities. We also have to do edge processing and analytics to make sure we are running things efficiently.

Finally, there is a range of actuation concerns. Police will need smartphones so they can receive real-time data and act on it. Streetlights must have the capability to react in real time and take automated action. And if John's car is actually broken into, we must be able to know that it is, in fact, his car and have the ability to contact him.

3. What are the key policy and equity concerns?

Finally, there are policy and equity concerns to contemplate. On the policy side, we are dealing with personally identifiable information which must be protected, and we also must secure systems against compromise and misuse. In terms of equity, this model assumes that all residents have low-cost data and computing resources (i.e. a smartphone to run the parking app, a car, etc.) and this might not be the case for low-income residents. As people become data and interaction points in the system, we also risk algorithmic bias in the form of blanket assumptions about communities based on the data, for example, lower-income neighborhoods becoming ranked as unsafe based on data inputs and then subjected to higher enforcement.



Ideal Conditions

There are many challenges with complex smart cities plans like the one described above, and these are the things we will be thinking about as we move to implement our ideas. That said, if we can set up the ideal conditions, then it can be pulled off.

For example, with support from the mayor, a top-down mandate would help us push through the barriers and break the silos of government so they can work together. A high-level blueprint will help, but we should also take a modular approach to allow for pivots as needed. An independent, centralized governance would assist the project, and we'd also need private sector partnerships and new business models to make these smart city efforts financially feasible. Finally, added technical expertise, particularly in the area of cybersecurity, would ensure that technology and data are managed properly.

These bold ideas can become a reality if we plan and thoughtfully address the challenges. Our commitment to doing just that is fueled by the desire to improve the city experience for John and our fellow New Yorkers.



Case in Point:

Solutions in Action – San Diego

David Graham, Deputy Chief Operating Officer, City of San Diego

San Diego's smart city story began ten years ago and was motivated by the fact that the city was broke. Major legal and fiscal issues led to the mayor resigning and a new mayor, a former police chief, coming in to clean house. With no money, we had to focus on efficiency, and that started us down the path of smart city initiatives.

That's not to say there weren't other challenges beyond lack of finances. On the macro level, San Diego faces a lot of the same issues as other large cities. I call them the Four Horsemen of the Metro Apocalypse: rapid urbanization, climate change, aging infrastructure, and security. We deal with the same issues on the micro level too: resistance to change, the entropy of bureaucracy, and politics.

This has led us to develop a specific approach to our smart city projects, as we seek to address city challenges and serve our 1.3 million residents. With 80 research institutions that get over a billion in federal funding from places like NIH, NSF, and NASA, a large and busy land crossing, and the largest concentration of military in the world, we have relied on collaboration to move things forward. We piggyback by copying ideas from other cities, we iterate to take what they have and make it better, and we have a real bias toward action, spending most of the time getting things done rather than trying to generate the next great model.

5 Pillars of the San Diego Approach

There are five main elements of the San Diego approach that can be put to work in other cities as well. As each is described, case studies are offered to demonstrate how this looks in practice.

“We face a lot of the same issues that all of you do on a macro level. I think most large cities do. I call them the Four Horsemen of the Metro Apocalypse. Rapid urbanization, climate change, aging infrastructure, and security. These are all our major issues.”

—David Graham
Deputy Chief Operating
Officer, City of San Diego

1. Think Platform

Our projects are planned out with great emphasis on the platform that is chosen, where platform refers to the technical platforms used, but also establishing a platform of people who are enablers, thus allowing us to deploy solutions rapidly without a lot of resistance.

For example, when our latest mayor was elected we wanted to update the website, as is the norm in many cities. However, this project was not just about updating the website itself; it was about the approach that was taken. Generally, one vendor is chosen for the website update, but we decided to talk to all the smart startups that do websites for major companies and businesses, which led us to select four vendors.

5,000 people played around with the website as it was being developed, including 900 beta testers. We updated to a mobile-enabled platform and completely redesigned the home page to more efficiently get people to the information they need in as few clicks as possible (without extra clutter and unnecessary information). This approach demonstrates how we strived for the best technical platform while also relying on the ‘people platform’ to create the best possible end product.

2. Default = Open

In our smart cities projects, we always default toward being open, which means being open and transparent with the people and also open with data.

A shining example is our creation of Cleantech San Diego, our main nonprofit that we work with in the smart city space. It was built on a model of openness, with the goal of having all major parties engage in open conversation at the same table, using open data to solve city problems. The member-based trade organization helps to foster collaborations, promote cleantech priorities, and encourage investment in the San Diego region.

Cleantech San Diego currently has over 100 members that include local businesses, universities, governments, and non-profits. A decade ago we realized that we couldn’t do it all, but by creating this organization we have found a way to enable a smarter city. Results are impressive, as we have become the second in the nation in installed solar capital, and have skyrocketed the adoption of electric vehicles and renewable energy.

3. Fix++

The driving factor of our smart cities projects is not just to improve efficiency but rather to turn inefficiencies into excellence. We seek not just to upgrade but to see the larger opportunities that fixing problems can bring.

One example is our streetlight updating project. San Diego is bold and innovative, but also conservative when it comes to spending money (as is the case in many cities). When we approached the project, we asked ourselves, how can we get to the most simple, most cost-effective solution that also has the greatest impact on the city?

The answer was to install 14,000 LED adaptive streetlights. Changing to LED would save money, and making them adaptive would allow us to control them. As we were working with GE, we then saw the larger opportunity to install sensors on the lights. At the time, GE was working on sensors, so we signed a letter of intent to do a temporary deployment downtown. The streetlights were installed with cameras and environmental sensors. This real life test revealed some flaws in the technology, which allowed GE to make important upgrades and improvements.



4. Human-Centered Design

The goal of San Diego's smart city projects is to improve the lives of city residents. We focus on the end-user experience and incorporate the ideas of our citizens into the plans.

Going back to the streetlight project mentioned above, how exactly did we decide to add cameras and environmental sensors specifically? We actually held a block party and had the people tell us what they thought mattered and what they cared about in their streets. The party included a large board where people could write their ideas. City residents shared a range of brilliant ideas, and this qualitative data was used to choose which sensors to include on the streetlights

5. Data Rules

Data plays a very important part in San Diego smart city projects. This is not to say that we are data-driven and make decisions simply because that's what the data says. However, data plays an important role in validating our policy decisions.

One example is in the adoption of solar energy in the city. Previously the process required people to get a solar permit. It was set up to run efficiently, but could we make it even more efficient to encourage more people to use solar? We ended up questioning whether we needed a permitting process at all. The same technology is used over and over again, and it is installed by engineers. We decided to change the policy so no permit was required and we would simply inspect the backend after the technology is deployed.

Months later, upon inspecting the data, we discovered how incredibly successful this policy change had been. In the span of just a few months, we saw a huge increase in the number of San Diego homes and businesses using solar energy.

These five approaches have driven smart cities success in San Diego. By using these principles, we aim to add one part Tesla and one part Edison to each project – innovative, future thinking while at the same time knowing exactly the sorts of solutions that the public wants.

*"Our perspective
as we were
going to deploy
the smart city
technology was
how can we
get to the most
simple, most
cost-effective
but greatest
impact to
the city?"*

—David Graham
Deputy Chief Operating
Officer, City of San Diego



Governance: An International Perspective

Jamie Cudden – Smart City Program Manager, Dublin City Council

Dublin, Ireland is a small city of 1.3 million people – a region that includes four local authorities that have been experimenting with IoT and smart city solutions for the past 7 years. The journey has included multiple phases and, admittedly, we have made mistakes along the way. However, in the process, we have figured out a better governance model and are starting to see our progress accelerate. These lessons have transformed the way we approach smart city projects, and can also guide other cities around the globe as they seek to strengthen their smart city programs.

Smart Dublin: An Overview

Smart Dublin has unfolded in three main phases that represent a progression in how we approach smart city projects.

- **Phase 1:** The first phase was characterized by a vendor-led approach when IBM set up their Smarter Cities lab in Dublin under the condition that we would provide access to data to help them understand the challenges in our city. This phase included the creation of DubL:nked, an open platform where not just IBM, but everyone could access the data.
- **Phase 2:** The second phase included the implementation of multiple pilot tests throughout the city, but it was more about testing the technology itself and looking for solutions. This proved not to be a very successful approach as there was disillusionment on both sides of the city and disappointment from companies who thought we were not delivering what we promised.
- **Phase 3:** In the third phase we migrated to a problem-based approach, with the creation of a digital masterplan in 2014 that aimed to create a digital leadership team, pull together all the key players, and embark on beta testing in a coordinated manner.

Smart cities expert Anthony Townsend has called the Dublin masterplan one of the best examples of digital masterplans available, and other cities even use it as a template. However, unfortunately, we didn't get to implement it because the mayor who created it

left and there was no budget. The problem, we realized, is that without a buy-in and a workable governance model, it's really hard to scale even the best thought-out smart cities plan.

Learning from Failure

Throughout the phases of our journey, I have learned that it is important to share your experiences and be proud of failure, for these are the moments when we can learn and improve. One prime example of that was a Wi-Fi project we started in 2015 that collapsed.

The problem is that there was not enough thought put into planning the initiative. The project was driven by economic development teams that never thought about why we were trying to deliver Wi-Fi in the first place, and the importance of quality and user experience. Essentially it was just a tick box on a larger to-do list, with the goal of 'just getting it done' so it could be crossed off the list. Since we didn't ask the right questions and didn't go out to the market with the right approach, the project was doomed to failure.

Fortunately, the lessons learned here would guide many future projects to success.

*"Share your
experiences and
be proud of
failure."*

—Jamie Cudden
Smart City Program Manager,
Dublin City Council

6 Main Lessons

From the Wi-Fi initiative and other failed projects along the way, we can glean several lessons on how to structure smart cities projects to ensure their success.

1. Proper Governance

Smart cities projects require overseeing by a chief executive, with a special team that reports to the chief executive about the various projects in motion.

2. Centralized Cross-Cutting Function

Although city governments tend to have several silos that act in isolation, it is important that projects are coordinated across silos, not just within them.

3. Seed Funds

With smart cities projects, you cannot rely on freebies alone. We have a very small capital budget of about €1.5M, but even this small amount gives more credibility to our projects, makes us more accountable for success, and allows us to scale up faster.



4. A Challenge-Based Approach

Smart cities projects shouldn't be set up as technology chasing a solution, but rather challenges in search of the right technology. We work with 450 operational staff across the region instead of middle management teams because these are the real people on the ground who understand the challenges in our city.

5. Collaboration with Local Champions

We have also learned to collaborate with local resources. In Dublin, we have 9-10 of the top tech companies, an amazing tech startup ecosystem, and world-class research centers. We also tap into local expertise by setting up an advisory network and hosting expos and events that bring in companies and problem solvers.

6. Awareness Building

For smart cities projects to be embraced by citizens, we have to do a better job of showcasing what we are doing well. This means telling more of the human stories that explain the impact of new technology and how it can benefit the city and citizens within it.

Applying the Lessons

In recent years, we have been able to apply these lessons to several smart cities projects in order to improve them and accelerate progress.

One example is a street lighting project where we aimed to incrementally upgrade street lights to LED in order to achieve energy savings. We decided to stop the upgrade; this was not just a tick box on a to-do list but a chance to explore even bigger opportunities. We worked for a year collaborating with others to understand the opportunities available in this space, the use cases and the business model. This allowed us to map out how other smart cities technologies could be applied to the network to increase energy savings and IoT potential.

Another example is a smart bin project, which was tested in small numbers years ago but was seen as expensive, a waste of money, and was never actually integrated into waste management workflows. Flash forward, and we decided to give it a try again. We called out to tech companies to learn about the latest technology in this area and heard from 10 companies. This led to a collaboration with Bigbelly, which offered 60 bins for a two-month pilot test. Results showed a 90 percent increase in efficiency in terms of how waste services were managed in the district.

We then looked into business models and ended up putting advertisements on the bins, which brought in significant revenue and allowed us to buy another 800 bins to deploy in the next 6-12 months. Meanwhile, the smart bins project was publicized on the Smart Dublin website (and other news outlets) which allowed us to build awareness and support as we explained how the technology works and how it benefits the citizens.



These and many other examples demonstrate that although we've had failures along the way in the Smart Dublin initiative, these failures have led us to develop a system to ensure success on our smart cities projects – lessons that can be implemented in other cities as well. Cities need to work together to address these challenges because we're being hit from all angles. Through collaboration and the sharing of failures, successes and best practices, we can build more smart cities across the globe.



IoT: What Works, What Doesn't and What We Care About

Linda Doyle, Director CONNECT, Professor of Engineering & the Arts, Trinity College, University of Dublin, Ireland

In 1997, the Smart Cities World Forum predicted that there would be 50,000 smart cities across the world by 2007. It is currently 2017, and this prediction has sadly not yet come true. In the context of where we are, there are some fantastic things that have happened, but there's not the progress that we expected. What can we do to speed this progress up? Here is a review the challenges we are facing and what is and is not working in smart cities development.

Where Things Are Working in IoT

As we examine smart cities from an engineering/computer science perspective, we see that things work really well when you can use existing infrastructure for smart cities. In the current self-contained situation, the following things are true:

- The sensor is a phone.
- The network is the cellular network.
- Citizens are responsible for paying for connectivity.
- Citizens are responsible for the power supply.
- The app developer is responsible for the business model.

In this self-contained situation, we see all kinds of apps being created that allow people to navigate the city or negotiate various places and things in the city. There are many out there, but to share an example: an app that lists tourist hotspots in the city along with the city map.

*“The Living Lab
is a wonderful
opportunity to
really progress
things. In fact
actually, when it
comes to smart
cities and IoT,
the only way
to progress
things.”*

—Linda Doyle
Director CONNECT,
Professor of Engineering
& the Arts, Trinity College,
University of Dublin,
Ireland

If we push this situation forward with all the same variables but **add in** additional data from city sources, we can take the potential of apps (and the smart city itself) to the next level. For example, with data from the city, a third party could create an app that gives real-time information about city buses – when the bus is coming, how long you’ll have to wait, and so on. The potential for these kinds of apps, in all aspects of city life, is huge. However, to reach this level the city needs to embrace open data and share that data in a form that people can use. Some cities have made huge strides with this, such as Dublin with the DubL:nked open data platform.

In the previous examples, smart city apps are created with the app developer in charge of the business model. For cities to push to the next level, the business model has to matter to the city itself and supply additional data from city sources as well. For these things to happen, the city needs to understand the value of data. We are currently seeing some cities become more involved at this level, but the problem is that although we understand data is important, we don’t yet understand the value of the data. This is the challenge we must overcome if the city wants to engage too, and not just leave smart city development up to third-party app developers.

The Challenge of Adding New Infrastructure

In the self-contained scenarios above, we are relying on existing infrastructure to fuel smart city developments, but things get even more challenging when new infrastructure is needed.

The phone is not the only possible sensor; in fact, there are all kinds of different sensors being made today: smart roads, smart lighting, noise maps, smart parking, and sensors that detect everything from water quality and leakages to traffic congestion. Many of these sensors run on batteries and send periodic small bursty data. These sensors require low-powered wide area networks (LPWAN or LPWA) to carry the data through the gateway and into the cloud where it can be processed (i.e. where we can then make sense of the data – is the city flooding, what is the air temperature, are the traffic lights working optimally, etc.).

LPWAN is a different kind of network than the cellular WiFi we are used to using, and there are actually many companies creating their own versions of LPWAN. Each has its own advantages and disadvantages, but there is kind of a big fight at the moment about which one or ones are going to dominate in the future. It is unclear which technology will win out in this space and this makes long-term city planning difficult. City officials want to build the infrastructure that can enable these new sensors and make a good long-term investment. This requires choosing the ‘right’ LPWAN network, but it’s currently too hard to tell which of these technologies will be relevant in the next 10-20 years and which will become outdated or obsolete.

Of course, there are many other challenges at the moment. Battery technology still isn’t there yet; sensors are not low cost enough yet; there are many security issues; there is an overwhelming number of advanced data analysis techniques to choose from. However, even when the technology is there, deploying the technology will still be a challenge. Although we see a lot of tests and pilots happening in cities, deploying something at real scale is still elusive. As we continue to try to push for



real-scale implementation, we will have to work through challenges with the practicality of deployment (Who owns this lamppost? Can I put something on it? Who owns the data if I do?), and finances (Who pays? How do we make money on this? How do we make this sustainable?)

Fundamentals That Could Improve the City

These challenges give way to a number of fundamentals that could improve the city from a technical perspective.

- **A City Asset Register:** A list, a collection of everything and who owns it: fiber, wireless, electricity points, lampposts, bus shelters, benches, etc. Deployment is going to continue to be poor and difficult to scale until we know exactly what the city's assets are...assets that can then become parts of its smart city network.
- **An Asset Marketplace:** A marketplace would give the city access to assets that it would like to use but does not own. It would assess market value and establish how to pay for the rights to use these assets. Pay could be in the form of cash, data, revenue share, city services, etc.
- **Automated and Dynamic Implementation:** Implementation of IoT is a time-consuming process. This could be sped up if we had a way to make planning tech implementation more automated and dynamic.
- **Historical View:** We often look at the world as if everything is new. There is actually a lot to learn if you take a historical view and understand how technologies have impacted the city in the past.
- **A Multi-Disciplinary Approach:** We often see multi-disciplinary teams come together for smart city projects, but these things only happen in short bursts. In the future, these people need to come together and work together for longer.

Despite the challenges, there's great technical progress happening right now. IoT is so big, and of interest to so many sectors; good things are going to happen, and the city will benefit. That's a definite. Cities are a big part of the progress too because they serve as Living Labs for testing and developing technology. Yes, there are enormous challenges, but cities in themselves are completely challenging. It's really important to say don't stop believing, as we work together to create smarter cities for the future.

"There's great technical progress, there's much more ongoing. IoT is so big and of interest to so many sectors; good things are going to happen and the city will benefit. That's a definite."

—Linda Doyle
Director CONNECT,
Professor of Engineering
& the Arts, Trinity College,
University of Dublin,
Ireland



Case in Point:

Solutions in Action – Boston

Nigel Jacob, Co-Chair, Mayor's Office of New Urban Mechanics

In Boston, smart city projects are the responsibility of the Mayor's Office of New Urban Mechanics, a startup inside of the Boston government that was started seven years ago under the prior administration, Mayor Menino. New Urban Mechanics works closely with the IT department but also works alongside other departments like public works and transportation. In this way, we can explore various approaches to smart cities technology and then apply them to a range of areas within the city government.

In essence, New Urban Mechanics is an R&D lab that is focused on the needs of Boston citizens. Along the way, the three most important lessons we have learned are that how you build is just as important as what you build, that you can use technology to build relationships, and that you should not be afraid to have an attitude.

How You Build Is Just as Important as *What* You Build

This lesson speaks to the importance of process. A major problem when working with vendors is that they have created products that are in search of a solution, in essence, thinking that we can just drop these products in the world and make things better. In Boston, we have realized that it just doesn't work that way, so we instead take a process approach to our smart cities projects. We recognize the need to consult with the public and include them as part of the solution, not just make them passive recipients of things that we are throwing out into the world.

New Urban Mechanics uses a three-step innovation formula.

1. Explore

The first stage is a way to evaluate all the potential projects that come to us – a way to find the people we want to work with, the challenges we want to work on and to see the opportunities and challenges.

This stage involves going to community meetings, listening in, engaging with parents, talking to researchers, and so on. When looking at the universe of all possible things, there are then three criteria we use to select the projects we will actually pursue: (a) Does this project have the capacity to impact people's lives? (b) Is it possible to prototype this thing? and (c) Does this idea have the potential to scale? We are essentially looking for ideas that will impact citizens, can be prototyped, and can be scaled if they prove to be successful in initial tests.

2. Experiment

Ideas that pass these criteria are taken to the experiment stage where we roll up our sleeves and do the actual work, including creating prototypes, formulating hypotheses, choosing a context, and running experiments. Experimenting is always iterative, meaning that we will test several versions of the prototype to find out what works and what doesn't.

3. Evaluate

When the experimenting stage is finished, we move on to an evaluation stage where we think about the insight that we have gained from the experiments and evaluate if it worked or not and why. If a project is not working, it will be shut down. If it does work, we begin to think about what we can do to scale the project, including figuring out funding, training, operations, and whatever it will take to expand the project.

The process we use creates a safe space for organizations to innovate without fearing risk or worrying that they will be blamed for failure. For example, a mid-level manager in a school district may want to find a different way of teaching students or training teachers, but they may be afraid to use budget money to try something that might not work. When they come to us, they can test their ideas without fearing the angry phone calls they might get if the project doesn't work out. When New Urban Mechanics tests new ideas and technology, the failure falls back on our own shoulders; because of this, sometimes we're called 'the department of failure.' I like to think of us as the risk aggregators, protecting others from risk so they can try innovative and bold new ideas.

"Sometimes we're called 'the department of failure.' I like to think of us as risk aggregators."

—Nigel Jacob

Co-Chair, Mayor's Office
of New Urban Mechanics

Use Technology to Build Relationships

Technology has many benefits. It can speed up delivery, make things more efficient, and make things more effective. While this is all true and good, for us, the most important aspect of technology is its ability to build relationships.

For example, like many cities, Boston is interested in placing sensors in the urban environment. These are typically placed in inconspicuous locations where they can blend into the background and go unnoticed. Instead, we are looking at ways to allow people to interact with them – to place them in visible areas where



“Our job is not to make the city the most efficient machine in the world. It’s about delivering service. It’s about making quality of life better in our city.”

—Nigel Jacob
Co-Chair, Mayor’s Office
of New Urban Mechanics

people can see them, stop, then learn about the sensor and our intent in using it. As an example, we are currently working on a project called Local Sense Labs. Downtown Crossing was chosen as the location for this project, due to the social, ethnic and economic diversity of the area. 11 different sensors have been placed in this one geographic location to measure things such as noise, light, air, and human activity. Our next plan is to make it look like an art exhibit so citizens can engage with the project. We will be holding community workshops as well.

Another example of building relationships with technology is the Citizens Connect app, which was created in 2009 but has since gone through a number of iterations. This app allows citizens to report problems in their neighborhood, such as potholes, broken sidewalks and graffiti. When we discovered that city workers were using the app, we then created a version specifically for them, called City Worker. The app allows them to see tickets, make repairs and close tickets without having to use archaic Excel spreadsheets or bulky laptops.

One thing we have done is to try to better connect these apps in order to forge stronger relationships between citizens and the government. We can now take pictures of the workers completing the work on the ticket, which is then sent to the original reporter with a note that the ticket is closed. Knowing that it was Paolo and Steve who completed the work, not some faceless government bureaucracy, helps to build a better relationship between the public and the government. In fact, we have found that if a photo is sent, that user is very likely to use the app again within the same month.

Don’t Be Afraid to Have an Attitude

A final thing we have learned from working on smart cities projects in Boston is that you have to speak up and should not be afraid of having an attitude. If something sucks, say it! If there is a spin you’d like to see, make sure you communicate it.

For example, one thing that came out of the Local Sense Lab project is that we need to do a better job of articulating to companies, vendors, partners, researchers, and community groups exactly what we mean when we say ‘smart cities’ and what we are looking for in potential projects.

As a result, we created the Boston City Playbook to voice our criticisms and state our wishes in plain language. We urge companies to stop sending salesmen and IoT vendors; send us someone who knows about the city and cares about residents’ experiences. We warn that our job is not about making the city the most efficient machine in the world. It’s about delivering service. It’s about making quality of life better in our city. And for those coming to us pushing a specific platform, we are simply not interested until we know what technology standards will prevail in the future.

These are three lessons that can help guide smart city projects. In Boston, we have done some awesome things, some stupid things, and we have learned a lot along the way. What we know for sure is that smart cities projects must be challenge-, community- and relationship-focused, and if you add in a little attitude, you can increase your chance of success.

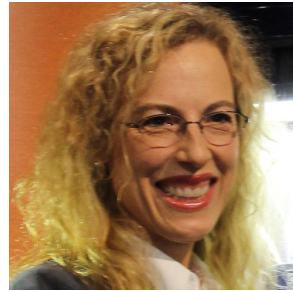
Partial List of 2017 Speakers and Participants



Bob Bennett
Chief Innovation Officer, City of
Kansas City, MO



Jason Collins
VP IoT Marketing, Nokia



Lorie Cosio Azar
Program Manager, Energy &
Sustainability, City Of San Diego



TJ Costello
America's Director Smart Cities
IoT, CISCO



Brian Donnellan
Professor of Information Systems,
Maynooth University



Miguel Gamifio
Chief Technology Officer, City of
New York



Jeremy Goldberg
Director, Civic Innovation
Partnerships, San Francisco
Mayor's Office of Civic Innovation



David Graham
Deputy Chief Operating Officer,
City of San Diego



Silvia Harris
Deputy Director of Operations
Department of Innovation and
Performance, City of Pittsburgh



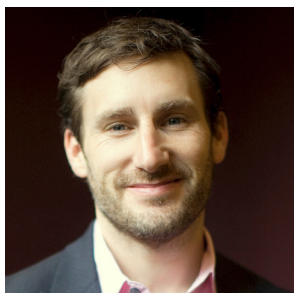
Nigel Jacob
Co-Chair, Mayor's Office of New
Urban Mechanics, City of Boston



Debra Lam
Managing Director, Smart Cities
and Inclusive Innovation, Georgia
Tech



Rob Meikle
Chief Information Officer, City
of Toronto, Information &
Technology



Jeff Merritt
Director of Innovation, City of
New York



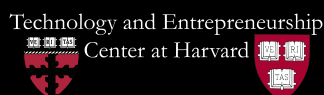
Albert Seubers
Director Global Strategy IT in
Cities, Atos



Grace Simrall
Chief of Civic Innovation and
Technology, Louisville Metro
Government



Ted Smith
Co-Chair, Louisville Civic
Innovation Advisory Council, City
of Louisville, KY



Hosted By:

The Technology and Entrepreneurship Center at Harvard (TECH)

hosts the 2016 Strategic Innovation Summit. TECH, part of the Harvard School of Engineering and Applied Sciences, is both a real and virtual space for students, faculty, alumni, and industry leaders to learn together, collaborate, and innovate. TECH enables this holistic exploration by sponsoring and supporting opportunities for the innovation community to gather and exchange knowledge via courses, study groups, mentorship relationships, innovation programs and special events. Find more information at www.tech.seas.harvard.edu



Sponsored by:

Nokia is a global leader in creating the technologies at the heart of our connected world. Powered by the research and innovation of Nokia Bell Labs, we serve communications service providers, governments, large enterprises and consumers, with the industry's most complete, end-to-end portfolio of products, services and licensing. From the enabling infrastructure for 5G and the Internet of Things, to emerging applications in virtual reality and digital health, we are shaping the future of technology to transform the human experience. www.nokia.com

Additional sponsorship from:



Produced in collaboration with Palisades Media Ventures peter.baer@palisadesmv.com

Contact Information

theinnovatorsforum.org/smart-cities-innovation-accelerator
smartaccelerator2017@theinnovatorsforum.org