

2016 Strategic Innovation Summit: Smart Cities Europe

*Insights from the 2016 Strategic Innovation Summit
Dublin, Ireland*





Introduction

In a global world, simply providing basic necessities like education, infrastructure and resources is not enough. To lead the next generation, cities must enable - and drive - innovation in their communities, providing creative solutions to urban problems that will improve the quality of life and economic opportunities for their citizens. How to accomplish this was the topic of the **2016 Strategic Innovation Summit: Smart Cities Europe**, where top leaders convened in Dublin, Ireland to discuss strategies that will lead their cities into the future.

The 2016 Strategic Innovation Summit: Smart Cities Europe is an initiative of the Technology and Entrepreneurship Center at Harvard. The event was designed to gather senior public officials, leading academics and thought leaders in order to help them implement strategies and programs that will enable their cities to be leaders in innovation. This Summit provided an unprecedented opportunity to learn from and network with the world's leading city innovators, Harvard Fellows and researchers.

The Summit explored the critical needs required to drive innovation within the community. We took a deep dive into questions concerning infrastructure, education, community involvement and economic programs. Most importantly, the Summit addressed the critical leadership attributes needed to choose a mix of collaborative strategies, governance models, and technologies that will help public officials make their communities ready for the future.

During the Summit, we focused our learning, discussion and best practices exchange around identifying the key enablers to growing an innovation economy. Participants learned from informative case studies using the Harvard Case method as well as engaging keynote speakers and peer-to-peer problem-solving sessions designed to help city leaders evaluate their current state and develop a plan to make their communities innovation leaders for the future.

Key learnings from the Summit are detailed in this report.



Contents

Introduction	2
How SmartCATALONIA Aims to Transform Catalonia into a Smart Region.....	4
Smart City Bristol	6
Local Innovation Ecosystems for Smart Sustainable Cities	9
Insights: Scaling and Business Models for Smart City Programss	12
Smart Dublin	15
Smart London	18
(Un)Plugging Smart City Transformations and Strategies in Europe	20
Insights: Governance for Smart Cities	23
Making the Urban Innovation Spiral Happen: Why, How, Where.....	25
Smart Cities: Why Those Who Share, Win	27
Challenges in Implementing Smart City Initiatives	29
Insights: Challenges and Opportunities.....	31
About the Strategic Innovation Summits and Symposia	33
Acknowledgements and Credits	34



How SmartCATALONIA Aims to Transform Catalonia into a Smart Region

Presented by Jordi Puignero I Ferrer, Secretary of Telecommunications, Cybersecurity and Digital Society, Government of Catalonia

There is a new internet revolution happening right now, and Catalonia aims to be at the center of it.

- **Internet of Information:** In the 1990s, developments clustered around using the internet to share information, for example, content and email.
- **Internet of People:** In 2010 and beyond we have seen a switch to an internet of the people, which has focused on the importance of mobile devices and social media.
- **Internet of Things:** As the number of connected devices keeps increasing, we are moving to an Internet of Things. The new revolution includes big data, artificial intelligence, virtual reality, cyber-physical systems, wearables, smart robots, drones, mobile, cloud, cybersecurity, and 3D printing.

It is important to focus our economies, our cities, and our countries down this new path. In fact, not too long ago we saw many cities in the Catalonia territory of Spain sparking up Smart Cities projects. For fear that these separate projects would create isolated Smart Cities, we came up with a plan to unite Catalonia by creating a Smart Region. The smartCATALONIA strategy was approved in October 2014 and was the first authorized Smart Region plan in Europe.

The SmartCATALONIA program identified three main areas to focus on: smart economy, smart government, and smart citizens. We identified framework

“We’ve been building a lot of roads and railroad trains in the past. In the future, we have to concentrate more our investments on moving not goods or people but in moving megabits.”

—Jordi Puignero I Ferrer,
Secretary of Telecommunications,
Cybersecurity and Digital Society,
Government of Catalonia

areas to ensure that projects in the region would be carried out successfully. For example, we invested in electronic infrastructures like data centers, networks, and sensors; we created a platform of services that could be shared among different municipalities, like cloud, big data, open data, and high-performance computing; and we have worked at creating legal framework for electronic communication in order to prevent digital exclusion while ensuring trust, privacy and cybersecurity.

These initiatives have allowed us to coordinate Smart City projects happening all across Catalonia. They have encouraged public-private partnerships and fostered openness where cities can share their experiences, so mistakes are not repeated and successes can be replicated.

Here are some of the many ventures of the smartCATALONIA Smart Region project.

Smart Cities Development

- **Catalonia SuperLab:** An urban network of laboratories dedicated to testing and validating smart solutions in real environments.
- **smartCATALONIA Observatory:** Which gives a comprehensive and updated overview of the projects and initiatives of the Smart Catalan territory.
- **Smart City Roadmap:** A collection of guidelines to help municipal officials adopt Smart Cities initiatives gradually

Smart Economy

- **Center of Excellence in Big Data:** A public-private partnership aimed at researching innovations in big data technologies and analyzing data that companies are producing in order to discover value in that data.
- **Industrial Forum for the Connected Vehicle and Automated Driving (IFCVAD):** A public-private partnership that includes car companies, factories, and telecom companies. The goal is to make Catalonia the best place for this new industry by tackling issues related to production, logistics, and testing.

Smart Grids

- **Intelligent Distribution Power Router (IDPR):** In the current model, energy is generated, transported, distributed then consumed. The Smart Grid project allows consumers also to generate their own energy, which flows back to the IDPR where it can be redistributed.

Smart Citizen

- **Mobile Coverage Project:** This initiative will allow us to create a real-time map of coverage quality anywhere in Catalonia. By voluntarily downloading the app, people can become smart citizens who transmit coverage data anonymously wherever they are, thus contributing to the map which can serve all citizens in the Catalonia territory.

This is a quick glimpse at some of the many projects happening right now to encourage Smart City projects across the area and ultimately to make Catalonia a Smart Region. As a result of these efforts, Catalonia is emerging as “Europe’s Silicon Valley.” Our developments have attracted businesses such as Zurich Insurance Group, Amazon, Computacenter, Nestle, Lenovo, Vodafone, CaixaBank, Oracle, and Nintendo, all of which have set up or expanded technology and data centers in Catalonia within the last year. By following the new internet revolution that is focused on the Internet of Things, Catalonia is creating an attractive ecosystem that will economically boost the region and create better jobs in the future.



Smart City Bristol

Presented by Kevin O'Malley, City Innovation Team Manager, Bristol City Council

Bristol is the 8th largest city in the UK and a booming city region of 1.1 million people. It has been identified as a leading city in the 2016 UK Smart Cities Index and touted as “the best place to live in the UK” by the Sunday Times. How did we get there? Throughout the past seven years, we have been working tirelessly to become a Smart City that will lead the future. Here is the story of our journey.

Step 1: Recognizing Why

The first step in our journey was identifying the reasons why we needed to become a smarter city. Some of the important drivers of our decision include:

- **Economic Benefits:** Becoming a Smart City would help us grow and become more prosperous by driving the ICT business sector.
- **Environmental Benefits:** Smart technology would help us meet challenging carbon targets of reducing emissions by 40 percent by 2020.
- **Energy Benefits:** The population in Bristol is growing, and Smart City initiatives would allow us to deliver better services at lower costs.
- **Citizen Engagement:** Despite being a prosperous city, some communities in Bristol still face high levels of poverty. A Smart City platform would allow us to connect the city and make everyone feel like an important part of it.

Step 2: Seek Advice

Once we identified our reasons for wanting to become a Smart City, we sought advice from Professor Chris Tuppen, a leader in the area. He benchmarked our activities, looked at our priorities and strengths, then came up with a report that included a set of recommendations about what we should focus on to achieve the biggest movements toward becoming a Smart City.

We had a counselor who stood up at a public event a few years ago and said, "There's only two types of data in Bristol: confidential data which we can't release and open data." That was quite a rallying cry and a very bold statement."

–Kevin O Malley
City Innovation Team Manager,
Bristol City Council

Step 3: Set Up a Smart City Program

Based on Professor Tuppen's recommendations, we set up pilot programs in the three major areas identified within the report: Smart Energy, Smart Mobility, and Smart Data. Here are some of our initiatives in each area.

• Smart Energy

- Teaching citizens in their own homes to better understand their energy usage through the use of smart meters.
- Making energy usage in council buildings more transparent through smart meters and open data.
- Working with citizens on a smart grid project whereby we deployed solar PV and battery storage in council houses, allowing people to offset their energy demand.

• Smart Mobility

- Launching two connected, autonomous vehicle projects, including Venturer, a driverless car.
- Developing more innovation in community transport, including Boxy, a hybrid between a bus and a taxi that allows people to order a ride then the route is adapted based on where everyone who is on board needs to go.
- Exploring different fuel sources, including a bus that runs on biofuel (human waste).

• Smart Data

- Developing a community of people in Bristol who are interested in open data and how it can be used to launch innovative businesses and improve transparency.
- Becoming one of the global nodes for the Open Data Institute in London.
- Establishing a virtuous circle of providing tools to the community and then encouraging developments by the people, such as the creation of apps that solve city issues.
- Embedding the use of open data through policy by making it compulsory for people within the city authority to release the data that they can.

Step 4: Develop Infrastructure

In Bristol, we have a research and development smart cities infrastructure where Bristol is a joint venture between the City Council and the University of Bristol. We have a fiber optic network overlaid by a showcase wireless network and on top of that is a radio-frequency mesh network. It hangs off of 1,500 lampposts in the city, allowing us to deploy data sensors and monitors quickly and cheaply.

With all that data coming in, we also invested in an open data platform to house the data and allow people to access it.

In addition, we have a Data Dome inside our planetarium that uses 24K 3D projectors to show what the data looks like visually. The theater seats one hundred, allowing decision makers to come together and view what is happening in the city in real time (congestion, air quality, etc.). Experts can see the data and discuss how they might solve the problems – a better way of engaging problem solvers than writing a report that they will never read.

A final bit of infrastructure that is coming live next year is the Combined City Operation Center, which will bring together our Emergency Center, our CCTV cameras, and our Traffic Control Center into one single area, thus encouraging organizations to come together, and share the space, the data, and the intelligence.

Step 5: Combining Individual Elements

We have seen excellent results with each program, but we are currently working on building a Smart District so we can see how all the different components of the programs and infrastructure can come together in one area. The project is called Replicate, and the goal is to be able to combine individual elements so we can produce results that are more than just the sum of the parts.

Step 6: Future Focus on the Community

Most of the Smart City initiatives implemented in Bristol so far have been created from the top down because that is where the investments are, and the majority of the initial interest has come from commercial organizations. However, increasingly there is a movement toward taking a bottom-up approach. By engaging the community, we can understand what their problems are and where their priorities lie. We can work with them to refine their ideas and create programs that speak to these individual- and community-level problems.

The Smart Cities initiative in Bristol was started by the City Council, which took control and made decisions about the direction of the city. I think we're now in a space where we need to open up more and recognize that the community can bring something really powerful to this too.

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–Kevin O Malley
City Innovation Team
Manager, Bristol City
Council



Local Innovation Ecosystems for Smart Sustainable Cities

Presented by Mikael Edelstam, CEO Miljostrategi

Many cities experience a need to deliver more and better services and develop initiatives for the citizens and businesses, but with restricted resources. This makes innovation necessary. Part of the challenge can be handled by working within the city's own organization, but most of it will require collaboration with external stakeholders like universities, companies, and citizens.

When trying to set up external collaborations, a key asset is the local innovation ecosystem with its diversity of stakeholders including public sector, business sector, universities, citizens and civil society organizations. It also includes the competencies and capabilities among those stakeholders, the existing institutions, policies, and practices, as well as physical assets like incubators, labs, test sites, and demonstration sites. To harvest the full potential of that system, you need to understand it and govern it.

Complexity and Wicked Problems

Smart City challenges are wicked problems, with a multitude of stakeholders, and diversity in the values and competencies among those stakeholders. The challenges also include strong aspects of uncertainty, unpredictability, complexity and interdependencies. These aspects make Smart City problems hard to handle.

Handling technical complexity is quite well-known as a challenge in development processes. But as Smart City development involves so many dimensions and stakeholders, the social complexity often is the bottleneck to efficient collaboration. The social dimension also tends to be a bit overlooked when building long-term collaboration.

Trust and openness make it possible to learn and to explore new ways of handling both daily routines and unknown challenges, as is the case when working with Smart Cities. Often, the context for collaboration will, at least at the start, be quite the opposite. The individuals and organizations have different backgrounds and values, meaning they have limited common ground to start with. They will be viewing challenges from different perspectives, and have a need to deliver value with different logic and different expectations from their own organization. Therefore, governance of the system is required.

Governance

Governance could be described as the means used to stimulate, support, influence or in other ways “manage” the interactions between different stakeholders. There are three basic models of governance:

- Hierarchic governance based on jurisdiction and control.
- Market governance based on prices, transactions, and efficiency.
- Network governance based on cooperation between different stakeholders.

When it comes to Smart Cities, the challenges are complex and unstructured, with a multitude of factors and actors, with the need for balancing different governance models. This meta-governance means using the right governance model for the right group of stakeholders, in the right situation, for the right action.

Action Space and Relational Space

You also need to understand two other aspects of collaboration — action space and relational space.

Action space is the aspect of collaboration that creates tangible value creation (new market opportunities, increased performance in existing operations, a better quality of life for citizens or something else). This is the obvious basis for setting up consortia and allocating resources for collaboration. Focus is on concrete results and execution.

Relational space is the aspect of collaboration that creates understanding and trust between the partners, in order for the roles and motivation that guide their participation to be clear and accepted.

In the case of working with the wicked problems of Smart City innovation, the relational space is more important than in ordinary projects. There are many reasons for this.

- The work is about exploring new ground, which requires searching and new thinking from all participants.
- You need a more common, but also more flexible and understanding vision of what you are trying to achieve together.
- Collaborative searching and sense-making, using the collective competencies and resources in the local innovation ecosystem, has a strong component of trust.
- You are aiming for long-term collaboration, not only three-year projects.

“On the deeper level of change, system analysis and design thinking are important, opening transformational strategies and solutions.”

–Mikael Edelstam
CEO Miljöstrategi

This often requires slow processes and systemic innovation that are not fit to work within project form. Instead, they need more open-end processes, where deeper understanding and new ideas among partners can emerge. This means building structural capital in the system.

In the past, I have put these process to work to help the Skåne region and a couple of cities in Sweden to develop a three-level governance model for Smart City innovation collaboration: the Form, Know, Do model.

The top level is the operational projects, called DO. This is about “normal projects and daily operational activities.”

The second level is about building knowledge and capabilities that are necessary to run projects on the DO level. This level is called KNOW.

On the deeper level of change, system analysis and design thinking are important, opening for transformational strategies and solutions. This level is called FORM.

Recommendations from the work include:

- Your local innovation ecosystem should be seen and governed as the strategic asset it is - establish a governance model for this.
- Understand and respect the differences in values and objectives among stakeholders.
- Project logic needs to be complemented by continuous processes for innovation ecosystem development.
- Work with Smart City wicked problems as exploratory, open-end processes, and involve all concerned stakeholders in defining issues and solutions.
- Learn from international best practices, and link up your local innovation ecosystem to international markets.



Insights: Scaling and Business Models for Smart City Programs

Throughout the Summit we heard several examples of how European cities are approaching technology and innovation to become Smart Cities of the future. These case studies ultimately led us to a discussion of what does and doesn't work when scaling pet projects and small pilots into larger solutions. Here are some of the insights.

Biggest Challenges

Although Smart City projects in Dublin, Bristol, Catalonia and other areas have achieved measurable success, there have also been challenges along the way. This includes:

- **Culture:** Smart City solutions require a change of culture within the city itself. Each unit of the city is its own silo and has its own way of doing things. There is often little interest in changing, but to become a Smart City you need a new, collaborative way of thinking.
- **Fear of Change:** Fear of change can be the result of culture but also because change may bring about potential negative consequences. For example, technological solutions are often faster, cheaper and more efficient than a human performing the same task. There is a fear that jobs will be lost, so trade unions may try to block projects.
- **Citizen Engagement:** It is vital for citizens to be engaged in developing Smart City projects. City leaders must be able to connect with citizens in order to understand their challenges and come up with technological solutions to address these challenges. Existing relationships between citizens and the government often make this difficult.
- **Budget and Costs:** Technology is still expensive at this point, and meanwhile, a majority of the budget often goes to the social care of the citizens, leaving little to spare for Smart Cities projects.

- **Future Issues:** When implementing Smart City solutions, you also have to contemplate what may happen in the future and prepare for it. For example, one statistic estimates that for every one job created in the new, automated world, 20 women will lose their job versus 5 men, and the jobs that are created will be in typically male-dominated areas. If this issue is not handled properly, then we could increase the problems we already have with wage inequality. Other future issues to reflect upon include the problem of preparing our schools and training our future labor force, and ethical and moral dilemmas associated with the data revolution.

Citizen Engagement

Of the challenges listed above, the most talked about topic was citizen engagement. Summit participants looked to identify why citizen engagement is so important and how to make it happen.

In general, participants agreed that citizen engagement is necessary for Smart City projects because these projects are not just about forcing technology and innovation on citizens, but rather using these things as tools to solve real-life problems. By talking to citizens, governments can understand what their concerns and needs are, then make sure that changes they make align with what the citizens want to see.

While citizen engagement is vital, it is also voluntary, and people vary widely in the level in which they'd like to be engaged. On the most basic level, citizens can agree to be 'data providers.' For example, in Catalonia, people can voluntarily download an app which allows them to send information anonymously regarding the mobile coverage in that area. This allows them to be engaged without having a large commitment or needing to stay very engaged every day.

While engagement through data is useful, many Summit participants warned against blindly creating laws and solutions based on data alone. When we rely on algorithms, decisions are taken out of our hands, so we also need citizens to engage as decision makers, actively shaping the changes they'd like to see in the cities where they live.

To that end, we are starting to see crowdfunding coming to places and cities where people don't want to wait for the democratic process to change their neighborhood. They are motivated to make changes themselves, and crowdfunding gives them a way to fund their projects.

This made some participants question whether "Smart City" really is equivalent to "smart local government." Perhaps it is time for the local authorities to get out of the way and stop trying to control and deliver the Smart City to residents. Perhaps, instead, communities should be leading the way and the role of local government is to simply enable citizens to make the decisions and changes they'd like to see.

*"Engagement
is about
understanding
where the untapped
value is and the
innovation comes
from finding a
solution to that."*

—David Ricketts
Innovation Fellow, Technology
and Entrepreneurship Center
at Harvard

Potential Solutions

Many European cities have already been tackling the challenges listed above. From their experiences, some possible solutions have been identified.

- **Forming a Smart Cities Division:** Creating a separate division for Smart Cities planning and implementation helps to make it a priority. For example, in Bristol, the division is called the Futures in Bristol, and its goal is to make sure that the future Bristol is a sustainable, inclusive, prosperous Smart City.
- **Understanding Your Starting Point:** As mentioned, fear of change can stall or block Smart City initiatives. It is important to know where people are coming from and why they are objecting to a proposed project. This gives you a starting point, and you can form a strategy to progress from there.
- **Integrating Stakeholders:** A collaborative approach works with Smart City endeavors. City administrators, universities, businesses, and even citizens themselves have to work together. This allows them to understand one another, draw out competencies, and learn via real cases.
- **Working with Trusted Intermediaries:** Where it is sometimes difficult for governments to engage directly with the citizens, intermediaries can help. Intermediaries are trusted members of the community who can help broker information backward and forward between the community and the local authorities.
- **Prioritizing Smart Cities in the Budget:** Budgets are tight and often if you wait until later in the budget year to ask for funding for a Smart Cities project, it will not be a priority. Instead, put a certain percentage away for innovative solutions at the very beginning of the budget process. Departments will then have the money they need to innovate, and having those funds will force them to think about innovation within their unit.

In the end, many factors have to come together to make a Smart City project successful. The city must have the budget and be willing to make changes. Skilled workers must be managed as a resource by shifting people into new roles, but the people themselves also have to be willing to change. Smart City innovation requires a complete mind shift in how business is done, with the need to think collectively and systematically about how technological and data assets will be managed. Citizens must become engaged too, not just as data providers but also as active decision makers. To become a Smart City, you can't just want to innovate – you have to take innovation seriously every step of the way.



Smart Dublin

Presented by Jamie Cudden, Smart City Program Manager, Dublin City Council

Dublin is a small city of about 1.3 million people, with four local authorities that make collaboration a challenge. Technology is huge in Ireland, with 80 to 90 percent of Irish people online and 75 percent using a smartphone. Although Ireland has the most users of mobile internet per capita, as a city we have been left behind. With the Smart Dublin project, that is changing.

Smart Dublin is an initiative of the four local authorities to engage with tech startups, universities, citizens and researchers to solve city challenges and improve city life. The following are the guiding principles that have helped to make the program a success.

Collaboration Model

What we have realized over the last couple years is that we don't have the expertise within our city governments to solve the challenges we're facing. It is difficult to keep up with technology innovations and resources have been cut. This has led us to adopt a new collaboration model.

If you look at Dublin, we have nine out of ten of the top tech companies. We have an amazing tech startup scene. And we have incredible research centers. Smart Dublin is an attempt to connect all of this expertise together in order to address the challenges of the city.

One specific initiative is Dubl:nked, an open data portal that gathers data and makes it accessible so others can innovate and create solutions. We have also set up an advisory network of 40 key leaders across tech, research, and citizen public representation groups. This network will help guide the vision and strategy for Smart Dublin, meeting twice a year to assess whether we are going in the right direction, where the opportunities are, and how we can work better together.

“By 2017, half of all internet solutions originate in startups that are less than three years old. So how can we embrace that innovation and, from a city, how can we work with these kinds of startups?”

*—Jamie Cudden
Smart City Program Manager,
Dublin City Council*

Focus on Challenges Not Technology

Projects in Smart Dublin are challenge-led, not technology-led. We have worked with operational staff in all areas to figure out what problems in the city need to be solved in the first place. We have engaged with over 100 operational staff in strategic workshops that try to uncover what the challenges are, such as:

- The challenge of sustained mobility, and how we can better understand flows in the city to reduce congestion and increase walking and cycling.
- Environmental challenges and how we may use low-cost monitoring to improve noise and air quality and reduce litter in the streets.
- Extreme weather challenges such as rain and flash floods and how we can better predict and respond to these events.
- Energy challenges and how we can reduce our energy footprint while improving building performance and upgrading street lighting.

When challenges are identified, we use them as a basis for how we engage the market. We can evaluate what is currently available to us and what we should invest in ourselves.

Doing More with Less

The Smart Dublin project is also looking into how we can maximize our city assets so we can ‘do more with less.’ As mentioned above, energy is identified as a challenge, with the need to upgrade street lighting in the city. Upgrading to more energy-efficient bulbs will reduce costs and carbon emissions – but what is the bigger opportunity here?

Dublin has 45,489 street lights. Instead of just changing the bulbs, can we completely rethink street lighting to incorporate additional smart solutions that will help us in the future? For example:

- A smart grid street light with dimming capabilities and on-demand light levels.
- Concealed placement speakers within light posts for music, announcements, and alerts.
- A push to talk button that can connect people with an emergency call station.
- Image sensors used for homeland security, counting pedestrians to gauge flow, and other things.
- Digital signage which could be used for wayfinding, alerts, civic information or even as a revenue stream.

By focusing on the bigger opportunities, we can reassess city assets and do more with less.

Engaging Entrepreneurs

When problems are identified, Smart Dublin seeks to engage entrepreneurs for creative solutions. Take the problem of city flow. By increasing biking in the city, we can cut down on traffic congestion; however, bike theft is a huge problem, with 20,000 bikes stolen each year.

In order to learn about new ideas and support startups in our community, we launched the Smart Dublin Cycle Challenge, offering up €100,000 in seed money to pilot data-driven solutions and new safety and security ideas related to improving cycling within the city. The challenge received 96 expressions of interest and 23 proposals. After 14 proposals had been presented, five Phase 1 winners were selected. The ideas received included things like using low-power radio to track bicycles, a smart bell to record actual and perceived obstacles in order to create a safer cycling environment in Dublin, and tracking devices similar to the “find my iPhone” capability that help recover stolen bikes.

Testing

There are many benefits to adopting Smart City innovations, but cities must first and foremost test and pilot the technology to validate the tech and understand the business models. Dublin is the “Goldilocks” size – a perfect place to test because it is not too big or too small. The Smart Dublin project has allowed us to run trials on smart technology like smart parking, smart bins, and other things. We can learn from these trials and figure out what works before scaling. For this reason, we consider Smart Dublin to be the start of a longer journey into becoming a Smart City, and we are looking forward to the next stage when we begin to scale up.

We have seen excellent progress in the Smart Dublin projects, but one challenge to address in the future is how to get the word out about our projects and our successes. Unfortunately, people don’t know half of the things we’re doing in the Smart space. As we have seen throughout the journey, the ability to demonstrate small successes is the key to growing and getting more people involved in Smart City initiatives.

“When you start connecting things in our cities, the opportunity to better manage our cities, to get better, to be more predictive, is just fantastic.”

–Jamie Cudden
Smart City Program Manager,
Dublin City Council



Smart London

Presented by Martin Curley, Professor of Innovation, Innovation Value Institute, Maynooth University

There is a new paradigm happening. Driven by technology and collaboration, the Open Innovation 2.0 paradigm is creating an environment where we can work together to invent and build a better future. Computing power keeps improving while costs have dramatically declined. Governments, industry, academia and the public are coming together to create innovative solutions and implement them faster than ever before. Through Open Innovation 2.0 we can solve key challenges in Europe, specifically those related to smart cities. Here I will share a few examples, but first, let's look at how Open Innovation 2.0 differs from previous forms of innovation.

A New Way of Innovating

In the past, we relied on a system of closed innovation where creative solutions to problems were formulated by a solo innovator or a solo company. The thinking was linear and happened 'in the box' as single entities wanted to control ideas in a win-lose game with competitors.

Along the way, it was discovered that you could achieve greater things with partners. Open Innovation relied on bilateral partnerships and using out of the box thinking to create a win-win game for both parties. Still, solutions were formulated using linear thinking typically within a single discipline.

“Everybody innovates together, and no longer is innovation done on sort of a separate basis, but it's done as part of the ecosystem.”

–Martin Curley
Professor of Innovation,
Innovation Value Institute,
Maynooth University

Open Innovation 2.0 goes further, recognizing that by collaborating under shared vision and values we can improve human wellbeing, boost economic activity, reduce the rate of consumption and address environmental issues. It uses a quadruple helix model where government, industry, academia and the general public come together to experiment and invent solutions. Out of the box thinking has been replaced with the idea that there is no box in the first place! With interdisciplinary partnerships and cross-fertilization, we seek to make our efforts a 'win more, win more' game.

Ultimately, Open Innovation 2.0 is innovation with a purpose. It's not just innovating for commercial profit, but it's about making the world a better place and being profitable at the same time.

Smart London Examples

Open Innovation 2.0 was put to work in the development of Smart London initiatives. The shared vision is to use the power of creative technologies to improve the lives of Londoners. Shared values guide the projects, including reconceiving the intersection between society and corporate performance, finding win-win outcomes, and growing profit through solving big problems. The projects themselves seek to explore solutions to London's challenges related to the environment, operations, transport, and energy.

With help from the Intel Sustainable & Connected Cities Institute, 'living labs' were set up in London. Five areas were selected around the city to serve as test beds to run projects. Then 150 gateways were deployed, and around 500 sensors were set up in order to conduct research.

One example is a project regarding air quality in Hyde Park. In the past, large boxes would gather information on air quality, which then had to be retrieved and fed into the system to create a computer generated model that could be used for planning. In this Smart London project on the other hand, those large boxes were replaced with sensor boxes about a 30th the size. They cost considerably less and allow for the transmitting of data in real time. Through testing in this 'living lab,' we were able to identify calibration problems and other issues. We have since fixed them, and the boxes are almost ready to be an available commercial technology for other cities around the world.

Another living lab was set up in Queen Elizabeth Olympic Park, where we wanted to see how technology could transform the operation of the park in terms of sustainability, customer experience, and profitability. In a project called Rome.io we created interactive stations as a way to exchange knowledge from the city to the citizens and from the citizens to the city. This allows us to interact with the park users and get feedback in real time, including who they are, how they use the park, and how they feel about it.

These projects are the collaborative work of parties including Intel, UCL, Imperial College, the GLA, and the London Legacy Corporation, but citizens also play an important role in our efforts. In 2013, the Dublin City Council ran a survey for the Open Innovation 2.0 conference. One of the questions they asked was, "Do you think Dublin should be used as a site for experimental technologies and if so, would you be willing to participate in the experiments?" A couple thousand Dubliners answered the survey, and over 90 percent said yes, showing an incredible appetite for citizens to be involved in the innovation process. The culture is changing and the new Open Innovation 2.0 paradigm shows great promise for building a better future through collaboration.



(Un)Plugging Smart City Transformations and Strategies in Europe

By Dr. Igor Calzada, MBA, Lecturer and Senior Research Fellow, Urban Transformations, University of Oxford

It is noteworthy that although Smart Cities are already being built around us, they differ considerably from the simplistic, one-size-fits-all, smart-city-in-the-box mainstream approach that has been hegemonic so far.

Hence, we could ask then, for whom and what purpose are Smart Cities being developed? Are Smart Cities primarily about, or should they be about, a) creating new markets and profit; b) facilitating state control and regulation; or c) improving the quality of life while enhancing levels of democracy within citizens?

Thus, the contemporary Smart City cannot just be reduced to the economic value generated by partnerships involving powerful public and private actors. When attention to the application of new information flows and the development of so-called 'Smart Cities' is increasing, there is still limited understanding of the interconnections among 'hard' and 'smart' infrastructures, and economic, political and social systems on metropolitan and regional scales. Furthermore, this hegemonic paradigm has often failed to deliver practical tools that can help us to better understand and intervene in our daily realities, while also engaging with the various stakeholders that are important for our cities and regions. Hence, a multistakeholder approach is required to overcome 'dataism,' the simplistic assumption that cities are systems of data or algorithms rather than ecosystems of citizens.

In a nutshell, I argue that the development and use of the buzzword 'Smart City' in planning inner cities are intimately connected to required current urban transformations. There is currently a great deal of rhetoric about the importance of building Smart Cities without paying attention to elements that constitute the Smart City strategies and policies in diverse contexts. Technological solutions have often been proposed under the umbrella of the 'Smart City' buzzword without considering first the needs and usability by citizens or the socio-technical misalignment within the city itself. I suggest that

first we should unplug, unpack and deconstruct the meaning of ‘smartness’ in our unique urban realities (Calzada et al., 2015) by asking ten underlying questions about the city that we want to make:

1. **Who:** Will the Smart City evolve into an urban sphere in which dwellers have the right to decide whether or not to be connected?
2. **How:** Is the city a social interface in which the citizens will be able to self-design their social, everyday life needs?
3. **System:** Will these devices serve the citizens more than the citizens serve the devices?
4. **Governance:** Is the bottom-up innovation perspective simply wishful thinking?
5. **Information:** In the era of data, is it possible to transition from controlled to open data-driven models?
6. **Focus:** Do we notice the difference between simple social interactions and trusting human ties?
7. **Space:** Will we observe changes in which context-collapsed information will be contextualised to enhance social interactions? What are the implications for the privacy and security perspective of individuals?
8. **Design:** How can design of places and user interactions be improved to anticipate an ambient commons for citizens?
9. **Socio-Political Processes:** Is a shift occurring among the stakeholders’ power interactions?
10. **Political Economy:** Will the political economy of the Smart City be altered by any changes in stakeholder power relations?

Indeed, it will be just after unplugging when we can plug stakeholders into a wide smart governance framework by including five type of actors, known as the Penta Helix model (Calzada, 2016). These actors are the public sector, the private sector, academia, civic society and social entrepreneurs. Indeed, it is necessary to plug stakeholders in by setting up a new, complex, multistakeholder, city-regional urbanity to transit towards real ‘smartness’ in cities and regions. A lack of dynamic power balance between stakeholders has so far been present in the hegemonic and technocratic version of the Smart City.

This view embraces a constructive take that favourable conditions exist for a potential critical politics of Smart City policy agenda based on urban transformations driven by social innovation and experimentation. Likewise, cities and regions represent powerful places in which to detect emerging processes and observe spontaneous urban transformations.

To sum up, after minimising the negative side-effects of hyper-connected societies, technology-oriented pathways of Smart Cities offer still-unexplored opportunities for experimenting. We should embrace transitional experiments in our cities and regions in the way some cities are already showing this alternative pathway: Dublin, Bristol, Barcelona, Amsterdam, and Glasgow, among others.

There are three related open research lines that we could test in today’s cities and regions:

1. What prospects are there for alternative funding and business models for Smart Cities?
2. What practical/political interventions are needed (among business, local governments, academic, communities and social entrepreneurs)?
3. Is another type of Smart City possible, that is, a third-way between state and market (overcoming the PPP, public-private-partnership)?

Learning Points

- Unplugging the Smart City means making the best of technology without modifying the human-driven systemic metabolism in the making of our own cities and regions.
- Above all, we need smart citizens and smart mayors, not only Smart Cities.
- The clearest shortcoming with the Smart City solutions is that they are based more on vendor push than on city government pull.
- What we will see in five years' time is how citizens' behaviour and technology should be connected without altering the value of offline human interactions. This is challenging to achieve in increasingly hyper-connected societies.
- For our cities to become smarter, they should: 1) re-connect interdependent stakeholders, renewing the democratic dimension of the urbanity; 2) establish the city itself as a data platform for deliberation; 3) enhance the smartness beyond the metropolitan and city-regional scales by tackling social and spatial inequalities in an integrated manner; 4) consider their own history, identity, path-dependency and lock-in to assess their own performance while learning with/from other cities; and 5) understand the role of the citizen as a decision maker rather than merely a data provider.

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Insights: Governance for Smart Cities

There are many players involved in the successful implementation of Smart City solutions, but at the Summit, participants discussed the specific role of governance. One of the challenges of Smart City initiatives is that there are often small pockets of innovation activity across the city but no overall coherence. Local governance can help guide these projects, so they are approached in a holistic, thorough and thoughtful way. But how can that be accomplished?

First, there is the question of whether a special division should be created to spearhead the Smart City developments or not. Having a dedicated division might cause other departments to view technological innovation as 'not my problem.' On the other hand, if you say that Smart City innovation is the responsibility of all departments, efforts can become disjointed and lost.

Some of the participants reported that, in their experiences, it has been beneficial to create a board or team that will lead Smart City projects. In Smart London, they established a board as a proxy for governance, and in Bristol, they created the Bristol Futures team.

“You have to be agile and responsive enough to be able to change as your priorities change.”

—Kevin O Malley
City Innovation Team
Manager, Bristol City
Council

When creating such a board, there are several keys to success:

- Decide on a set of priorities that can guide future focus and action. It is crucial that you explore the ‘why’ behind your exploration into Smart Cities solutions; the ‘how’ is much easier to work out when you have a solid vision.
- Get top local authorities on board by coming together for conversation and collaboration.
- Gather multidisciplinary players including companies and researchers who will work on pilot projects.
- Don’t focus on a huge master plan. Instead, talk to citizens, identify their challenges, and pick solutions to focus on. Be agile and responsive enough to be able to change as your priorities change.

Participants also discussed the ability of Smart City data to lead to Smart Politics and Smart Governance, where data and statistics from Smart City technology can be used to govern better. In addition, they stressed the need to restructure the skill set within the government to bring in data scientists and other skilled workers to guide projects and gather insights.

It is clear that there is something of a ‘governance maturity curve’ when it comes to setting up and governing a Smart City. Most cities are still on the first level of this maturity curve, but as success stories emerge we can recognize patterns and replicate best practices. Governance has an important role to play in the development of Smart Cities, and with good governance, we can deliver better results.



Making the Urban Innovation Spiral Happen: Why, How, Where

By Daniel Sarasa Funes, Zaragoza City Hall

As urban practitioners, we are increasingly interested in cities as solution providers for problems. The aqueduct of Segovia (Spain) is an example of how cities, in the Roman era, solved the problem of access to drinkable water thanks to a smart invention. Today it attracts hoards of tourists while giving a distinct identity to the city. In the middle ages, city walls, like Lucca's (Italy) gave shelter to people threatened by insecurity and pillage. In the 21st century, that wall is one of the city's main attractions, its upper promenade offering a shady tour of the city on the hottest days of summer. But overall, in the past as well as in present times, cities have represented the quest of prosperity. Few names illustrate this pursuit better than the name of "La Prosperidad," a Madrid neighborhood populated with migrants from southern rural Spain.

The world urbanization rate grows in parallel to the decrease in illiteracy level and life expectancy. Those are fundamental, aggregate indicators. Literacy is highly correlated with our future. Life expectancy speaks mainly about our past. But, while urbanization fixes the bigger picture (famine, extreme poverty or violence, access to sanitation), it creates bugs: inequality, obesity, isolation, etc. Many refer to the process of addressing these bugs through technology as the transition to becoming a "Smart City."

In terms of complexity, we acknowledge that the task of developing digital technologies is far easier than building aqueducts or thick walls. In terms of expectations, let's abandon the hope that digital technology will fix what poor urban planning spoiled. A simple comparison between Smart City rankings and schools of urbanism highlights the fact that well-planned cities are unbeatable in efficiency and quality of life.

But the success of our cities creates a new paradox, which we can state as “the middle class can destroy us all.” Yes, a middle-class human consumes the equivalent to 11.000 Watt/day in resources, while a hunter in an Amazon tribe barely consumes 300 Watt/day. Given the unstoppable rise of the middle class (as a consequence of urbanization), the fear that the planet will, sooner or later, become exhausted, is justified. Astonishingly, it is the innovation potential of cities, again, which could save us from the fate of running out of fuel to expand our brave new (urban) world.

So cities are trapped in what we call “the urban innovation spiral.” The time-lapse between two disruptive innovation is shortening; the innovation pace is accelerating exponentially. The quest for new basic energy sources advances quicker than ever: wood, coal, oil, renewables, coltan, lithium and maybe even data in the near future (why not?). Most of this research is happening in urban innovation ecosystems. Cities are fostering the rise of the middle class, and cities, through innovation, have the potential to prevent the middle class from exhausting the Earth’s resources.

Having outlined the central role of cities as innovation providers, one may question how to increase the chances that the next revolutionary idea will originate in your city. First, it is people that have ideas, so the bigger your city, the more probable that the “next big thing” will be invented there. But it may also be the case that your city does not encourage thinking, or prototyping, or entrepreneurship and that ideas get systematically lost, and restless individuals get sadly frustrated.

Considering the city as an innovation platform will help in developing the appropriate conditions for innovation and projects to thrive. As such, in Zaragoza (Spain) we launched the Open Urban Lab (www.openurbanlab.es) as a human API (Application Programming Interface) to the Smart City.

The Open Urban Lab aims to:

- Seek out the proper questions before closing up the debate with premature answers.
- Encourage rapid prototyping and early failure.
- Bring in city hall officials as facilitators.
- Humanize access to the city as a real test-bed for radical ideas.
- Use public funding not to subsidize but to mobilize private investment.
- And to nurture local talent (especially kids) as our most precious asset.

Those, in short, are our proposals (still under daily experimental development) for turning our beloved cities into thriving innovation platforms.

“Considering the city as an innovation platform will help in developing the appropriate conditions for innovation and projects to thrive.”

–Daniel Sarasa Funes
Zaragoza City Hall



Smart Cities: Why Those Who Share, Win

By Carl Piva, VP Strategic Programs, TM Forum

Getting to know people, their plans and ambitions, and how they tackle challenges in different cities and countries around the world is what brings value over time. After dissecting roughly 100 Smart Cities case studies over the last couple months, here are my top five takeaways.

1. Citizen focus trumps everything else.

The message comes through loud and clear that without a relentless focus on citizen value and social inclusion, Smart City initiatives will fail. This was echoed and demonstrated throughout the presentations, from early-stage initiatives such as Johannesburg, South Africa to more mature projects like Waterfront Toronto, where Rob Meikle, CIO, Toronto, outlined his city's ambition with North America's biggest revitalization initiative.

2. There are more similarities between cities than differences.

Of course, all cities have an interest in differentiating themselves from others – in order to attract investment and top talent, as well as improve life for people who already live in the city.

When pressed, most city leaders will agree (if sometimes grudgingly!) that there are more things that bind them together than separate them. However, compared to the private sector, there isn't a strong culture of building shared assets between cities.

Take a look at the global telecommunications industry — where would we be if we hadn't teamed up together and created the common standards that allowed us to differentiate on top? Imagine trying to phone home if the appropriate standards hadn't been put in place? Cities are slowly starting to realize that by teaming up they can both share investment and unleash innovation on a grander scale.

3. City sustainability can pay off.

Anthony Mallows, Director of the Greenfield Masdar City project in Abu Dhabi, offered an excellent perspective on the economies behind new city development. The financial model behind Masdar City evolved from being a state-funded project during the financial crisis to what it is today, a commercial enterprise based on the notion of a green, sustainable city. With a combination of solar energy, pedestrian clusters, narrow shaded streets, high performance buildings and a well thought-through mobility strategy, they have already achieved a much better living environment (e.g. by having the temperature in the city 15-20 degrees below that in the surrounding desert). This has been achieved through a sound business model, delivering return on investment (ROI).

4. Those who share, win.

Imagine two groups of cities: The first group decides to work together to drive best practices and create common assets for how to engage with citizens and businesses. The second group doesn't work together, but instead attempts to solve every problem individually. In ten years' time, which group of do you think will have the most innovative, vibrant, fastest-moving cities attracting the best talent? This is indeed one of the reasons we are seeing cities starting to come together to solve common challenges.

5. One city is not a marketplace.

Jarkko Oksala, CIO, Tampere, made the point that "one city is not a marketplace" when discussing scaling the use of data. He outlined the Six Cities initiative between six of the largest cities in Finland. Establishing a vibrant economy of data requires critical mass and the right scale but also an implementation-driven approach based on a sound city platform.

This is the next stage of data-driven cities – from sharing static, open data to creating an economy of data by enabling the use of real-time data, open platforms and common APIs – and it creates huge opportunities for growth and innovation for cities.

At the Strategic Innovation Summit in Maynooth, I presented the TM Forum Smart City Maturity and Benchmark Model, used to capture the key aspects of a city's transformation journey to becoming a smarter city. City leaders can use the model to assess their current situation and learn about global best practices that will help them chart the city's future. The model is free for cities and will soon be available in the AppStore.

References: Smart City Maturity & Benchmark Model: <https://www.tmforum.org/smart-city-forum/smart-city-maturity-benchmark-model/>



Challenges in Implementing Smart City Initiatives

Presented by Brian Donnellan, Professor of Information Systems, Maynooth University

The biggest issues we face in implementing Smart City initiatives are not about the technology itself but rather the problems that arise when we try to put ideas into action.

As a research community, we talk about things like sensor power, sensor performance, and so on. We see neatly crafted Smart Cities diagrams, and we talk about how clever they are. Then we go out into the field, into the cities, and find that those linear steps of A, B, C and D have unraveled into a tangled web of dynamic relationships. We find integration and business processes to be just as challenging as technology. And we find ourselves asking, “How can we align all the stakeholders to come together and achieve a sense of collective responsibility and common purpose?”

A survey by The Climate Group provides insight on what those challenges are, and many of these themes were brought up during the Summit. In this survey, 50 cities were asked about issues related to Smart City projects, and findings include:

Procurement

- Procurement processes are not designed for quick update of ‘new’ solutions (44 percent).

Finance

- Finance itself, or the fact that it is difficult to get priority around the limited funding options available (64 percent).
- Pilots require funding and that funding is difficult to obtain (64 percent).
- Partnerships with the private sector are required but difficult to manage (16 percent).

Data Sharing

- City systems don't 'talk' to one another, a problem of data sharing (32 percent).

Business Model

- Many technologies or systems lack a credible business model to sustain them (30 percent).
- Too great a focus on the short-term benefits instead of long-term sustainability (26 percent).
- Relevant city operators are not aware of the full benefits (22 percent).
- Unable to create a strong value case for the investment using existing data (14 percent).

People and Politics

- The solution requires multiple departments to align (74 percent).
- Progress is slowed by elections or other political cycle challenges (38 percent).
- Departments or employees resist the implementation of disruptive systems (34 percent).
- There is too much risk for politicians to be the first movers to test new technology (10 percent).

As we look at specific Smart Cities projects in Ireland, we do see these problems occurring. For example, the Dublin Docklands project involves providing new commercial tenants for the Docklands area, and the questions that have surfaced include who will cover the costs, how will revenue be generated, who will receive the revenue, and what is the stakeholder value chain? We also see mismatches in expectations, including expectations about timelines, the length of time needed to go from pilot to fully-scaled solution, and collaboration intentions.

One recent activity that holds a lot of promise in exploring and making progress on these challenges is the Irish Smart Cities Forum. The intent is to get each of the cities in Ireland to share their experiences, to collaborate, and to identify challenges so all Irish cities can move forward in their Smart Cities endeavors without reinventing the wheel or running into mistakes that have been made elsewhere.

These are things we also have to think about as a research community. We are in denial mode if we think that these problems have been solved, or that the issues we face are purely related to the technology itself. By reframing the problems surrounding Smart Cities, we can address practical issues and make better progress during implementation.

“Let's frame the problem slightly differently. Let's not just see this as a technology crunch issue.”

—Brian Donnellan
Professor of Information
Systems, Maynooth
University



Insights: Challenges and Opportunities

The Summit was an opportunity for senior city leaders to explore Smart City solutions that are happening at the present time. However, as the end of the Summit grew near, the discussion became future-focused. What had we learned from the panelists and the conversations during the full-day event? What should we do moving forward to continue the progress that has been made in Smart City innovation?

While many suggestions were given, the theme can be summarized as a little less talk, a little more action. This includes:

- Codifying best practices by identifying common elements among successful Smart City integrations and building a model that can be replicated in other cities.
- Using maturity models as a tool to tell us where we are as a city and where we need to go. And also working on developing more actionable tools that can guide progress.
- Forcing people and different departments to begin working together, getting them out of their silos so they can understand the benefits of collaboration.
- Embedding Smart City solutions into the way that the city operates. By creating the right operational governance, the changes we make can survive the test of time.
- Focusing in on one big technology or big challenge that hasn't been explored much, with the goal of working on it until a solution is nailed.

“One of the things I learned in the last year through working with our cities in their Smart Cities forum is that there’s an incredible generosity of spirit among the Smart Cities coordinators.”

–Brian Donnellan
Professor of Information
Systems, Maynooth
University

- Developing really good case studies that demonstrate to citizens the innovative and interesting technological solutions available, and how these solutions can impact their lives.
- Carrying collaboration projects beyond their close, where they do not end in an archived report but instead, are extended into new projects.
- Opening up data as well as sharing worst practices and lessons learned to help the wider global community.
- Expanding on the collaboration that is happening within cities to the kind of collaboration that happens across cities or across countries.

On that final suggestion, many participants recognize that there is some collaboration happening across cities and countries right now, but there are definite limitations. We have to learn how to share best practices and other information more efficiently. Also, while we may come together to discuss Smart City initiatives, it is often only for the sake of discussion, then we fall short when it comes to action.

Other cities and countries around the world have the same issues that we have, related to poverty, the environment, and taking care of our citizens. To find solutions, we must learn how to collaborate in meaningful ways and end the trend of innovation in isolation.



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).



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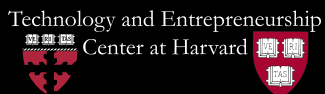
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