

FIELD ACTIONS SCIENCE REPORTS

**FACTS
REPORTS**

First
semester 2017

SMART CITIES AT THE CROSSROADS



Coordinated by **David MÉNASCÉ**

azao

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facts-reports.ve@institut.veolia.org

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FOREWORD



Nicolas RENARD - Director of Foresight, Veolia Institute

“By opening up unprecedented prospects to the city, the digital economy is radically changing the relationship between local authorities and their citizens, and so the modes of urban governance.”

Digital technology is changing everything: infrastructure is changing; the relations between local authorities and citizens are changing; services are changing; the city is changing. More than a revolution, “digital technology is a civilization”¹.

Although poorly defined, the smart city has become the new frontier for urban planning for one simple reason: combining their respective power, connectivity and big data are exponentially growing the universe of the possible. Over the years, they have been put to use to improve transportation in congested cities, public health by monitoring atmospheric pollution, resilience to natural catastrophes and management of municipal waste, to name just these.

In emerging countries, the Internet has made it possible to professionalize and build on informal practices, together with the appearance of collaborative services to make up for the failings

of public operators. Still, digital technology will never be able to overcome a lack of basic infrastructure. No digital technology will be able to make a drinking water, wastewater or electricity network operate more efficiently where there is none.

In developed countries, the digital shift is paving the way to the more efficient, more fluid and more economical operation of local services. It is also resulting in the creation of bouquets of interactive services that make life easier and lift a region’s prosperity and image. Based on high value added, there can be no denying the success of these new services, simply look at the silent vote exercised daily by millions of people in support of Uber or Airbnb.

Cities are unequal in the face of the digital revolution. In theory, it allows each its chance; in practice, it polarizes the urban world even more: smart cities connect with their peers and look far ahead, at the risk of abandoning their hinterlands. In truth, the smart city gets as much damning as positive praise. Digital

technology may be liberating but it also bears the seal of ambivalence. Digital technology is a powerful tool, but used for what, by whom, with what purpose and with what controls? Software is not neutral: the choices made by programmers remain a mystery to users. Through their data-based activities, citizens leave a digital trace everywhere that can be used without their knowledge.

So, how can we achieve the promise of the smart city while avoiding its downsides? Up to what point is the digitalization of urban services relevant? How do we make the shift from connected to smart city? To whom does this mine of data, the black gold of the 21st century, belong? What areas should the municipality retain in order not to lose its sovereignty? Who will control the smart city: GAFA, the citizens or elected officials? How do we protect citizens’ privacy? These are the questions on which this issue of FACTS attempts to shed some light.

Both a solution and a problem, digital technology can lead either to social progress or an Orwellian nightmare. On the one hand, it has democratized access to economic initiative, reinforced multijobbing, encouraged the emergence of an economy of sharing, energized innovation, and stimulated local service business. On the other hand, the digital mutation is unsettling: precarization of casualized labor, reduced social welfare cover, unequal sharing of value added between freelance workers and the intermediary platform, flawed taxation. Above all, in many professions, the ramp-up of digital technology will result in the massive destruction of jobs. It is therefore the responsibility of mayors, together with business leaders and civil society to refocus digital technology on the priority needs of their cities, including employment and reduced inequality. Without which there is considerable risk that the “digital disruption” will bring “social disruption” in its wake.

After smartphones, social media and the Internet of Things, the smart city is another facet of the digital revolution. However, the digital economy is exploding the city’s management systems. By opening up unprecedented prospects to the city, it is radically changing the relationship between local authorities and their citizens, and so the modes of urban governance. Crucial for their future, the governance of smart cities is yet to be defined.

¹ Milad Doueilhi, Professor of Digital Humanities at Paris-Sorbonne University

INTRODUCTION



David MÉNASCÉ - Coordinator

David Ménascé is co-founder of the consultancy firm Azaa, which works side by side with corporations, institutions and NGOs to bring integrated solutions to societal issues. He teaches at HEC Paris, notably as part of the “Social Business/ Enterprise and Poverty Chair”, for which he runs the course “New Business Models at the Base of the Pyramid”. He is also academic director of the Executive MBA programme “Reinventing Business in Emerging Markets”, in partnership with the University of Cape Town in South Africa and the Indian Institute of Management Bangalore in India. David Ménascé is a graduate of HEC and Sciences Po Paris.

The city, as geographer Guy Burgel described it, is a “total phenomenon.” It is a political, economic and social space where all dimensions of human activity intermingle: production, consumption, work, as well as citizen engagement and entertainment.

From the city as a “tool” to the city as a “fun place” and to the political city, the city is a way of life. Cities are multi-faceted but the urban phenomenon has something unique as well. Urban civilization, and the relations between the citizens that it implies, in a way transcends the diversity of urban spheres.

At the same time, and like a mirror effect, information and communication technologies are equally *transverse* technology: digital technology is revolutionizing the way we consume, produce and work, together with our social ties and our private relationships with others.

So, it is no overstatement to say that what is commonly called the *Smart City* is a protean phenomenon covering extremely varied dimensions.

Digital technology’s potential is not limited to optimizing the city’s infrastructure and its urban services. It is contributing more fundamentally to the rapid rise in new ways of living, working and consuming in the city.

As a French politician recently pointed out, “A change in era occurs when new technology meets values. The printing press didn’t change the world; it was the encounter between the press and the values of the Enlightenment. With digital

technology, we are witnessing something of similar importance.”¹

In other words, technological change and social evolution resonate together, support each other and accelerate apace with each other.

If the intuition turns out to be correct, the smart city will without doubt have been a conduit for far-reaching change. It is clearly the art of living in the

“Digital technology’s potential is not limited to optimizing the city’s infrastructure and its urban services. It is contributing more fundamentally to the rapid rise in new ways of living, working and consuming in the city.”

city that is about to be remodeled through the digital transformation.

Such is the aim of this issue of Facts. Using actual case studies, the purpose is to analyze how digital technologies are revolutionizing the city’s functions, the relationships between citizens and between citizens and the other stakeholders, public authorities in particular, giving rise to citizens’ engagement.

Modesty must act as a precious compass here as ICTs have, perhaps even more than any other technology, the virtue of not always serving the aims for which they had been introduced. As the historian Laurence Fontaine points out, “The advent of any new technology is always an adventure as no one really knows what it will become, who will use it, how, or to what ends. Innovations come with only limited instructions when they are created and it is the people – rarely the ones the inventors had imagined – who take hold of them and end up defining how they are used.”²

At the same time, it is necessary to stipulate the context in which this urban transformation is occurring and to anchor this discussion and the practices analyzed in today’s urban evolution given the extent to which digital technology will entrench or disrupt the city’s inherent tensions. Three urban “tensions” would seem to be particularly affected by digital technology.

Smart city, economic growth and social inequality

Today’s cities create wealth and inequalities. A recent OECD report – *Making Cities Work for All*³ – analyzes the relationship between cities, economic growth and social inclusion. The city first and foremost creates opportunities. In the OECD countries, cities have, for example, contributed 60% of employment and GDP

¹ Nathalie Kosciusko Morizet, Interview with Liberation, 2016

² Preface to *La France du Bon Coin*, Institut de l’Entreprise, 2015

³ *Making Cities Work for All – Data and Actions for Inclusive Growth*, OECD, October 2016

growth in the past 15 years. Urban household wealth is also on average 18% higher than in other areas.

At the same time, inequalities have been growing⁴ in cities for several years. The issue of inequality is undoubtedly global, exists more or less everywhere, and the divide between richest and poorest is growing. But the urban phenomenon deepens inequality. Income inequality is even greater in cities.

In all OECD countries, income inequality is greater than the national average within metropolitan areas⁵. Additionally, the larger the city, the greater the inequality. Metropolitan areas with a population of more than 1.5 million have the highest Gini coefficients in terms of disposable household income.

While the link between the city, growth and inequality is far from being a new phenomenon, the effect of digital technology is somewhat specific. Smart Cities can both reduce inequality by providing greater opportunities through better connections and reducing urban fragmentation, but they can also considerably worsen inequality, as evidenced by the discussion about the robotization and uberization of the economy.

Smart city and urban governance?

Cities are by definition built from the interaction between citizens on the one hand and the city's organizations on the other. In other terms, the city is structured on the basis of the relationships between citizens themselves and through the ways decisions are made between residents, political authorities and the other stakeholders, companies in particular.

The issue of governance therefore sits at the heart of the urban question. Here again, digital technology is a powerful factor driving transformation given the extent to which the smart city can revolutionize the old balance between citizens on the one hand and between citizens and all the city's stakeholders on the other. In other words, the smart city re-distributes the urban governance cards giving citizens far greater powers.

The smart city is an accumulation of platforms allowing citizens to communicate with each other and enabling the organization of new forms of exchange for all types of information, products or merchant and non-merchant services.

While these platforms are indeed highly heterogeneous, they are also governed by the same rationale: auto-organization that can turn out to be a conduit for very rapid progress but even more broadly a way of questioning the traditional authority of established players. The *multitude*, as defined by Nicolas Colin and Henri Verdier⁶, that is, the millions of educated and

connected people, especially in cities, who are now able to innovate in a more horizontal manner at very low cost, can bring about far-reaching change to the social dynamic and governance of cities.

Smart city, privacy and private life

The city is also a place where people seek peace, anonymity even, but sometimes also desire frenetic movement, information or new sensations.

This tension is further stressed by digital technology. How is it possible to benefit from the opportunities provided by digital technology for optimizing our daily urban lives while at the same time ensuring the protection of our privacy that is one of the fundamental givens of urban life.

In *L'homme nu*, Marc Dugain and Christophe Labbé explain that "Taking control of our lives is benefitting a new global oligarchy. A new dictatorship threatens us. A Big Mother far more terrifying than Big Brother. If we sit idly by, tomorrow we will all be *naked humans* without any memory, programmed, under surveillance?"

Numerous associations are indeed seeking to defend the right to privacy and to protect our private lives.

These issues nonetheless reflect a degree of schizophrenia: urban citizens want to optimize their consumption and benefit from increasingly tailored services but at the same time they are concerned about the effect on their private lives.

These three issues provide a common thread to this issue of Facts: smart cities and new business models with ambivalent impacts on inequality, smart cities and governance, and smart cities and protection of privacy.

This issue is divided into three main sections. The first seeks to define the conditions for legitimizing the smart city, especially with regard to the most ambiguous issues. The second section determines and uses actual case studies to document today's most significant transformation drivers. The third section aims to identify the success factors that can be used to govern scale-up.

⁴ The average income of the wealthiest 10% is now 9.6 times greater than that of the 10% poorest in OECD countries (compared with 7 times 25 years ago).

⁵ Canada is an exception to the 11 countries studied in the OECD report.

⁶ Henri Verdier, Nicolas Colin, *L'âge de la multitude*, *Entreprendre et gouverner après la révolution numérique*, Armand Colin, 2012

⁷ Marc Dugain, Christophe Labbé, *L'homme nu*. *La dictature invisible du numérique*, Laffont – Plon, April 2016

1. EMPOWERMENT, LEGITIMACY AND SOCIAL IMPACT



The importance of Information and Communication Technologies (ICT) in cities is much debated. Before looking at how smart cities develop, part 1 sets out to identify and describe the challenges to the legitimacy of smart cities. Three challenges are particularly important.

1. PHYSICAL WORLD VERSUS DIGITAL UNIVERSE

The first challenge centers on how ICT interact with the “real” world. Smart cities can conjure fears of a mechanized and robotized city, a place where the randomness of human action no longer prevails. Worse still, the automated city could cut us off from all contact with reality as technology will end up suppressing our ability to pay attention and make decisions. This is the argument that Matthew Crawford develops in his interview. Crawford wrote a much commented-on paper looking at the meaning of work and is the author of a book examining our ability to concentrate in the digital age. In this interview, we discuss the ways that ICT risk undermining our ability to concentrate and pay attention to others, as well as discussing strategies for maintaining control over the technologies that surround us. In other words, how to identify the conditions that ensure ICT remain a faithful servant and do not become a bad master.

2. VERTICAL MINDSET VERSUS HORIZONTAL APPROACH

As Edouard Geffray points out in his interview, smart cities were originally driven by a vertical mindset, where public authorities working with ICT companies delivered centrally designed smart cities by introducing digital technologies into metropolitan policies and urban infrastructure.

These early approaches were soon overtaken by new mindsets that set out to enable citizen-users to share goods and services quickly and simply. This is the platform mindset that allows the “multitude” to interact, as described by Henri Verdier and Nicolas Colin in their book¹. The smart city is no longer a result of centralized strategies designed by public authorities but of interactions between city dwellers who now have the ability to self-organize thanks to applications created by startups. Transportation is simplified with taxi booking platforms, accommodation with applications like Airbnb, and the secondhand market with websites like Leboncoin in France. Platforms are multiplying and enabling everybody to appropriate and fully participate in the smart city mindset.

This tension between vertical and horizontal mindsets lies at the heart of the construction of smart cities. Neither seem sufficient when taken in isolation: self-organization risks producing sub-optimal results, while the top-down approach severely limits citizen appropriation.

Deciding how best to combine these two approaches is the biggest challenge that public and private actors currently face. The trick, says Edouard Geffray, lies in devising ways for public authorities to work more closely with platforms, closing the gap between innovation and the common good.

“Lulu Dans Ma Rue” is an initiative that offers a real-life example of how to balance these competing forces: digital versus physical, centralized versus horizontal. The article exploring the project set up by Charles-Edouard Vincent provides food for thought on the conditions needed for platform approaches to achieve legitimacy. Lulu Dans Ma Rue proposes a threefold innovative solution based on:

- a responsible and locally based way to create activities and services;
- a public-private partnership between Paris City Council, private businesses and citizen-clients;
- a physical presence in the form of a kiosk and strong neighborhood relationships that aim to build lasting social ties.

This balance between vertical and horizontal mindsets and digital and physical presences is a concrete illustration of how to embed the social acceptability of these new models.

3. ECONOMIC INNOVATION VERSUS POLITICAL REGULATION

The final challenge to legitimacy centers on questions of data protection and the political role of regulation. Edouard Geffray and Jean-Bernard Auby help us to arrive at a better understanding of what is at stake, of the possible dangers surrounding data protection, and of the tensions between innovation and data protection. They stress that personal data are the building blocks of the smart city universe, and that smart cities’ social acceptability requires both a functioning forum for discussing and enacting regulations, and an educational effort to ensure that everyone properly understands the issues at play.

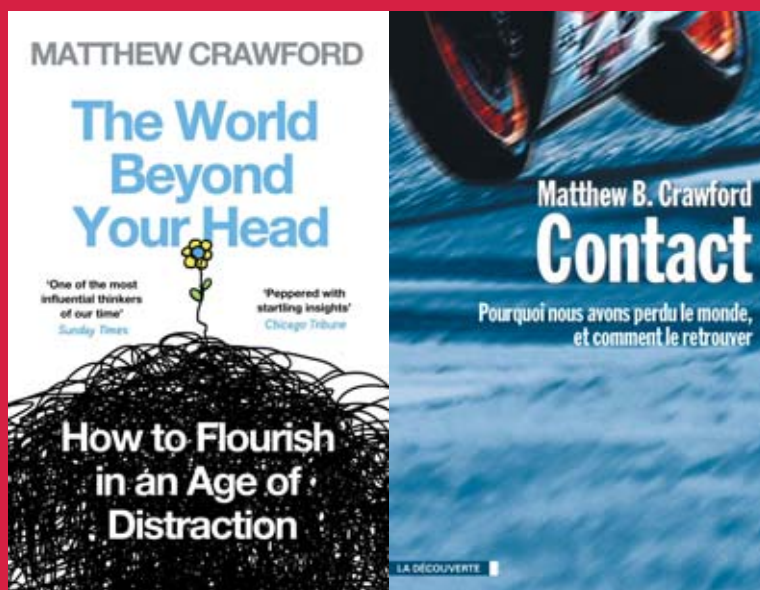
David MÉNASCÉ
Coordinator

¹ Henri Verdier, Nicolas Colin, *L'âge de la multitude, entreprendre et gouverner après la révolution numérique*, 2012

SMART CITIES AND TECHNOLOGIES: connected or disconnected citizens?

Interview with Matthew Crawford

Writer and research fellow at the Institute of Advanced Studies, University of Virginia



Matthew B. Crawford is an American writer and a senior fellow at the University of Virginia Institute for Advanced Studies in Culture. He also runs a motorcycle business in Richmond, Virginia. He attended the University of California, Santa Barbara in Physics and turned after to political philosophy (Ph.D from the University of Chicago). Matthew Crawford has published his first book in 2009. Entitled *Shop Class as Soulcraft*, this book deals with manual competence. *The World Beyond Your Head: How to Flourish in an Age of Distraction* (2015), coping with attention as a cultural problem of modern life, is his second book.

KEYWORDS

- AGE OF DISTRACTION
- ADVERTISING
- CAPTIVE AUDIENCE
- PUBLIC GOOD
- DIGITAL TECHNOLOGIES

In his book *The World Beyond Your Head: How to Flourish in an Age of Distraction*, Matthew Crawford describes attention as a cultural problem of modern life. Individuals, notably urban dwellers, experience every day the fragmentation of their attention as everything is done to colonise our mental spaces by advertising. In this interview, Matthew Crawford gives details on this phenomenon that precedes Smart Cities but could be amplified by new technologies.

David Ménascé: In the introduction of your 2015 book *The World Beyond Your Head: How to Flourish in an Age of Distraction* you describe attention as “a cultural problem”. Could you tell us more on why attention has become an issue of the 21st century?

Matthew Crawford: My book begins with this idea because it seems that our mental activity is more and more subjected to fragmentation. We have this strange impression of not being entirely able to control our attention and to focus on one task at a time anymore. The reason is quite simple: everything is done to attract our attention in order to benefit from it. Public spaces for instance, that used to be protected from disturbance, are slowly but surely colonised by advertising.

To give you an example, I was comforted by the idea of writing this book when I was paying at automatic checkouts in groceries. Advertisements were displayed on screens in between each step. Perhaps these intervals were even artificial... I realized that someone had understood that in this kind of situation, people are a captive audience and that their mental space could be monetized. So yes, I think that today attention has become a collective problem – a cultural one - of modern life.

D.M.: Do you think that the crisis of attention you describe could be amplified by the interplay between Information and Communication Technology (ICT) and urban areas? In other words, would you say that the age of distraction is the age of Smart Cities?

M.C.: The likelihood of being distracted is surely tied to the “*intensification of nervous stimulation*” that German sociologist Georg Simmel already identified with cities a hundred years ago. The phenomenon is therefore an old problem that can be linked to cities but is definitely older than Smart Cities. Every time people come together in a shared space, there is an opportunity to treat them as a captive audience. And undoubtedly, urban areas give greater opportunities to gather a wide range of people in the same place and at the same time.

I can give you a couple of striking examples of the way urban dwellers are treated as a captive audience in cities. In Seoul, South Korea, bus riders experience a new kind of advertising, not related to sight but to the sense of smell. A smell looking like the one of Dunkin’ Donuts coffee is released into the bus. At the same time a Dunkin’ Donuts advertisement is played while the bus stop near the closest Dunkin’ Donuts store...! The advertising agency that came up with this idea was rewarded with a Bronze Lion award for “best use of ambient media”!

Another interesting example is the one of railway stations in the United States. In Philadelphia, there is a beautiful railway station that has one day been covered with huge signs advertising a resort in the Bahamas. In the US, we call this communication strategy “*station domination campaign*”. But it makes you feel as if you were in a place that is no longer really one. What is interesting is that other cities have made very different choices. For instance, in the seventies,

“THE LIKELIHOOD OF BEING DISTRACTED IS SURELY TIED TO THE “INTENSIFICATION OF NERVOUS STIMULATION” THAT GERMAN SOCIOLOGIST GEORG SIMMEL ALREADY IDENTIFIED WITH CITIES A HUNDRED YEARS AGO”

NYC railway station, Grand Central Terminal, was covered by advertising. But in the nineties, real shops began to open in the station, progressively replacing intrusive advertising having nothing to do with the shops you can find in the station.

However, what is truly new with Smart Cities is that it gives unprecedented opportunities to track people movements, subject them to advertising, etc. While gathering more and more ultra-connected people, Smart Cities are full of technologies that have enabled us to become more technique on how to capture attention.

D.M.: Does it mean that the technologies we increasingly find in Smart Cities amplify the contemporary problem with our attention?

M.C.: It would be too simple to consider things like this. If you think of the “station domination campaign” at Philadelphia railway station, this marketing strategy - that really disturbs people’s attention - has little to do with digital technologies... So, the crisis of attention exists without new technologies. However, it is true that with new technologies, advertising has become more and more sophisticated, and maybe more shameless. It has become harder and harder to turn away from advertising in our modern cities.

What I would say is that distraction is not a problem of technology in itself. It is rather a problem of political economy. What we need to look at is the driving intention in the design and dissemination of technology in people’s everyday life. Looking at the intention given to technologies is the best way to design Smart Cities for the sake of public good.

D.M.: For many observers, Smart Cities can leverage ICT to optimize services (transports, housing, etc.). Do you agree with this idea or do you think that potential risks related to Smart Cities, notably an increasing loss of control on our mental spaces, are greater?

M.C.: I think that great things can always happen from technologies to smooth the functioning of the city. We have today some very good reasons to pursue these smart infrastructures: improvement of basic services (energy, transports, health, etc.), better access to every citizen, etc.

But the real problem today is that most Smart Cities are not designed for the public good because they are controlled by what could be seen as a cartel of ICT companies. Thus, citizens have become more and more captive and dependent in their everyday life. Citizens' lack of control and progressive loss of expertise are the main risks that we need to address when it comes to Smart Cities.

When you think about it, the path we are taking is about eliminating contingencies as much as possible. The way Mickey Mouse cartoons have evolved over the years is a funny, yet relevant example. In old cartoons in the fifties, laughter was mainly provoked by material stuff creating frustration (snowballs, fold-down beds, waves at the beach, etc.). But in the new Mickey Mouse Clubhouse cartoon, material reality is presented in a very different way. In each episode, Mickey and his friends must solve problems by using innovative technologies and it always works. Contingencies have been completely erased from their environment. This overdetermination of Mickey Mouse's world is not so far from the world we live in, as smart technologies reshape our world in a quite similar way. Smart Cities could even become cities where thinking is not necessary anymore as technologies should be able to anticipate our will and behaviours thanks to sophisticated algorithms. It can be seen as source of progress, but it could also lead to more and more dependence towards technologies and ICT companies.

A concrete example is the one of driverless cars. The way we move in the city – our freedom of movement – is likely to be progressively controlled by ICT companies. And as we do not need our skills and brains to move in our environment, companies have more of our brain to exploit. Think about this, why a company such as Google, that may be today one of the largest ad company in the

United States, is interested in self-driving cars? Well, I think that it is mainly because driverless cars are the best way to colonize one more activity in the real world. The average journey of an American to go to work is about 52 minutes...The more we make ourselves available to private interests, the more the spirit of independence is likely to become obsolete.

D.M.: What could be done by public authorities, and notably cities, to protect citizens from this age of distraction?

M.C.: As I previously said, I think that one of the main things we need to address is to guarantee that Smart Cities are designed for the public good. It is quite difficult to assess the intention given to a technology. I think that competent people, maybe local public officials, should be in charge of examining the intention and effects of all that programming that is in the system.

Education also plays an important role. We need to raise awareness on the use of new technologies in order to increase expertise on code, algorithms, open data, etc. Some public authorities have started to do that, it's already a good thing.

Generally speaking, and this goes beyond cities, I am advocating for the need for the concept of an *attentional commons* meaning that our attention has to be treated as a collective resource, both private and public. Concretely it means not to install speakers in every corner of a shopping mall, not to play music in every restaurant, etc. This power belongs to those who design our environment - our cities for instance - and have the ability to make such things happen.

“WHAT WE NEED TO LOOK AT IS THE DRIVING INTENTION IN THE DESIGN AND DISSEMINATION OF TECHNOLOGY IN PEOPLE'S EVERYDAY LIFE. LOOKING AT THE INTENTION GIVEN TO TECHNOLOGIES IS THE BEST WAY TO DESIGN SMART CITIES FOR THE SAKE OF PUBLIC GOOD.”

THE POLITICAL AND LEGAL CONSEQUENCES OF SMART CITIES

Interview with Edouard Geffray
Secretary General, CNIL

Legal perspective with Jean-Bernard Auby
Professor of Public Law at Sciences Po Paris



Master of Requests of the Conseil d'Etat (French Council of State), Edouard Geffray first joined the CNIL (Commission Nationale de l'Informatique et des Libertés) as Director of Legal and International Affairs and of Expertise, in February 2012. He was appointed Secretary-General of the CNIL in September 2012. He is a graduate of ENA (National School of Administration / Ecole Nationale d'Administration) and of Sciences Po Paris, and has a Master's Degree in History.

A teaching fellow in public law and PhD in Law, Jean-Bernard Auby is a Professor of Public Law at Sciences Po Paris. Since 2006, he has held the Chair for Changes in Public Action and Public Law.

KEYWORDS

- FREEDOM OF THE INDIVIDUAL
- DATA PROTECTION
- PUBLIC SERVICES

Not only public services but also the citizens' quality of life can now be improved through the use of data. Using concrete examples (transport, smart meters, etc.), Edouard Geffray discusses in an interview the criteria needed to ensure a fair balance between data protection and freedom of the individual, on the one hand, and innovation, on the other. Jean-Bernard Auby then focuses on detailing the legal consequences around the emergence of smart cities.

David Ménascé: From the perspective of a stakeholder like the CNIL, what are the main issues around smart cities?

Edouard Geffray: Before answering, we need to have several underlying concepts in mind.

First, personal data in a way provides the atoms of the smart environment. These then are the basic particles that form smart cities. The data in itself does not make the city smart, but it does provide the city's intelligence. In other words, it provides the intelligence for urban services to be smart, optimising transport, energy or water services.

Next, the dynamic of smart cities has changed dramatically. The first smart cities came about through an approach that might be termed planned or top-down – to push the point somewhat. The first smart cities were often new cities that a central authority – political and administrative power – organised with private service providers.

The dynamic was turned on its head with the arrival, tangentially, of private or association stakeholders, which positioned themselves between the citizens and the traditional stakeholders in the city's administration. This new interface, a sort of very fine layer between the existing systems, created a new dynamic with the shift from a centralising rationale to a more innovative balance between top-down approaches and bottom-up approaches. We are now confronted with a more mixed landscape, less planned and more innovative.

The third general aspect refers more specifically to the role of the public power and public services. The ramp-up of open data policies and general interest data have a potentially very positive effect on urban public services by fulfilling the famous Rolland laws defining the public service: continuity, quality, universality. Here we find that the articulation between bottom-up approaches and centralised, more top-down, policies provides the most promise. This interlink between public and private can actually contribute to achieving service quality, universality and continuity.

D.M.: Could you give us some examples?

E.G.: All network infrastructure provides areas in which the interlink is promising and fertile.

The transport sector is a prime example: the use of data can optimise transport modes by avoiding interchanges and smoothing users' trips involving several modes of transport.

More fundamentally, it is now possible to inscribe the transport dimension into a broader urban perspective and also by trying to better understand the interaction between stops and public transport frequency, the use of other public services – childcare centres, schools, etc. – and the pathways of citizens' professional and personal lives. A district with, for example, a high proportion of shift workers can now have transport far better suited to their needs. Through the judicious use of data, it is also possible to improve the living conditions of people suffering hardship, combat exclusion and assist the most vulnerable members of society.

It is there that the interlink between bottom-up initiatives and public policy becomes most meaningful. The use of data, innovation and political will can really improve not just transport services but far more fundamentally the quality of urban life and truly make the city smart.

Data can indeed objectify the urban system but only political will can point it in the direction of the general interest. It's this that makes sense of the partnerships. The operator has the economic and technical intelligence of the data but the community also has its social intelligence. That's where there is something to be invented. In other words, it will be by bringing together all the city's stakeholders – citizens, public authorities and economic stakeholders – that the city will really be able to be smart. Otherwise, it will only be mechanical or economic.

D.M.: What are the main risks around data use?

E.G.: The challenge starts when you realise that this interlink between private and public is only made possible by the flow of data. This flow must be fluid and efficient, and also framed by the principles of respect for privacy and personal freedom.

The example of smart meters clearly illustrates this point. Smart meters are an obvious step forward. Tracking consumption simplifies billing for the operator and provides personalised consumption solutions for the user.

But if the read frequency at which consumption is measured ultimately makes it possible to reconstruct the intimacy of people's lives, that is, to know if they have had guests, get up regularly during the night, etc., then this innovation presents an obvious risk in terms of respect for personal freedom.

“THE RAMP-UP OF OPEN DATA POLICIES AND GENERAL INTEREST DATA HAVE A POTENTIALLY VERY POSITIVE EFFECT ON URBAN PUBLIC SERVICES, BY FULFILLING THE FAMOUS ROLLAND LAWS DEFINING THE PUBLIC SERVICE: CONTINUITY, QUALITY, UNIVERSALITY.”



D.M.: Indeed, but how do we find a balance between the two?

E.G.: The principles for finding a fair balance between data protection and innovation are relatively simple.

First principle: adjust the system's default settings so that they are as balanced as possible. If we take the example of the smart meter again, the aim is to set the default read frequency at 30 minutes. This period enables the operator to monitor consumption with sufficient detail but without risking being able to map the user's personal life in detail. If it were set at two hours, the operator would not be able to optimise the user's consumption.

The second principle is that of the person's consent to change the system's default settings. In the case of the smart meter, the read frequency can be increased with the user's consent. Similarly, local storage of data is permitted for six months without allowing the company access to it. If users want to have their consumption analysed to be offered alternative and better suited plans, they may consent to their data being accessed.

Finally, after the balanced default settings and personal consent, the third principle is aggregate data processing. The point here is to ensure data anonymity. Open data rationales – allowing for the circulation of data between different services – must not be detrimental to end users' privacy. In other words, if data sharing is necessary, the data made available online must not be detrimental to citizens. The aim therefore is to ensure the data's anonymity from the beginning and to guarantee that people's identity cannot be extrapolated from it. Take the example of geolocation. Knowing the geolocation data of an individual can help deduce a certain number of things. Imagine if your employer could track your every move; they could immediately know if you were looking for another job, for example. It was precisely for this reason that France's Lemaire Law entrusted the CNIL with standardising data anonymisation methods in order to secure the legal framework.

These principles in no way hinder innovation. To use a driving metaphor, they are not a brake pedal but rather a seatbelt in the system. Without protection of the freedom of the individual, the city would simply be mechanical but in no way smart.

D.M.: Do you think Europe is in advance on these issues?

E.G.: Europe is the leading personal data market. It is estimated that its market will be worth US\$1,700 billion in 2020.

Data protection has become a really serious issue for competitiveness given the value of the "latest innovation" in new approaches to the collaborative economy or smart cities. Most new stakeholders are only fine layers in a vastly more extensive existing infrastructure. But ultimately, it is these fine layers that "scoop the winnings".

Above all, individuals are increasingly sensitive to the issue of protecting their data. For example, in the last four years, the number of complaints filed with the CNIL has doubled. If we want the digital society to be tenable, it is crucial that the individual retains control over it. Protecting personal data is the fundamental condition for people having trust in the smart city. Those who will rise to these challenges are those who will hand the power back to the users.

LEGAL PERSPECTIVE: SMART CITIES, DATA AND DIGITAL LAW

By Jean-Bernard Auby



“DATA CAN INDEED OBJECTIFY THE URBAN SYSTEM, BUT ONLY THE POLITICAL WILL CAN POINT IN THE DIRECTION OF THE GENERAL INTEREST. THE OPERATOR HAS THE ECONOMIC AND TECHNICAL INTELLIGENCE OF THE DATA, BUT THE COMMUNITY ALSO HAS ITS SOCIAL INTELLIGENCE.”

1. SEVERAL REMARKS FIRST ABOUT WHAT WE MEAN BY “SMART CITY”

My perception of it is based on the idea according to which the phenomenon combines three evolutionary lines.

First, the “smart city” movement reveals a gradual but deep transformation of the relevant cities’ infrastructure. Technological changes – in particular those that involve new information and communication technology: the Internet of things, etc. – mean that this infrastructure meets more efficiently the needs to which it responds. Another major transformation is down to the fact that the infrastructure’s components are increasingly interconnected; they operate less and less in isolation. Finally, under conventional urban infrastructure – or above if you prefer – sits a digital meta-infrastructure made up of various communication channels – public and private– in which flow masses of data enabling smart cities to function.

The second area of change concerns digital technology and data directly which are the fuel of the smart city. Here, mountains of data are constantly being collected (by a growing number of sensors the most commonplace of which are our smartphones), which then flow through the aforementioned meta-infrastructure. This data is more

or less aggregated by public authorities – more or less is a key issue for the future – which use it to operate their equipment, but also make it available to all – open data – both to inform and also to allow its reuse by citizens, companies, associations, etc., which in turn apply it to create their own services.

The third area of change concerns governance. There is a huge margin of uncertainty surrounding the way in which the operation of smart cities will be regulated, and especially the way in which public and private action will intermesh. However, the governance of smart cities is also gradually being transformed by the free circulation of a growing amount of information about their operation: this change is the seed for transforming the relationship between public authorities, citizens and private organisations, by a sort of potential rebalancing of these relationships.

2. ALL THESE CHANGES INVOLVE, HERE AND THERE, THE LAW, REQUIRING IT TO ADAPT

For me, the main legal consequences of these changes involve digital technology law. But there are others to be considered.

a) The most obvious legal issues are those around data and digital technology law.

The issue that most immediately springs to mind is privacy protection. The mountains of data flowing through smart cities each day include a lot of personal data: where we physically are at a given time, our water and power consumption, how we use certain public infrastructure, etc. The rules of France's 6 January 1978 law on information and freedom of the individual are there to protect us from digital intrusion into our private life, but they will struggle in the context of the smart city. Data anonymisation will be a particularly sensitive issue.

Although particularly sensitive, privacy issues are not the only legal problems that the data regime in digital cities raise and will continue to raise. It is crucial to first understand that the data needed for smart cities to function is not necessarily held by the public authorities. It may be in the hands of some of their partners involved in the local public business – typically, delegated public service operators of water, electricity, gas, transport or parking services – or even in the hands of purely private operators – telecom companies for example. Hence the current emergence of the notion of “general interest data” that the holder should make available to the public authorities. This is what the French Law “for a digital Republic” dated 7 October 2016 sets up with regard to delegated public service operators. Underneath the corresponding discussion lies a far more general conversation that is far from over, about whether data can be the subject of copyright.

Data held by public authorities raises other problems. The aim of making it public under open data arrangements is now a reality as a result of France's 7 October 2016 law, which made it compulsory for municipalities with more than 3,500 residents to allow people access to and for them to use data, in theory, free of charge. A few exceptions will apply to national organisations, like INSEE-the French bureau of statistics and IGN-French institute of geographic and forest information. It will not always be easy to implement these

**“WITHOUT PROTECTION OF
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principles as some municipalities are not well equipped to comply: disperse data, processed in different formats, formats unsuited to being opened and reused, etc.

Another issue addressed in the 7 October 2016 law is whether public authorities can base their decisions on algorithmic processing of data sets. The Law says they can, while nonetheless requiring that the addressees of the decisions be informed of this state of affairs and that the description of the algorithm components be held at their disposal.

b) Other questions not directly linked to digital law will be raised and are already being raised.

Establishing the infrastructure of smart cities requires and will continue to require changes to public contract law. The most obvious area today concerns the way in which the requirements for innovation – central to smart cities – will be incorporated into this law: a particular form of public contract, the so-called “innovation partnership”, was recently devised for this purpose. Over and above this change, it is easy to imagine that the interconnected nature of the smart city's infrastructure will require for its production and management “consortium” contractual mechanisms involving a great many parties binding them over a long term. It is not sure that such mechanisms will fit easily into existing law.

It is a safe bet, too, that town planning law – urban planning, building permits, etc. – will have to adapt to a context in which smart city regulations require a great many concerns and constraints to be managed concurrently: from privacy concerns to ever-changing technology, from the energy transition to improving traffic, etc.

Finally, local institution law will not escape as it will undoubtedly be necessary to find new ways of articulating the relationship between local government with its resources and new powers and better informed citizens, on the one hand, with a private sector that will certainly have played a key role in actually constructing the smart city, on the other. Smart city management law has, by and large, yet to be invented.

SMART CITIES AND NEW FORMS OF EMPLOYMENT

David Ménascé

CEO of consulting firm
Azao and Associate
Professor of the "Social
Business, Enterprise and
Poverty" Chair at HEC

Charles-Edouard Vincent

Founder of *Lulu Dans Ma
Rue* and Associate Professor
of the "Social Business,
Enterprise and Poverty"
Chair at HEC

Mathilde Martin Moreau

Consultant at Azao



Lulu Dans Ma Rue

David Ménascé heads the consulting firm Azao specialised in defining and implementing "social business" strategies. Associate Professor of the "Enterprise and Poverty" Chair at HEC Business School in Paris, France, he is the author of several studies on the modifications of the forms of employment caused by the digital revolution. After founding in 2007 *Emmaüs Défi*, Charles-Edouard Vincent launched *Lulu Dans Ma Rue*, a "local service counter". Associate Professor of the "Enterprise and Poverty" Chair at HEC Business School in Paris, France, he was the recipient of the 2013 Social Entrepreneur Award. Mathilde Martin Moreau is a social innovation consultant working with consulting firm Azao. In particular, she works on the development of collaborative economy and digital platforms.

KEYWORDS

- COLLABORATIVE ECONOMY
- DIGITAL PLATFORMS
- EMPLOYMENT CRISIS

The development of smart cities is fostering a rapid rise in on-demand work through digital platforms (Uber, Helping, Deliveroo, etc.). Most initiatives around these new types of employment occur in urban environments, mainly because these platforms operate all the better the higher the population density. To improve understanding of this phenomenon, the article shares the results of qualitative studies conducted with service providers registered on various types of platforms and discusses an example of a citywide initiative, *Lulu Dans Ma Rue*, which has been designed to use new technology to recreate local economic activity.

INTRODUCTION

Several years ago, Robin Chase - the founder of Zipcar, a US car-sharing company- said "My father had one job in his lifetime, I will have six jobs in my lifetime, and my children will have six jobs at the same time". This prophecy, while it may seem excessive, shows that the digital revolution is not just technological but is also transforming our social models. On-demand work (coming from on-demand economy), which enables each person to find income opportunities through digital platforms (Uber, Helping, Deliveroo, etc.), is effectively encouraging the switch from a labour social norm based on salaried employment to a broader rationale of economic activity.

The number of collaborative workers registered on these platforms is unknown and there are no solid estimates yet. Nonetheless, several indications can still be given. While in France, platforms like Uber and Hopwork together have around 34,000 professional contributors¹, in the United States, Seth Harris and Alan Krueger estimate the number of regular collaborative workers between 600,000 and 1.9 million (that is, between 0.4% and 1.2% of the country's active population in the United States)².

The rise in on-demand work is above all an urban phenomenon. It is the result of an increasingly services-oriented urban economy, and the dissemination of information technology in cities. At the same time, cities undoubtedly have the most relevant mesh to regulate these new ways of working.

1 N. Amar, L.C. Viossat, Les plateformes collaboratives, l'emploi et la protection sociale, IGAS, May 2016.

2 Seth D. Harris, Alan B. Krueger, A Proposal for Modernizing Labor Laws for Twenty-First-Century Work, December 2015.

1. THE ERA OF ON-DEMAND WORK IN SMART CITIES

A. ON-DEMAND WORK IS MAINLY GROWING IN CITIES

Several factors converge to make cities the pre-eminent location for the emergence of on-demand work: **(1)** population density, **(2)** expansion of the tertiary sector in urban economy, **(3)** salaried employment crisis, and **(4)** the emergence of new work aspirations.

Population density: the platform model requires a high population density

The higher the population density, the better digital platforms operate. Urban density allows for a critical size to be reached on both the supply and demand sides. Growing urbanisation – 66% of the world's population will live in urban areas by 2050 compared with 54% in 2014³ – is liable to speed up the growth of these new models in the years ahead.

Expanding tertiary sector: the urban economy is a service economy

The “tertiarisation” of urban economy encourages the development of a service society. As it happens, the tertiary sector provides the best fit for on-demand work. To take one example: the “services to individuals” sector, highly represented on digital platforms, provides a source of employment that will equate to more than 170,000 positions by the end of 2016 and 800,000 in the longer term⁴.

The employment crisis: cities attract poor people

The structural crisis of the labour market, especially for the least qualified workers, means that it is often easier to find clients than a boss. This phenomenon is all the stronger in cities because urban areas remain more attractive than rural areas. They attract poor people seeking new economic opportunities. To quote Edward Glaeser⁵: “Cities aren't full of poor people because cities make people poor, but because cities attract poor people with the prospect of improving their lot in life. (...) It suggests that cities should be judged not by their poverty but their track record in helping poorer people move up”.

Many people with highly varied backgrounds – on fixed-term or open-ended employment contracts just wanting to help make ends meet, retirees looking for additional income, long-term unemployed and people receiving minimum social benefits, or recent arrivals without work permits – now have access through this new digital sector to a market that exceeds that of their own networks. This phenomenon is all the more revealing of the employment crisis in that it concerns a broad range of people: while economically inactive people or the unemployed are becoming micro-entrepreneurs, the professionally integrated are also increasing the number of their activities to increase their income.

New job aspirations: some population categories, notably urban, aspire to greater freedom and flexibility

We are witnessing a growing aspiration for more independent and more flexible forms of working. A recent study⁶ published by the *Salon SME* micro-enterprise trade fair shows that for 70% of “slashers” – a term referring to people who have chosen to have several jobs or professional areas of interest – having multiple jobs is a choice. While this trend should not be overestimated – few quantitative studies provide a precise idea of the phenomenon – it is nonetheless apparent that there has been an upswing in the freelancer status in the past few years. According to a McKinsey study, there may currently be more than 160 million freelancers in Europe, all qualification levels combined, and 15 million in the United States that is 20% to 30% of the working-age population⁷. This estimate implies that the figures provided up until now tended to underestimate the situation. Some 15% of these freelancers have reportedly already used a digital platform to find work. The decision to freelance is increasingly prevalent in cities. Between 2009 and 2010, it increased by 14% in predominantly urban areas, while the number of self-employed has remained unchanged in rural areas⁸.

B. CITIES HAVE THE MOST RELEVANT MESH TO REGULATE ON-DEMAND WORK

A quick glance at the news reveals the role played by cities in the discussion around on-demand economy: from London to Berlin and Paris, there have been lively discussions about the status of Uber drivers and Deliveroo delivery couriers. Cities therefore find themselves in the front line of the battle between people who are for and those who are against “digital labour”.

Because they are closely related to the use of on-demand economy, cities are seen as key players in framing, or even regulating, the sector. To quote the terms used by Anne Hidalgo, the aim is to make sure that collaborative economy is a “sharing economy” and not a “predator economy”.

6 Le Salon des Micro-Entreprises, *Slashers ou pluri-actifs, qui sont ces nouveaux et futurs entrepreneurs*, September 2015.

7 McKinsey Global Institute, *Independent Work: Choice, Necessity, and the Gig Economy*, October 2016.

8 APCE, *Les auto-entrepreneurs, un succès confirmé*, July 2011.

“THE DEVELOPMENT OF SMART CITIES IS FOSTERING A RAPID RISE IN ON-DEMAND WORK. MOST INITIATIVES AROUND ON-DEMAND WORK OCCUR IN URBAN ENVIRONMENTS. IN THE UNITED STATES, OVER HALF OF ALL CITIES CLAIM TO HAVE OBSERVED GROWTH IN THE COLLABORATIVE ECONOMY IN THEIR REGION IN RECENT YEARS.”

3 United Nations, *World Urbanization Prospects*, 2014.

4 Oliver Wyman, *Les Services à la Personne en 2012*, DARES Analyse, No 038, May 2014

5 Edward Glaeser, *Triumph of the City*, 2012

These past few years, cities have introduced numerous initiatives around the collaborative economy and its governance. Here are several examples:

- Launch in 2013 of Seoul Sharing Cities initiative to encourage the development of the collaborative economy, including a startup incubator, financial support, partnership with innovative startups, etc.
- Creation in 2013 of the Sharing Cities Network that maps the collaborative initiatives in over 70 cities to share best practices and encourage scalability
- In March 2016, introduction by the Paris City Hall of a Commission of representatives of civil society specifically for the collaborative economy as part of the Future Generations Council
- Organisation by Paris City Hall and Mayor of Medellin of the Cities for Life Global Summit in November 2016 to address the inclusive city, which also included a section on the collaborative economy (presentations by people qualified in this field, village of initiatives with several startups of the sector, etc.).

C. UNDERSTANDING THE PROSPECTS OF ON-DEMAND WORKERS

While the labour revolution concerns both qualified and low-qualified labour, the main criticisms and difficulties have crystallised around low-qualified work. In order to try and understand the rise in these new forms of work, we have conducted two qualitative studies on a sample of around 50 service providers registered with various platforms⁹. All the service providers in our sample were based in Paris and its inner suburbs. Taking as our starting point the opinions of these service providers, whose voice is not often heard, seemed to us crucial to document the phenomenon and formulate credible proposals to enable us to assess the social utility of these platforms.

The effect of digital platforms on work trends can be analysed as a positive or negative overall. To grasp these multiple effects, it is first necessary to distinguish between the platforms' economic models. They can be divided into two groups: the "quasi-operators" offering only one type of service and delivering a standardised service quality (based on the Uber model for transport or the Helping model for home cleaning services) and "market places" based on a peer-to-peer model and simply putting a provider into contact with a client (the *Le Bon Coin* or *Youpijob* model). This distinction is defining, as the respective impacts are profoundly different.

The diversity of provider profiles operating on these platforms also needs to be taken into account. Four main types of profiles are identifiable:

- The "**astute**" who often have a stable professional status (employee, civil servant, etc.), and who make use of their time to help ends meet
- The "**helpful**" who find themselves in a similar situation but focus on the local context and have a keen sense of solidarity
- The "**micro-franchisees**" who value self-employment and generally want to develop an independent main activity within the more or less longer term, mainly relying on "quasi-operator" platforms
- The "**compelled**" who, unable to find a stable salaried job, have to do odd jobs for individuals in order to survive day to day.

The qualitative interviews we conducted led us to the conclusion that the platforms result in some progress in these providers' situation. For the majority of the respondents, the platforms are a source of social progress by providing everyone with access to economic initiative. These conclusions have been corroborated by a recent article published in the Harvard Business Review¹⁰ showing that people on the edges of the traditional economy (stay-at-home parents, retirees, students, etc.), but "resourceful", benefit significantly from digital platforms as they provide them with additional options that are better suited to their situation.

Nonetheless, digital platforms still potentially lead to a more precarious and weakened social model, especially for the most vulnerable. While the "astute" and "helpful" cohorts cumulate both the advantages inherent in their stable legal status (unemployment insurance, more advantageous social security cover, etc.), and their easily mobilised additional income, the situation is more ambiguous for the "compelled" cohort who face at-times ferocious competition on the "marketplace" platforms and often have no complementary status providing them with a degree of security. For their part, the "micro-franchisees" have engaged in an approach aimed at the long-term viability of their activity using "quasi-operator" platforms and adopting a self-employed status. For this latter group, the independence provided by the platforms is often a factor driving their motivation.

2. CASE STUDY: LULU DANS MA RUE, A "LOCAL SERVICE COUNTER"

A. PRESENTATION OF THE INITIATIVE

Launched in the 4th arrondissement of Paris in 2015, *Lulu Dans Ma Rue* (LDMR) is a "local service counter" project aimed at reinventing local services and regenerating economic activity at the local level by leveraging information technology. The aim is to put people seeking economic opportunities in contact with neighbourhood residents requiring day-to-day assistance (water plants, mind pets, small deliveries, etc.). This solidarity company was created by Charles-Edouard Vincent, the founder of *Emmaüs Défi*, an integration structure

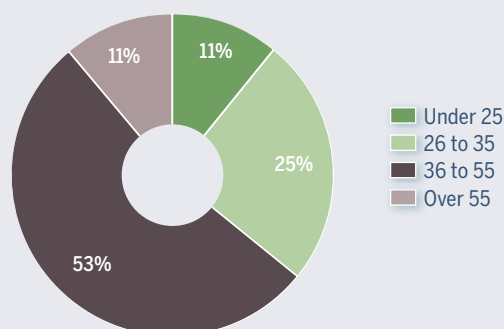
⁹ David Ménascé, *La France du Bon Coin*, Institut de l'Entreprise, September 2015, and David Ménascé, *Quel modèle social pour le travail à la demande*, June 2016.

¹⁰ Harvard Business Review, *Who Wins in the Gig Economy and Who Loses*, October 2016.

BOX 1: HIGHLY DIVERSE PROFILES OF LULUS

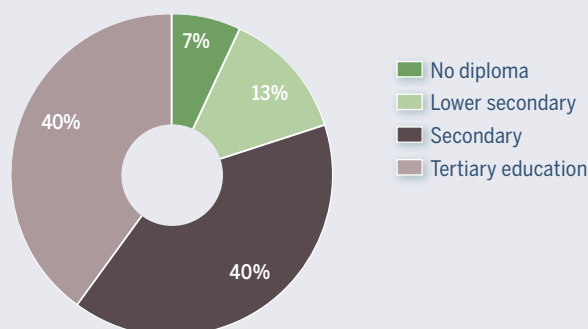
**LULUS AGED 19 TO 66
WITH 53% AGED BETWEEN 36 AND 55**

Distribution by age



**60% OF THE LULU RESPONDENTS
HAVING SECONDARY OR LOWER QUALIFICATIONS**

Distribution by level of education



On 36 active and registered Lulus in the first quarter of 2016

that aims at generating economic activity for homeless people through a system called “first hours”¹¹. Following his initial experience with integration activities, Charles-Edouard Vincent concluded that 30% of people on an integration programme found a job or further training after their integration course with *Emmaüs Défi*. Following on from that, it is necessary to find new forms of activity for the people who are unable to join a conventional company at the end of their course. *Lulu Dans Ma Rue* was therefore devised as a local initiative aimed at recreating an economy of “small local jobs” enabling everyone, especially the long-term unemployed, to find gainful work. *LDMR* combines two approaches: (1) a digital interface (website, smartphone app for people offering their services etc.), and (2) a physical space in the form of a kiosk on Place Saint-Paul. All the providers, called “Lulus”, offering their services through *LDMR* have self-employed status, making it possible to track and declare all their services. The City of Paris supported *LDMR* right from the start as the project contributes to the growth of the region’s dynamism: creation of GDP at the city level, and strengthened social ties through the kiosk’s presence in the heart of the neighbourhood, assistance provided by Lulus in the neighbourhood (first-aid courses, awareness of the need to help the elderly during heat waves, etc.). The project is scheduled for rollout in several other arrondissements in Paris. *Lulu Dans Ma Rue* also aims to work with insurance companies and agencies that help people create companies (access to funding, etc.), to improve its services in terms of access to welfare cover and business development.

B. INITIAL FINDINGS

To measure the economic and social impacts of *LDMR*, we conducted two impact studies a year apart on a sample of around 30 Lulus.

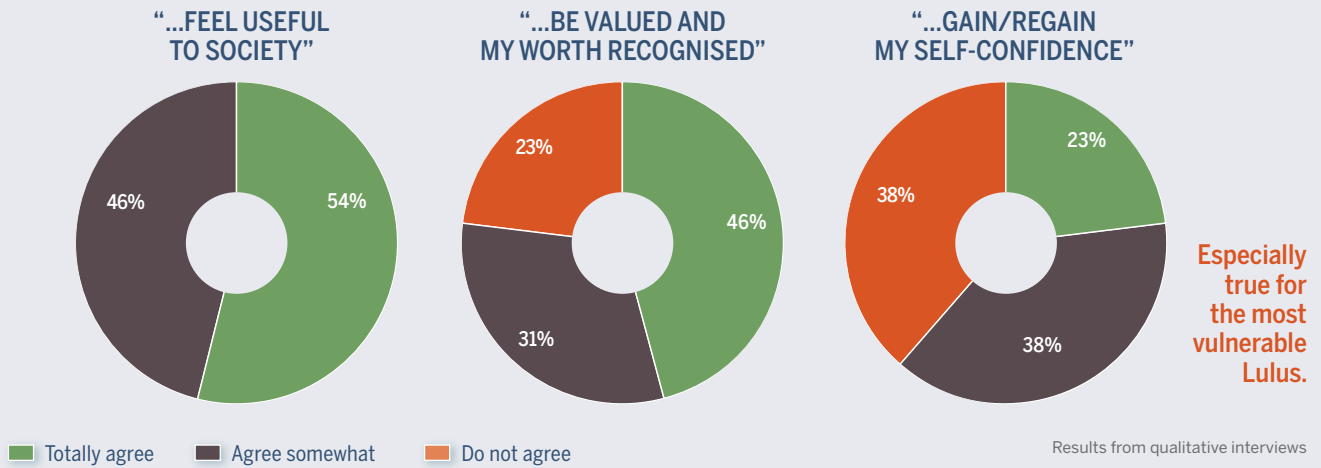
The following are the main findings from these studies.

- **One year after joining *LDMR*, Lulus say they are still satisfied:** 93% of Lulus said they were satisfied in March 2016 compared with 92% in July 2015.
- **Lulus have a wide range of profiles (cf. box 1):** students, retirees, RSA (Active Solidarity Income) beneficiaries, part-time employees, etc. Their respective activity varies greatly as do their qualifications ranging from Lulus without any diploma to those with seven years’ tertiary education.
- **Despite their diversified profiles, the vast majority of Lulus feel they belong to a community:** 80% of the Lulu respondents say they feel they belong to a “*LDMR* community”.
- **The income from Lulus’ activity is for the most part additional to other sources** (for example, salaried job, welfare payments, etc.): 80% of Lulus earn between €400 and €600 a month, while 20% earn more than €1,000 a month thanks to *LDMR*.
- **The status is particularly suited to RSA (Active Solidarity Income) beneficiaries:** the services provided as a Lulu allow them to earn additional income without losing any of their welfare benefits. Through this professional activity, many Lulus increase their employability on the conventional labour market. Of the 70 Lulus in the 4th arrondissement, seven found a job in the year in which they were Lulus.

¹¹ The *Premières Heures* system was introduced by *Emmaüs Défi* in 2009 under the name *Travail à l’Heure*. It enables the long-term unemployed to return to work on a gradual basis: 4 hours/week, then 8 hours, etc., until they reach the level of the 26-hour CUI (Single Integration Contract).

BOX 2: LULUS FEEL VALUED, RECOGNISED AND USEFUL

Do you agree with the following statements: "I like the LDMR project because it allows me to..."



- **For some Lulus, LDMR is a "life saver":** this is all the truer for the Lulus in the most precarious situations, as they may have experienced significant professional or personal difficulties prior to joining LDMR. In the words of the Lulus we interviewed, "Lulu gives you a boost, it boosts your morale and gives you a real lift. It's hard to leave the safety of your home when you are unemployed, when you have no regular activity. Lulu opens the door to opportunities, you have to seize them" and "LDMR helps me overcome my loneliness. It enables me to live financially and boosts my morale".
- **Working with LDMR provides many Lulus with the self-confidence they need and helps them to feel valued (cf. box 2):** for 51% of the Lulus interviewed as part of our impact studies, LDMR allows them to gain or regain their self-confidence. In the words of one Lulu, "Lulu has shown me that I can still do things. It's a great feeling." For 77% of Lulus, the project provides them with recognition and with the feeling to be valued for their work. And finally, almost 70% of Lulus say they are proud to be a Lulu.
- **LDMR answers a need certain Lulus have for flexibility and independence:** the majority of Lulus interviewed say they prefer to be independent rather than employed. In the words of one Lulu, "I don't want to work in a salaried position anymore. It's too draining. They take a lot and give you little in return. I prefer to be independent, working for individuals and working out my own schedule." Another Lulu added, "For me, a salaried job equates to the working class, shift work, listening to the boss, and so on. I'm too old for that. It's not who I am anymore."
- **Lulus approve LDMR's social project and the fact of being involved in strengthening social ties at the neighbourhood level:** 80% of the Lulus interviewed believe it is important to be part of a committed structure. Many Lulus who do not necessarily place any importance in the social dimension at the outset, admit that they are eventually "caught up" in the company's social project, "I joined the LDMR team because I needed to earn a bit of money. But the idea of being part of a wider human adventure that also makes it possible to help others was ultimately a real driving force", or "initially, it was really just to earn a bit of cash. Now, it's also because of the atmosphere that I'm there. It's nice to be part of a project like this and to feel like I am useful in the neighbourhood too."

The model put forward by LDMR fits perfectly with the current social trends mentioned earlier: urbanisation, "tertiarisation", crisis in the low-qualified employment sector and new aspirations. By creating real economic value at the level of a city neighbourhood, LDMR, both a physical and digital platform, provides a solution to counter the deteriorating employment market. At the same time, it seeks to combat the potential risks inherent in freelance work by providing ongoing improvements to the services it provides Lulus with.

These potential risks, especially for those in the most precarious situations, need to be taken into account and raise the issue of how to maximise the social utility of such platforms.

"BY CREATING GDP AT THE LEVEL OF A CITY NEIGHBOURHOOD, LDMR, A PHYSICAL AND DIGITAL PLATFORM, PROVIDES A SOLUTION TO COUNTER THE DETERIORATION IN THE LABOUR MARKET!"

3. WHAT NEW SOCIAL MODEL TO INVENT FOR ON-DEMAND WORK?

A. THE MAIN AREAS OF TENSION

Today, the effects of digital platforms are still ambiguous: they provide opportunities for the most qualified and most “astute” but are a source of potential traps for the most vulnerable. The principle risks and main questions around the rise in on-demand work are:

- **The insecurity of on-demand work:** how to avoid new forms of employment from becoming socially “inferior”?
- **Sharing added value and representativeness:** what social and political acceptability for digital platforms without new forms of capital sharing?
- **Welfare cover:** what guarantees can be offered to people with numerous professional activities and their statuses?
- **Taxation:** what tax rules need to be implemented to integrate digital platforms as best possible?

For the service providers for whom it is their main activity and registered on the “quasi-operator” platforms, there would seem to be two priorities: their status and their hybrid situation, both legally independent and economically dependent on the one hand, and welfare cover on the other.

B. IDEAS FOR PROPOSALS

Regarding welfare cover and providers’ rights, there has been a growing amount of work on on-demand work in France in the recent months (MP Pascal Terrasse’s report on the development of the collaborative economy, General Inspectorate of Social Affairs’ report on platforms, etc.). We believe there are four areas of proposals that are crucial to allow, insofar as possible, each provider to benefit as best possible from the economic opportunities provided by the platforms.

- **The simplification of the self-employed status:** if the creation of a status specific to the situation of these providers, at the crossroads between employed and freelancer, would above all be a source of confusion, it would seem appropriate to guarantee the simple use of the self-employed status by returning to an initially simplified status.
- **The creation of frameworks for dialogue between platforms and providers:** the balance between “quasi-operator” platforms and service providers requires the independent individual relation to be regulated by a fairer and inclusive collective framework.
- **Support for providers in securing their professional pathway:** the development of an entrepreneurial activity requires initiative and ongoing adaptation. The situation of providers registered on these platforms, often compelled by economic circumstances, makes access to finance and insurance complex. The experiences run so far with micro-credit and micro-insurance could be areas worth exploring. The platforms could also pool their efforts based on the practices of comparable sectors, such as the temporary employment industry.

These proposals are each intended to answer a specific issue. It would, however, be possible to go further and propose to deal with these various issues through a comprehensive proposal and a certification system for the “quasi-operator” platforms. The aim would be to implement a voluntary, flexible system to reconcile social responsibility and legal stability.

This certification process could be based on two principles:

- A framework contract between platforms and service providers. The idea involves reducing the imbalance between providers and platforms in the same way that collective bargaining agreements maintain a balance in relations between employees and employers. The aim is to provide the community with the right to negotiate what the individual alone is unable to obtain. Systems of this nature exist, under a variety of legal guises, for example, in the relations between insurance companies and brokers (under a collective bargaining agreement even though brokers are independent) or between franchisees and franchisers. This contract could be negotiated (under conditions to be considered) by providers’ representatives. It would make provision for the introduction of welfare benefits, such as supplementary health cover and professional insurance taken out by the platform for its providers (possibility for mutualisation). Obviously this certification would only be granted to platforms whose providers declare their related activity and income.
- The platform implementing such a framework contract would be awarded a certification together with a conclusive presumption exclusive of any connection with its service providers.

While some areas of these proposals can only be implemented by the national government (for example, simplification of the self-employed status), cities can also contribute by prompting digital platforms to be more responsible (the certification process could, for example, be applied at the local level).

It should be noted that progress has recently been made at the legislative level in France, notably under the French Labour Act, in which Article 60 aims to introduce “platform social responsibility”. This Article defines a certain number of obligations for the operator platforms (access to insurance and equivalent right to strike for the service providers, collective dialogue, etc.). The correct application of this text will however depend on the implementation of decrees, initially expected in December 2016. These decrees will in particular set the level of worker income from which the platforms will be subject to these obligations. It will prove difficult to set this threshold given the diversity of platforms and situations. Clarification will also be made concerning issues like insurance (what form the contract should take? amounts? etc.). The issue is to protect the service providers as well as possible while avoiding creating a heavy-handed approach to regulations which would be obsolete within a few years, if not months, and could end up being difficult to implement given the variety of economic models, and provider statuses and motivations.

2. A HOLISTIC APPROACH TO SMART CITIES: ARTICULATING TECHNOLOGY AND CITIZEN ENGAGEMENT



Part 2 sets out to identify the mechanisms for urban transformation that ICT (Information and Communication Technologies) offer in terms of optimizing mechanisms for achieving balance between bottom-up and top-down, physical and digital, technological innovation and social change.

Two articles describe experiences in southern hemisphere cities, illustrating how self-organization creates smart cities.

City dwellers in poor and emerging economies now enjoy better access to ICT: according to the International Telecommunication Union, penetration rates for mobile phones exceed 85% and 40% for internet access.

Unlike in OECD countries, where smart cities involve creating new uses and often involve top-down integration of ICT into planning policies, the advantage cities in emerging economies have is that informal practices and habits are already in place, and are usually very well established. This makes them ideal testbeds for new smart cities, since ICT do not need to be used to create new ways of doing things but to leverage improvements to existing ways of doing things, helping residents to upgrade systems they themselves have created.

This new trend in favor of what can be termed informal 2.0 is seen in the emergence of applications dealing with transportation or public safety, as shown in the first two articles about Kenya, looking at Digital Matatus and Ushaidi. The Digital Matatus project, for example, has mapped Nairobi's network of informal minibuses, matatus, for the first time. Mapping the matatu network revealed that behind the superficially disorganized informal minibus sector lies a well-designed and organized network in terms of the spatial division of routes, timetables, stops, and so on. Informal is not a synonym for irrational, but is closer to what we might term invisible rationality—a form of rationality ICT can make visible.

But a snapshot alone is not enough to improve the system. This is where the role of public authorities and innovative actors becomes essential: Nairobi City Council's future-forward open data policy has helped to accelerate the process and kick-start the creation of applications that can really make an impact. This convergence of traditional, in the form of solutions from the informal sector, and digital has led to the emergence of a new form of hybridized innovation, where ICT empowers residents to improve informal practices they themselves helped to shape.

In the same way, but using methods common to cities in OECD countries, analysis of the Nice and Lisbon cases shows how a carefully nurtured mix of political will, technological innovation and citizen involvement from the earliest stages is capable of genuinely transforming a city and creating cities that are truly intelligent.

This multi-layering of digital and physical approaches and interactions between top-down and bottom-up are prominent features of the final example studied, The Food Assembly (La Ruche Qui Dit Oui! in French). This initiative is based on neighborhood units and local organizers and aims to rethink short food supply chains in major cities.

David MÉNASCÉ
Coordinator

URBAN ENVIRONMENTAL MONITORING (UEM):

a demonstration project pooling corporate expertise for smarter cities implemented in Nice Plaine du Var

Philippe Maillard

Project manager, Innovation & Markets, Veolia

Pierre Brunet

Business development director, Innovation & Markets, Veolia



With over 179,000 employees worldwide, Veolia designs and delivers sustainable and competitive water, waste and energy management solutions to its customers. The Innovation & Markets division is tasked to develop marketing at company level and to steer R&D efforts to accelerate changes in Veolia's activities and business models.

KEYWORDS

- URBAN MONITORING
- PUBLIC-PRIVATE PARTNERSHIP
- URBAN SERVICES
- QUALITY OF LIFE
- BEHAVIORAL CHANGE

This article presents the Urban Environmental Monitoring demonstration project, developed jointly by the Nice Côte d'Azur metropolitan authority, Veolia, Orange, m2oCity and IBM since 2012. Exploring new ways of combining new technologies and social sciences, the project seeks to exploit a broad range of data to offer new urban services, designed to make the city of tomorrow more attractive, sustainable and competitive.

INTRODUCTION

The city of Nice is determined to be a laboratory for smart city innovations. Since 2008, the city has accomplished a broad range of experiments and pilot projects: measuring noise levels and the quality of air and light, smart mobility, smart street furniture, smart grids, contactless mobile services, and more. Nice is one of the most innovative smart cities in the world—ranked fourth in Juniper's 2015 Smart City Rankings, behind London and ahead of Singapore.

To take this innovation process a step further, the Smart City Innovation Center – established jointly by the Nice Côte d'Azur metropolitan authority and the Mediterranean Institute for Risk, Environment and Sustainable Development (IMREDD) at the University of Nice Sophia-Antipolis – was opened in March 2015. The center was set up in response to the fact that most smart city projects are compartmentalized and operated in silos. This integrated collaborative platform brings together stakeholders from research and educational backgrounds, leading smart city-focused companies, regional startups and public bodies. Urban Environmental Monitoring is one of the first projects developed by the Smart City Innovation Center, with a consortium coordinated by Veolia.

1. THE URBAN ENVIRONMENTAL MONITORING PROJECT: OBJECTIVES AND OPERATING METHODS

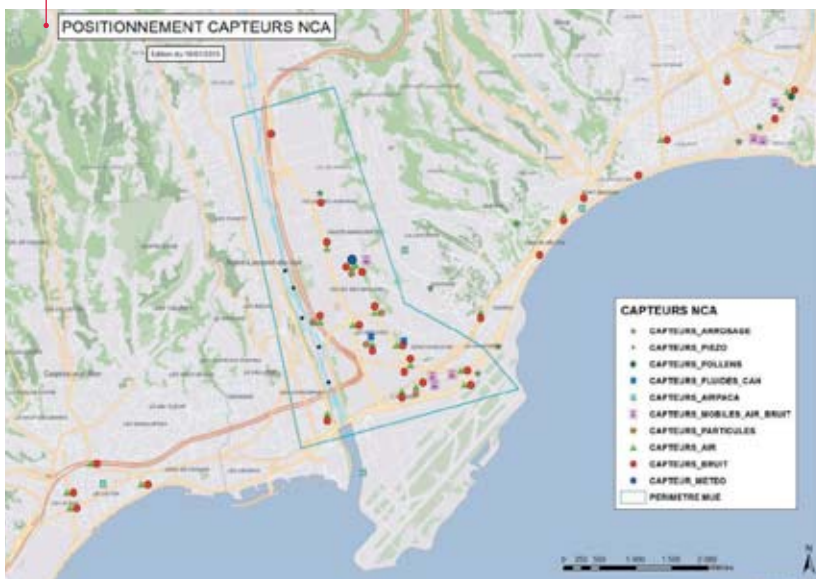
Developed jointly by the metropolitan authority of Nice Côte d'Azur, Veolia, Orange, m2oCity and IBM since 2012, Urban Environmental Monitoring is a unique demonstration project that aims at enabling collaboration between large and small companies, research laboratories, local government authorities and residents to make Nice a smarter city. All these stakeholders share a common concern: how can a broad range of data be developed to advantage to offer new urban services and make the city more attractive, sustainable and competitive?

UEM collects a broad spread of environmental data (air quality, noise levels, water network losses, traffic density, energy consumption, waste management, etc.) thanks to a network of close to 3,000 sensors across a 160 hectare eco district at the southern end of Plaine du Var area. Energy-autonomous wireless sensors are located all over the district: on street furniture (light stands, waste collection points, water distribution networks, etc.), in buildings (public buildings, social housing, apartment blocks, etc.), on a fleet of vehicles owned by the Nice Côte d'Azur metropolitan authority and the City of Nice, and in a special sensor-equipped trailer successively moved throughout the district.

Once processed, the data is used to monitor the district's environmental performance and to trigger short, medium and long term actions.

- **Example 1** - If a sensor detects high levels of air pollution, UEM triggers actions to improve the situation or limit impacts on residents: traffic flow improvement through traffic lights management, communication with drivers thanks to display panels etc.
- **Example 2** - Sensors fitted to waste collection points enable waste truck routes management so that only full containers are emptied— providing fuel and time savings for the local authority and improving the quality of life for local residents.

Sensors in the district. Source: Veolia



Nice:
RANKED 4TH
in Juniper's 2015
Smart Cities Rankings

3,000 sensors

160 hectares

10% TO 20%
net savings for street
lighting, energy
and water use

The UEM project has an ambitious final goal: testing new services (and design the relevant technical, economic and contractual models) that will optimize the ways cities are managed, improve urban environmental health, save energy and offer residents an enhanced quality of life.

2. A UNIQUE CROSS-FUNCTIONAL APPROACH

The UEM project's key strength lies in its fundamentally cross-functional nature. At every stage, the project has been designed in integrated and decompartmentalized ways. There are four facets to this cross-functionality:

- **Stakeholders:** the project involves multiple and diverse stakeholders, working in a win-win relationship of co-construction and shared expertise.
- **Services:** unlike many *Smart Cities* initiatives designed in silos, UEM sets out to provide a bunch of highly diversified services at crossroads of multiple challenges and sectors.
- **Levers for improvement:** UEM is a unique process inter-connecting technological and behavioral challenges. Residents are integrated as stakeholders in the project: thanks to the public availability of data, they are encouraged to make informed decisions and to adopt more virtuous behaviors.
- **Tools:** the project pools the radio data transmission network for a broad range of sensors. At the other end of the line, the city uses the same platform to monitor a range of alerts and indicators, and to combine data. Thus, integrated and shared solutions are deployed where separate services could have been relied on.

2.1. AN ECOSYSTEM OF STAKEHOLDERS: CO-CONSTRUCTION AND SHARING EXPERTISE

The origins of the UEM project can be traced to the acknowledgement that inter-stakeholder collaboration is a vital feature of smart cities. One of the key innovations the project offers is the ability to facilitate collaborations between stakeholders sharing a desire to test new services to improve city-living but that have never, or rarely, previously worked together. UEM is built around a virtuous ecosystem that involves five types of stakeholders:

- **A local government authority: the Nice Côte d'Azur metropolitan authority.** UEM would never have been launched without the metropolitan authority's vision and determination, deeply committed to smart city issues. The authority plays multiple roles within the project:
 - Overall project steering;
 - Definition of the needs, in close collaboration with the authority's various departments and residents;
 - Investment in sensors and networks (the authority provided half of the total budget, with a €2.1 million funding. - The balance is reached with the participation of the consortium of partner companies);
 - Supervision of the city hypervisor platform.
- **A consortium of major companies, leaders in smart cities: Veolia, Orange, m2oCity and IBM.** During earlier research, the Nice Côte d'Azur metropolitan authority did not share its data and worked with a single corporate partner at a time. Today, thanks to the Smart City Innovation Center, all corporate stakeholders can pool their data and knowledge for the first time, in turn multiplying the possibilities for experimentation. Convinced that no single company could come up with the full solution, several industry partners decided to pool their skills in a consortium that the authority then signed an R&D agreement with:
 - **Veolia:** world leader in environmental services, Veolia is responsible for consortium coordination, upstream diagnostic assessments, and design and sale of services;
 - **Orange:** tests a new sensor network, experiments new services and exploits the data in close collaboration with partner companies;
 - **m2oCity:** in charge of the sensors network and operational data gathering, this market-leading French company was set up by Veolia and Orange in 2011 to provide connected objects for the Internet of Things;
 - **IBM:** has deployed a platform (Intelligent Operations Center) that retrieves, processes, exploits and transforms data from the sensors in real time.

- **SMEs and startups.** Besides the large companies forming the consortium, UEM also relies on expertise delivered by SMEs and startups. Some are located in the region, such as RPP and its innovative TV applications, and Adam, a social mediation company. Others include Azimut Monitoring (sensors), EcoLogic Sense (sensors), Equitia (social support), Manodo (applications), Simplon (development), Sepia and OpenHealth (data analysis).
- **Universities and institutional partners.** The metropolitan authority and consortium also work closely with universities and institutional partners, including the Mediterranean Institute for Risk, Environment and Sustainable Development (IMREDD) at the University Nice Sophia-Antipolis, where the Smart City Innovation Center is located; AIRPACA, an approved nonprofit tasked with air quality monitoring; Acoucité, a nonprofit specialized in noise issues; Pasteur University Hospital; the Sophia-Antipolis Scientific and Technical Centre for Buildings; the French Environment and Energy Management Agency (ADEME), etc.
- **Residents** test the services, validate the approaches and approve expected results.

The UEM project offers unique working methods governance, based primarily on collaboration and co-design.

2.2. A CONCEPT DESIGNED TO OFFER A BUNCH OF SERVICES, AT CROSSROADS BETWEEN DIFFERENT SECTORS

Whereas most connected or smart city initiatives are run on a sector-by-sector basis and thus remain relatively compartmentalized, UEM offers a fundamentally new approach: starting with a cross-functional analysis at crossroads between a number of different sectors, it then offers a bunch of services answering the issues cities face.

Services tested by the UEM project have to meet three criteria:

- Be aligned with the challenges the metropolitan authority faces;
- Making it possible to reuse and exploit the data and test innovative solutions;
- Be based on an economic model capable of generating benefits and cost-savings for the authority, local residents and partner companies.

In all, the UEM project will test around 20 different services, divided into three broad groups:

- **Group 1:** services improving health, air quality and living conditions in the city (monitoring air quality, noise levels, pollen count, temperature hotspots, biodiversity indicators, etc.);
- **Group 2:** services that make it possible to manage existing public services' improvement (mainly management of water, energy and waste: watering green spaces, monitoring drinking water quality, smart management of heat networks, local waste drop-off points, etc.);
- **Group 3:** new services created by exploiting and reusing urban data (tracking water and energy use in buildings, air quality monitoring and information, city noise levels and pollen counts, dashboard of city indicators, etc.).

For a stakeholder like Veolia, UEM represents an unparalleled innovation source: although the services in the second group are just enhanced existing solutions that the company already delivers, services in groups 1 and 3 represent profoundly innovative solutions in fields where the consortium's industrial partners are

not traditionally involved. In offering a chance to explore this new field, the UEM project acts as an innovation catalyst for all involved stakeholders.

2.3. A CROSS-FUNCTIONAL APPROACH THAT EMBRACES TECHNOLOGY AND SOCIAL SCIENCES

There is more to smart cities than simply a technology issue. For smart cities to be effective, they have to be embedded within a participatory framework that will ensure residents' long-term engagement and backing. This is the mindset that underpins the UEM project.

Residents are involved in the new services' validation process as active participants in the experiments. Their views are sought and listened to (a e-questionnaire will be sent to eco-district residents, designed to assess their opinions about the progress enabled by the experimental program). By associating residents with the improvement of their living conditions process and inviting them to join in, the UEM project aims to maximize the long-term impacts of the new offered services.

For example, as part of the project to help manage household water and energy consumption (see below), some 50 households were invited to join the experiment and track their water and electricity use. These households were supported by local nonprofit bodies responsible for raising awareness and helping households to adopt new and more eco-friendly behavior patterns (managing energy use, cutting bills, etc.).

By linking technology (sensors, monitoring tools, applications, etc.) with social sciences (behavioral change and resident participation), UEM is configured to provide a cross-functional response to the challenges smart cities face.

3. FOCUS ON TWO APPLICATIONS OF THE URBAN ENVIRONMENTAL MONITORING PROJECT: MANAGING CONSUMPTION AND POLLEN COUNTS

To give a better insight into the realities of the services tested as part of the UEM project, we will now look at two experiments in greater detail:

- support for household water and energy consumption management;
- pollen counts.

3.1. SUPPORT FOR HOUSEHOLD WATER AND ENERGY CONSUMPTION MANAGEMENT

Household Energy Management Support (AMCI) is an experimental service offered by Veolia to two apartment blocks managed by social housing provider Côte d'Azur Habitat in the Moulins district of Nice. The aim of this experiment is to encourage tenants to monitor and manage their water and energy use to reduce their bills. AMCI should enable tenants to make an overall 10% saving on their water and electricity bills (saving €150 to €200 excluding taxes per home per year). The landlord should see a return on investment within three years.

There are two pillars to the service, simultaneously tested in a dozen pilot areas across France:

- **the technology pillar: smart monitoring and digital apps.** Apartments are fitted with room temperature sensors,

“THE UEM PROJECT’S KEY STRENGTH LIES IN ITS FUNDAMENTALLY CROSS-FUNCTIONAL NATURE. AT EVERY STAGE, THE PROJECT HAS BEEN DESIGNED IN AN INTEGRATED AND DECOMPARTMENTALIZED WAY. [...] ONE OF THE KEY INNOVATIONS OF THE PROJECT IS TO FACILITATE COLLABORATIONS BETWEEN STAKEHOLDERS [...] THAT HAVE NEVER, OR RARELY, PREVIOUSLY WORKED TOGETHER.”

calorimetric sensors, and sensors measuring volumes of water and hot water used. Apps have also been designed to enable tenants and landlords to track changes in consumption over time;

- **the behavioral pillar:** it is important that tenants take ownership of the service if the targeted 10% savings is to be met. Veolia has tasked Equitia, a company specialized in behavioral change support, and Adam, a nonprofit specialized in social mediation, to ensure that the tested solution is both welcomed and fully understood. Both contractors are in charge of raising residents' awareness so that they adopt energy-saving habits. Personalized coaching programs based on individual analyses of consumption and behavior patterns are offered for a six-month period.

The question of behavior is key. Initial experimental feedback shows that although 90% of contacted residents agreed to have sensors fitted in their apartments (around 50 households in total), they met trouble taking ownership of the consumption monitoring tools and applications. This underlines that extended prevention and awareness-raising actions targeting users are needed to support changes in behavior, technology cannot come alone.

Thanks to this careful combination of the technology and behavioral pillars, the AMCI service provides a twofold advantage:

- **for tenants:** higher disposable income thanks to reduced water and energy bills; better control over bills for water, electricity and heating; greater awareness of the impact of personal behavior on household bills; a shared bond with their neighbors;
- **for social landlords:** direct savings on internal costs; higher household disposable incomes leads to fewer rent defaults; better management of the tenant relationship; establishment of relationships more closely aligned with tenants' real concerns.

“THERE IS MORE TO SMART CITIES THAN SIMPLY A TECHNOLOGY ISSUE. FOR SMART CITIES TO BE EFFECTIVE, THEY HAVE TO BE EMBEDDED WITHIN A PARTICIPATORY FRAMEWORK THAT WILL ENSURE RESIDENTS’ LONG-TERM ENGAGEMENT AND BACKING.”

3.2. REAL-TIME POLLEN COUNTS AND MONITORING

An experiment is currently running as part of the UEM project – in collaboration with the National Aerobiological Surveillance Network (RNSA) – offering an innovative service that provides real-time counting and monitoring of airborne pollen concentrations, which in turn increases the effectiveness of allergy prevention strategies.

Traditionally, pollen counts are obtained from air samples analyzed in a laboratory, a task that can be both lengthy and painstaking. The UEM project offers real-time information thanks to an innovative

TAKEAWAYS FROM THE RÉFLEXE EXPERIMENT: THE DIFFICULTY OF CHANGING USERS’ BEHAVIOR

To add further food for thought about the behavioral dimensions inherent in any smart city project, we want to take a brief look at the takeaways from another research project run by Veolia Research & Innovation teams in the south of France in 2012 and 2013. Known as RéFLexE (Response Flexibility in Electricity), the project set out to assess the social acceptability of flexible electricity consumption within the context of a smart grid. It should be remembered that the value of smart grids is the ability to adjust to needs in real time, using ITC to connect electrical demand and supply infrastructures. For instance, when demand exceeds supply, smart grids can briefly reduce electrical consumption in a group of buildings. On the other hand, when supply exceeds demand, the purpose of smart grids is to call on energy storage solutions. This is what we term flexible electricity consumption.

In this respect, an experiment was run at a group of office buildings in the PACA region of southern France, seeking to assess the social acceptability of this type of intelligent grid mechanism. In office buildings, flexible electricity consumption can be responsible for the alteration of occupants’ thermal comfort through the production of heat and/or cooling. This experiment was also used to assess the extent to which users are occasionally prepared to compromise their comfort as part of electric consumption adjustment processes.

Thus, several in-situ temperature adjustment tests were carried out, and a questionnaire issued to participants to assess their reactions to their thermal comfort’s alteration and the extent to which they accepted this kind of changes. The experiment demonstrated that, on the whole, occupants’ satisfaction in regard to thermal comfort was very noticeably impacted by the flexibility actions tried out. As an example, after lowering air-conditioning in buildings in July between 1 and 3 p.m. (raising indoor temperatures from 23 to 25°C), 65% of respondents stated that the apparent temperature was “far hotter” than normal, with 32% even stating that the temperature was “far too hot.” Working from these results, researchers running the project attempted to identify factors that could be obstacles to behavior changes (in this case, altering temperatures at a set time of day), as well as possible levers to circumvent these obstacles. Among other findings, they demonstrated that:

- **Acceptance of flexible electricity consumption varies according to the context.** Users appear willing to make efforts in emergency or exceptional circumstances (for instance, during extreme consumption peaks in winter, or in the event of an incident such as a fire or grid fault). They are driven by the feeling that they have no choice in the face of a potential power cut and/or because of a sense of responsibility toward other specific users on the same grid: they declare that child daycare centers, rest homes and hospitals take precedence over their personal comfort. There are, however, far more divergences of opinion regarding less sensitive situations, for example the intermittent production offered by renewable energy sources. Aside from emergencies or situations engaging their sense of social responsibility, users frequently find it less acceptable to compromise their comfort. During the experiment, users expressed their reluctance with varying degrees of directness. For example, they expressed views about what their colleagues would think — *“people are going to complain”* — rather than their own opinions, and/or formulating avoidance strategies designed to minimize or totally negate any personal discomfort (e.g., adjusting the air conditioning in June, or during the morning, to avoid the sensation of a rise in temperature);
- **irrespective of whether they are generally positive or negative about adjusting consumption, users all seem to be sensitive to three arguments: efficiency** (flexible electricity consumption is seen as a way to save energy, a core consideration for some of the people surveyed); **justice** (efforts must be made by all in society); **responsibility** (equally, the division of constraints must align with the respective responsibilities of the various stakeholders involved in regard with the problems to be solved). The researchers concluded that these three levers should, in varying proportions relative to the targetted public, be at the heart of all communication strategies deployed to convince users to alter their behavior.

For any project aiming at making our cities smarter, this example serves as a reminder of how critical it is to accompany users as they try to change their behavior. They have to be educated, informed and offered lasting encouragements in accurately designed ways to answer their specific preoccupations (their perception of the environment in which they live, sensations of discomfort, motivations, relationship to others, etc.).

sensor, the FIDAS-200. For the first time in Europe, an optical analyzer provides instant data on the granulometric distribution of pollen particles, making it possible to predict periods of high pollen incidence.

An initial test phase, run in central Nice from March to July 2015, with sensors positioned on the roof of the Museum of Modern and Contemporary Art, demonstrated the efficiency of the analyzer, particularly in comparison to traditional traps.

After these promising initial results, the decision was taken to pursue the experiment, issuing an alert bulletin based on readings from the FIDAS-200. The *Metropollen* bulletin, which has been tested by various volunteers from the Nice Côte d'Azur metropolitan authority since January 2016, provides a 24-hour real-time description of pollen concentrations. Users have the choice of consulting different sections: history, neighborhood pharmacies and allergy specialists, advice, impact studies, etc.

The project has a twofold ambition for the years ahead:

- improve quality of life for the thousands of people with pollen-related allergies who live in the city (preventing and reducing allergic attacks);
- reduce expenditure on healthcare relating to consumption of anti-allergens.

A study will run during the second half of 2016 to assess the impact of the new alert bulletin in regard to the above factors.



Metropollen bulletin screenshot. Source: Veolia

CONCLUSION

The UEM project's cross-disciplinary nature (involvement of a large number of stakeholders, the broad range of services tested and the combination of technology and social sciences) makes it a unique innovation laboratory for tomorrow's smart city's imagination and design. Focusing on collaboration and co-design within a genuinely experiment-driven mindset, it facilitates integrated testing at the district level of a multitude of new services for cities.

The project's implementation is scheduled in two steps: experimental phase from 2014 to 2017, and deployment and economic development from 2017. This approach should

soon yield the first results. The set out targets are already encouraging:

- **financial and economic impacts:** net cost savings of 10–20% for energy and water use in public buildings and for street-lighting, 10% increase in efficiency across the public water network (rate achieved in Beaune, where a similar service was tested), etc.;
- **environmental impacts:** 15% cut in greenhouse gas emissions and local air pollution thanks to better managed collections from local waste drop-off points, etc.;
- **social and societal impacts:** improved quality of life for residents (public health, well-being, time savings, etc.).

FABLAB LISBOA: when a Municipality Fosters Grassroots, Technological and Collaborative Innovation

Bernardo Gaeiras
Director, FabLab Lisboa



After graduating in design from the Sandberg Institute, Bernardo Gaeiras worked as a designer for 5 years and coordinated a FabLab in Amsterdam in 2007-2008. In 2013, he became director of FabLab Lisboa, a public FabLab implemented by the municipality of Lisbon. He also served as an advisor to the Lisbon municipality on FabLabs and creative industries and occasionally worked as a consultant for the World Bank on innovation policy and makerspaces management. Recently, Bernardo Gaeiras was appointed by the Portuguese Secretary State of Industry as co-director of the forthcoming Portuguese Maker Network.

KEYWORDS

- FABLAB
- INNOVATION
- MUNICIPALITY
- ACCESS TO TECHNOLOGY
- CITIZEN EMPOWERMENT
- SMART CITIES
- ENTREPRENEURSHIP

This article presents the strategy developed by the municipality of Lisbon to foster innovation and entrepreneurship, as a response to the 2008 economic crisis.

The article specifically focuses on the implementation of FabLab Lisboa, a unique space where anyone can come to develop its own project, using state-of-the-art technology and collaborating with other “makers”. By empowering citizens and fostering innovation, FabLabs appear as a key lever to make our cities smarter and anticipate future challenges.

INTRODUCTION

FabLabs have emerged recently – in the United States, at the end of the 1990s – and spread out rapidly in many cities across the world: over 650 FabLabs are active in more than 80 countries today. Most often located in cities, FabLabs – a short term for “fabrication laboratories” – are small-scale workshops enabling individuals’ access to digital fabrication technologies. People can access a 3D printer or any other digital machine in order to prototype and test their ideas. By making knowledge and technologies available to any citizen, FabLabs promote a democratized access to innovation and entrepreneurship. As such, they have a key role to play in smart city strategies as they empower citizens and encourage them to innovate and create. In this context, the potential contribution of FabLabs to make our cities smarter is promising and deserves specific attention.

In Lisbon, FabLab Lisboa¹ appears as a unique place dedicated to entrepreneurship, and one of the most innovative initiatives of that kind at the European level. To respond to the economic crisis of 2008, the city initiated several initiatives dedicated to entrepreneurship and innovation such as incubators and accelerators. The launch of FabLab Lisboa in July 2013 is fully part of this strategy: the municipality wanted to create a unique place where anyone could have access to technology and become a “maker”.

¹ <http://fablablisboa.pt/>

1. LISBON'S AMBITION: PROMOTE INNOVATION AND ENTREPRENEURSHIP

1.1. PUTTING LISBON AT THE CUTTING EDGE OF INNOVATION IN EUROPE

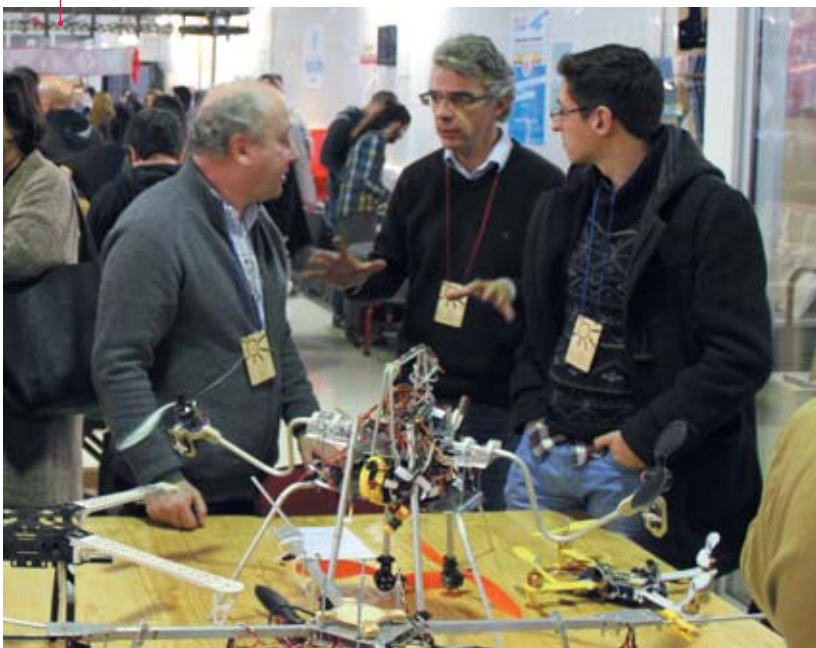
To respond to the economic crisis of 2008 and the rise of unemployment, the municipality of Lisbon designed an integrated strategy focusing on the promotion of entrepreneurship. The objective was to bring together public, private, local and national bodies in order to create new projects and increase the city's competitiveness at an international scale. António Costa, elected mayor of Lisbon in 2007 and now Prime Minister of Portugal, played a key role in implementing this strategy and in creating an ecosystem favorable to creativity, innovation and entrepreneurship. This policy included several initiatives among which:

- **Creation of a Department of Economy and Innovation** at the municipality level in 2011.
- **Development of business incubators to facilitate the launch of start-ups.** StartUp Lisboa² for instance, an incubator created by the municipality in 2011 with a specific focus on new technologies, acts as a real innovation hub and gathers a variety of Portuguese and foreign entrepreneurs. The structure offers key support to many entrepreneurs, through the organization of events providing visibility to entrepreneurs and assistance given to many co-working spaces. Mouraria Creative Hub³, for its part, is an incubator launched in 2015 and specialized in supporting creative and cultural industries.
- **Fostering of an ecosystem for innovation through the Lisbon Incubator Network** which aims at federating initiatives in favor

² <http://www.startuplisboa.com/>

³ <http://www.cm-lisboa.pt/centro-de-inovacao-da-mouraria-mouraria-creative-hub>

Source: FabLab Lisboa



Over
650 FABLABS
in more than 80 countries

2,066 PEOPLE
registered to FabLab Lisboa

**40% OF
BUSINESS IDEAS**
presented in worldwide start-up
competitions and open calls to
business are related to material
objects (Vs. digital projects)

of entrepreneurship, including incubators and FabLabs, co-working spaces, business angels, etc.

- **Launch of the Lisbon Challenge**⁴, an initiative that selects local start-ups to receive top mentoring and support in different parts of the world (including in Boston, London and São Paulo).
- **Creation of Lisboa Empreende**⁵, a program that supports micro-entrepreneurs in the fields of commerce and services, from development of business plans to access to funding from microfinance institutions. This program received the top prize of the 2015 European Enterprise Promotion Awards (EEPA).
- **Launch of the Lisbon Youth Entrepreneurship Program** which offers education and training for youth in citizenship and ethics, career development, entrepreneurship and financial literacy.
- And, last but not least, **support to the creation of several FabLabs in Lisbon**, including FabLab Lisboa.

Reflection upon the opportunity of launching a FabLab in Lisbon started in 2012. While several initiatives were already existing at the city level (various programs launched by the municipality, development of knowledge in local universities, network of business innovators and incubators, etc.), the municipality realized that there was no place in Lisbon for citizens to develop, share and test ideas related to hardware and product

⁴ <http://www.lisbon-challenge.com/>

⁵ <http://www.cm-lisboa.pt/investir/empreendedorismo/lisboa-empreende>

“LISBON APPEARS AS A DYNAMIC HUB IN TERMS OF ENTREPRENEURSHIP, AND THE ‘NEW PLACE TO BE’ FOR INNOVATION AND CREATIVITY IN EUROPE.”

development. In this context, FabLab appeared as the ideal solution to bridge the gap between people’s ideas and existing incubators. FabLab Lisboa was created in 2013 as an open workshop to enable everyone to materialize its ideas. This FabLab represents a key element of Lisbon’s creativity and innovation strategy today.

1.2. A SUCCESSFUL STRATEGY INTENDED TO BE REPLICATED AT NATIONAL LEVEL

After several years, results of Lisbon’s strategy are very positive: the city appears as a dynamic hub in terms of entrepreneurship, and the “new place to be” for innovation and creativity in Europe. As a matter of fact, Lisbon attracts innovators from all around the world: the entrepreneurship network Impact Hub6, established in 5 continents, recently announced the opening of a center in Lisbon, as well as the London-based incubator Second Home7. Similarly, Lisbon will host next November the Web Summit 20168, often called “Europe’s largest technology marketplace”, with 42,000 participants expected.

The success of this strategy is internationally recognized: in June 2014, Lisbon received the *European Entrepreneurial Region of the Year 2015* award. It was the first time that this award, attributed by the European Union to regions that promote entrepreneurship and innovation in small and medium enterprises, was given to a city - and not a region9. It gave Lisbon a great boost to develop new initiatives.

Lisbon’s strategy regarding entrepreneurship and innovation should now be replicated at national scale. This is the ambition of our Prime Minister, António Costa, who initiated Lisbon’s innovation policy, before taking national responsibilities. Last spring, he announced his willingness to replicate what he did in Lisbon at the country level – which is very good news. First signals of this ambition are already visible: João Vasconcelos, founder and executive director of StartUP Lisboa, was named as Secretary of State for Industry in November 2015 and a national program for entrepreneurship, named



Source: FabLab Lisboa

StartUP Portugal10, was announced in June 2016 in Oporto. Running until 2020, this program aims at creating an enabling environment for the development of entrepreneurship (international visibility, access to funding, etc.). Among the different initiatives that are part of this nationwide program, there are a National network of Incubators and a National network of FabLabs, which I am currently co-developing and will be formalized soon. For the record, Portugal’s legislation was already very favorable to entrepreneurs. In 2005, the national government implemented a set of measures removing barriers to the setting up of companies: the “Empresa na hora” program for instance enables anyone to set up a company in only 2 hours (it is so far the fastest and easiest registration process in Europe).

FabLabs are expected to play a major role in this strategy and to disseminate in the whole country.

2. FABLABS: FOSTERING INNOVATION AND SHARING KNOWLEDGE

2.1. FABLAB: A BOOMING CONCEPT

The very concept of FabLab appeared at the end of the 1990s at the Massachusetts Institute of Technology (MIT), when a teacher set up a class with one objective: enabling his students to create almost anything, by providing them with state-of-the-art desktop machines. The success of this class was so astounding and the resulting projects so interesting that the concept rapidly expanded and FabLabs started to appear all over the world. There are now more than 650 FabLabs globally11, in developed countries as well as in emerging countries, and their number doubles every one or two years.

6 <https://www.impacthub.net/>

7 <http://secondhome.io/about-us>

8 http://websummit2016.org/?gclid=CjwKEAjw_LG8BRDb1JTxm8uP_UwSJA Du_8pWqUlfr3h33jGtt67bPMBxiQ0dtqyuvNISrmvLm9Q6RoC3D3w_wcB

9 The city of Valencia in Spain also received the award the same year.

10 <http://startuportugal.com>

11 The list of FabLabs is available here: <https://www.fablabs.io/labs>

While the concept flourishes worldwide, Portugal is a pioneering country in connecting FabLabs with municipalities – which is, more generally, quite specific to the European context. This particularity lies at the very heart of FabLab Lisboa: it is really an initiative imagined and implemented by *the municipality*, as part of its broader strategy in favor of innovation and entrepreneurship. More and more municipalities are tempted to do so today.

2.2. FROM A COMMON APPROACH TO LOCAL APPLICATIONS: A KEY SUCCESS FACTOR FOR FABLABS

All FabLabs share the same basic concepts, materials and functioning. Indeed, to be labelled as FabLab, initiatives must meet certain conditions. The main conditions are:

- Public access to the FabLab, at least part-time: a key requirement as the objective of FabLabs is to democratize access to technologies;
- Subscription to and endorsement of the FabLab charter¹²;
- Common tools and processes, with at least the following capabilities: a laser cutter to make 3D structures, a sign cutter to make antennas and flexible circuits, a high resolution milling machine to make circuit boards and 3D molds, a larger milling machine to make furniture and housing and programming tools for circuit prototyping. Open source software and freeware complete these tools;
- Participation in FabLab global network: creating a FabLab means being part of a global community and collaborating with other FabLabs.

Depending on their level of compliance with these requirements, FabLabs are given a conformity-rating, each criteria being rated from A to C. For instance, FabLab Amsterdam is rated AAAA as it guarantees free public access, refers explicitly to the charter, detains all required tools and processes and is actively involved in the global network.

This standardized approach is a great opportunity that enables to adapt FabLabs to local contexts and local communities' needs. Indeed, knowledge is created at global scale and can easily be shared with all the members of the network. For example, of an India-based FabLab designed an electronic sensor to test milk quality: although this innovation would not necessarily be useful in Lisbon, the knowledge developed to design this electronic sensor could contribute to develop a similar technology adapted to Portugal's context.

The strength of FabLabs really lies in this common ground which strongly facilitates knowledge sharing.

2.3. FOCUS ON FABLAB LISBOA: PROMOTE INNOVATION AT CITY-LEVEL

FabLab Lisboa, which has just celebrated its third anniversary in July, is totally aligned with these principles.

We put forward free access to our equipment two days a week (called "OpenDays") to anyone who wants to experiment or prototype after registering on our website (people only have to pay for the materials). Then, our community of makers who want to use the machines on a

more regular basis and for commercial purposes has to pay per hour of use. Still, while our objective is to have a place that is accessible to anyone, we make sure that our prices remain very low, between 10 and 20€ per hour.

Currently, 2 066 people are registered to FabLab Lisboa. If we assume that every user is working on a project, it means that we have helped more than 2000 projects to materialize - which is huge! When writing this article, I was asked to describe two or three projects in order to give readers an idea of what our community can produce. Yet, as FabLabs gives you the opportunity to make *anything*, there are so many different projects that it is merely impossible to pick only two of them... Projects developed in our facility can go from street food cars to open sourced handicraft, jewelry, drones, furniture, prosthesis for children or musical instruments. We sometimes organize events to promote projects designed in the FabLab: it is great to see fifteen or twenty so different projects gathered in the same room!

Besides our community of makers, one of our key objectives is to raise awareness of the general public and to give anyone the willingness and the courage to jump in and to launch their own project. To comply with this objective, we regularly organize workshops, where we convene adults and children in order to trigger their creativity spirit. For instance, we have recently hosted a workshop with local entrepreneurs in the area of "edutainment" where children were taught how to build their own automated little robot car. We are also currently hosting a biweekly workshop where people can learn to program in Python language (for a very modest cost: the entire program, made up of 12 sessions, only costs 5€ - 15€ if the participant does not finish it).

3. CHALLENGES AND PROSPECTS FOR THE DEVELOPMENT OF FABLABS

FabLabs currently face four main challenges.

3.1. COLLECTING INFORMATION ON PROJECTS

All FabLabs face the same difficulty: getting precise information on the projects designed and developed in their facilities. Indeed, the concept of FabLabs means open spaces and free innovation: everyone can come in, work on a project for one hour and leave. It means that we cannot know what happens in our spaces. Sometimes, we even discover successful projects that have been developed in our own FabLab when they are presented on TV!

¹² <http://fab.cba.mit.edu/about/charter/>



Yet, knowledge sharing is crucial for the ongoing learning process: it is important that users share their experience in order to make the community smarter. FabLabs' ambition is to enable everyone to learn from his/her neighbor. This is one of the key principles of the sharing economy: we share things and we share knowledge.

In order to achieve this goal, it is important to design tools to monitor projects and their results. At the beginning, we were very strict and always asked people to document what they were working on: they had to send us information about their projects to be allowed to come back. Yet, we realized that this requirement threatened the very principle of open access and the appropriation of the place by users, so we finally dropped it. We are currently working on a "Fab Kiosk" to deal with this challenge. The idea is the following: when you enter FabLab Lisboa, you check in on the kiosk and enter some information related to your project: field of work (designer, artist, etc.), quick description of the project, upload of some pictures. The information given is then made available to the rest of the community and can be used for reporting.

"I OFTEN COMPARE FABLABS TO CONTEMPORARY LIBRARIES WHERE YOU CAN FIND THE KNOWLEDGE YOU NEED, STUDY AND EASILY DEVELOP YOUR OWN PROJECT – IN A NICE AND COLLABORATIVE ENVIRONMENT. OUR MOTTO COULD BE: 'LET'S 3D-PRINT A SOLUTION WHILE HAVING A CUP OF COFFEE.'"

3.2. FINDING NEW SOURCES OF FUNDING

The second concern for FabLabs worldwide is the financing issue: FabLabs continuously have to show that they have a sustainable business model to maintain their activity in order to get funds. Fortunately, the municipality of Lisbon has understood from the beginning the relevance of FabLab Lisboa and the impact it can have on citizens and has provided all necessary means to the continuation of its daily activities. However, most of the time, FabLabs struggle with the financing aspect.

Hopefully, there are more and more funds available, from international organisations - the European Union, the World Bank, etc. - but also from municipalities (Ulan Bator for instance has recently showed interest in federating its community of makers). Yet, to gain access to these sources of funding, FabLabs need to prove their Social Return On Investment (SROI), just like any organization. This can be quite difficult, because of the reporting issue (mentioned above), and also because we always have to find a middle ground between the interest of different stakeholders – the municipality and the general public.

In this context, the endorsement of a FabLab by a municipality (like in Lisbon) is a great opportunity – as long as municipalities are truly committed, both for the FabLab (in terms of financial viability) and public authorities. Indeed, FabLabs are formidable tools serving the interest of the general public in the same way as a library or a swimming-pool. In fact, I often compare FabLabs to contemporary libraries where you can find the knowledge you need, study and easily develop your own project – in a nice and collaborative environment. Our motto could be: *"let's 3D-print a solution while having a cup of coffee"*.

In the future, I really think that there will be a clear difference between cities that will have developed this kind of facilities and the other ones. Cities must innovate to be able to face future challenges: instead of outsourcing, they must invest to improve their in-house facilities and produce better services. This is, in my perspective, a key component of the "smart cities" concept: FabLabs will enable cities to anticipate and imagine their future, in a cross-sectorial perspective.

3.3. BUILDING A GLOBAL NETWORK GATHERING ALL FABLABS

Another key issue for FabLabs is to keep on building and feeding a consistent network to share knowledge between FabLabs at national but also at global scale. It was with this aim in mind that FabLab Lisboa organized a national FabLab meeting last January, to enable Portuguese FabLabs to meet and exchange ideas. Besides this event, we are also collaborating with other FabLabs, on a project basis. For instance, we recently mobilized national FabLabs to co-design and co-create a wood pavilion for the annual Maker Fair Lisbon. Because the structure is based on a modular design, its different parts were designed in Oporto FabLab and the file was sent to 6 FabLabs all over Portugal to be machined. The different parts were then transported and brought together into one single massive pavilion at the place of the fair in Lisbon. We didn't know if it would work until the last minute, but it did and it was a very impressive collaborative exercise! The ambition now is to structure this collaboration between FabLabs at national scale. In Oporto in June 2016 was announced the launch of a National network of Incubators and a National network of FabLabs, which I am currently co-developing and shall be officialised soon as the Portuguese Makers Network.

At global scale, there are also efforts to create a community gathering FabLabs. The Fab Foundation¹³ has created the FabLab network, to gather a community of makers from over 78 countries.

3.4. REINVENTING FABLAB'S IDENTITY: COLLABORATION VS. TECHNOLOGIES

A key issue for FabLabs is to continuously reinvent themselves.

For a long time, FabLabs have mainly been seen as "technology temples" where everyone can have access to state-of-the-art technologies. It is important to stress that they are *much more* than that. FabLabs are not only about technology. Technology evolves rapidly (we are speaking about 3D printers for now, but they did not exist yesterday and will be replaced by new machines tomorrow), and will be easily accessible to everyone in the near future. If one says that FabLabs are just a way to democratize access to technologies, it means that they will disappear as soon as people can afford to buy personal 3D printers. This is complete non-sense. Technology is only an excuse to gather people, but the true purpose of FabLabs is to make people work together and collaborate. They are places that connect three main features - resources, ideas and people – in an emulating and innovative atmosphere. This magic combination is the true inner richness of FabLabs.

This is a crucial challenge: it means that FabLabs have to constantly innovate and listen to their community of makers in order to design new tools and ways to make people work together.

CONCLUSION

The strength of FabLabs resides in their ability to make innovation available to anyone. They democratize access to technological tools and machines and, above all, give people the taste to innovate and collaborate. This "openness" is the very essence of FabLabs and we will always keep our doors open to anyone.

Yet, FabLabs should also pursue an additional objective: professionalize their services by helping makers to move up from a personal project to a professional and entrepreneurial project. Most of our makers need to be assisted in this transition in order to transform their project into an entrepreneurial venture. This need is already visible in the innovation ecosystem. While most start-ups used to develop digital projects (mobile applications in particular) in the last few years, we are progressively coming back to a more "material" culture where people want to produce objects. 40% of business ideas presented in start-up competitions and open calls to business are related to material objects. This is a challenge for FabLabs as it is much easier to support software applications than to support the creation of products. In order to efficiently help this kind of projects, FabLabs will have to work with partners (incubators and accelerators for instance), and provide their communities with more professional services. This is, in my mind, the future big challenge for FabLabs.

"IN THE FUTURE, I REALLY THINK THAT THERE WILL BE A CLEAR DIFFERENCE BETWEEN CITIES THAT WILL HAVE DEVELOPED [FABLABS] AND THE OTHER ONES. (...) THIS IS A KEY COMPONENT OF THE 'SMART CITIES' CONCEPT: FABLABS WILL ENABLE CITIES TO ANTICIPATE AND IMAGINE THEIR FUTURE, IN A CROSS-SECTORIAL PERSPECTIVE."

¹³ <http://fabfoundation.org/>

USHAHIDI:

Empowering Citizens through Crowdsourcing and Digital Data Collection

Interview of Juliana Rotich
Co-founder of Ushahidi, Board member



Ushahidi is a technology leader in Africa, headquartered in Nairobi. It was developed to map reports of violence in Kenya after the post-election violence in 2008. Since then, thousands have used its crowdsourcing tools to raise their voice. Co-founder of Ushahidi, Juliana Rotich has been its Executive Director for over 4 years. She has recently transitioned to a board member role.

Created in 2007, Ushahidi which means “testimony” in Swahili, is both the name of a Kenyan not-for-profit civic tech company and of a crowdsourcing platform allowing to submit violence reports and map the events. In this interview, Juliana Rotich, co-founder and former Executive Director of Ushahidi, introduces the Ushahidi technology and the next challenges to face, notably in the context of African smart cities.

KEYWORDS

- CROWDSOURCING
- CIVIC TECHNOLOGY
- AFRICAN SMART CITIES

Question: Ushahidi is one of the pioneer organizations specialized in crowdsourcing in the world. What is the story behind your structure?

Juliana Rotich: Ushahidi, which means “testimony” in Swahili, was created in 2007 in the context of violence incidents in the aftermath of the Kenyan presidential elections. Back then, the idea was to create a crowdsourcing platform allowing to submit violence reports and map the events through mobile phone or the Internet. Between 2007 and 2008, 450 000 users used this technology. After its launch in Kenya, Ushahidi has been replicated in many different contexts, from geolocation of victims after the Haitian earthquakes to coordination of demonstrations during the Arab Spring and reporting of violence committed in Syria. Though fields of deployments are very diverse, most of them are dealing with election monitoring, crisis and emergency response, activism as well as civic engagement and community building.

But today, Ushahidi, which is both the name of our organization and of our crowdsourcing platform, has expanded and developed activities beyond this first objective of crowdsourcing and data collection. It stands for a not-for-profit civic tech company developing a wide range of software designed to manage and analyze data collected by SMS, email, web and even Twitter. For instance, we have developed Roll Call, a team check-in app to reach each other and confirm everyone is okay, notably during a crisis. Whatever the software, the ultimate objective is to change the ways information flows, empowers people and helps them raise their voice.

Question: If we focus on your Ushahidi crowdsourcing platform, who are the people using this technology?

J.R.: Our community of users is very diverse. The main groups actually using Ushahidi are civil society organizations and community-based organizations, media, activists and citizens, researchers and academics and even governmental organizations. For instance, Conservation International and IFES use our platform. IFES uses the platform for election-related activities around the world. We are not able to measure today the exact number of people using our platform since we do not have any “log in” system. However, we have recorded 90 000 deployments worldwide since 2007 with a total of 6.5 million posts or “testimonies” in 160 different countries.

Question: These figures are great indicators to demonstrate the success of Ushahidi. According to you, what are the key factors of success of your crowdsourcing platform?

J.R.: I think that there are five main factors explaining the success of Ushahidi and the fact that many people embrace the technology.

First of all, the technology is very simple to use and do not require specific competences. When designing any software, the Ushahidi team always makes sure that it can be used by a large audience. It is surely one of the most important factors of success but it was also a great challenge. Indeed, when Ushahidi was first made

**90,000
DEPLOYMENTS**
worldwide since 2007

**6.5 MILLION
“TESTIMONIES”**
in 160 countries

available, it did require some IT competences to use the system... It took a while before civil society organizations and various users of Ushahidi got to know and adopt the technology for their uses. To overcome the server issue which was difficult and costly to manage, we decided to set up a cloud system which is much easier to use and reduces time for new deployment from 30 to 3 minutes.

Secondly, Ushahidi has been developed to be accessible even in remote areas or contexts where connectivity is low. This was a mandatory step to develop a crowdsourcing platform which is mainly designed for emerging countries.

Thirdly, Ushahidi is available on different devices from the Internet to a simple mobile phone, making it available to almost everyone.

Fourthly, the verification process of information is key. Testimonies must be verified. It depends on the organization deploying and what their strategy is for doing so. But Ushahidi provides guidance in the form of toolkits that help with charting effective strategies for crowdsourcing.

Finally, I cannot talk about key factors of success without mentioning our economic model which is a mix between funding, mainly from international foundations and digital companies, and a business and development scheme. In other words, we are a public interest organization designing open source software, combined with a business entity proposing custom solutions to clients (mapping tools, interactive data visualization, on-site training and support, etc.).

Question: Today, smart technologies are developed at the city level. Is Ushahidi an “urban model” that requires specific criteria that can only be found in cities or could it be expanded to rural areas?

J.R.: Using Ushahidi in places where connectivity and wireless service coverage are high will always be easier. However, Ushahidi has been designed

to be used both in urban and rural areas. During its launch in Kenya in 2007/2008, the technology enabled to report violence in cities as well as to gather information in rural areas.

The underlying idea of our model is to take into account the specificities of local contexts, such as the density of population or low bandwidth regions, and design appropriate solutions. Our team has always been working to develop technologies that can be operational even when connectivity is very low. For instance, we have recently launched a new technology called BRCK which is a connectivity device that aims to fit the needs of people living in areas, rural or even urban, where both electricity and Internet connections are problematic.

Question: What is the next challenges Ushahidi seeks to address?

J.R.: The next challenge that we are currently addressing is the conceptualization of what we call the “Ushahidi Tracker”. It is an interactive dashboard that gathers and analyzes active Ushahidi deployments throughout the world. It will enable anyone to explore reports from various regions, inspect top deployments and top active regions, select a particular time period and so on. It could be a powerful tool to monitor and analyze data in times of crisis. While developing Ushahidi Tracker (a first version of the software has been made public in October 2015), the Ushahidi team is also working on a new initiative called CrisisNET that aims to become the first platform dedicated to the world’s crisis data by aggregating deployments made through Ushahidi as well as thousands of other structured and unstructured data.

Question: The story of Ushahidi bears in witness the rapid rise in the use of new technologies in Africa and the opportunities these technologies offer to solve specific issues, notably in urban areas. According to you, what is the next issue that African smart cities should address?

J.R.: I think that there is an immense potential to use new technologies in order to reconnect governments and citizens in Africa. Indeed, new technologies could be considered as a bilateral way for local governments to engage with citizens, especially at the locality level. A grassroots approach could indeed enable authorities to come

“I THINK THAT THERE IS AN IMMENSE POTENTIAL TO USE NEW TECHNOLOGIES IN ORDER TO RECONNECT GOVERNMENTS AND CITIZENS IN AFRICA. INDEED, NEW TECHNOLOGIES COULD BE CONSIDERED AS A BILATERAL WAY FOR LOCAL GOVERNMENTS TO ENGAGE WITH CITIZENS.”

up with policies responding to people’s specific needs. Concerning crowdsourcing, the key opportunity for governments and organizations interfacing with the public is to see crowdsourcing as a way to connect with constituents in a way that establishes bottom up flow of information. There is an immense opportunity to optimize resources allocation and to implement a mechanism enabling effective response to citizens’ concerns and feedbacks.

Many interesting programs dedicated to foster the representation of communities, including marginalized ones, in local decisions have been developed recently. “*Map Kibera*”¹ is certainly one of the most inspiring. Started in 2009, the project aims at empowering residents of Kibera, one of the most marginalized informal settlements of Nairobi, through the use of digital tools. After releasing the first digital map of Kibera, Map Kibera has launched the initiative “*Voice of Kibera*”², which relies on the Ushahidi technology and aims at giving residents a chance to report any information relevant to them and their communities - thus making their voice heard by local authorities.

At the international level, there are interesting initiatives too. Through the project “*Making All Voices Count*”³, led by Hivos, the Institute of Development Studies and Ushahidi, grants are for instance given to programs promoting good governance and transparency in 12 countries across Asia and Africa. In the same perspective, a project entitled “*Municipal Barometer*” has been set up in the Netherlands, and is now duplicated in South Africa⁴. Led by the Centre for Municipal Research and Advice, it is a web-based tool that tackles the limited availability of local level government data in South Africa. It provides citizens with easily accessible data on various topics: use of public money, access to public services, governance and accountability, etc.

These few examples definitely demonstrate the capacity of new technologies to help citizens regain their decision-making power and voice their concerns at the city level and it definitely stands for one of the main challenges of smart cities in Africa.

1 <http://mapkibera.org/>

2 <http://www.voiceofkibera.org/>

3 <http://www.makingallvoicescount.org/>

4 <http://www.municipalbarometer.co.za/>

INFORMAL 2.0:

Seeing and Improving Urban Informal Practices through Digital Technologies The Digital Matatus case in Nairobi

Jacqueline Klopp

Associate Research Scholar, Center
for Sustainable Urban Development,
Columbia University

Dan Orwa

Senior Lecturer, University of Nairobi

Peter Waiganjo Wagacha

Associate Professor, School of Computing
and Informatics, University of Nairobi

Sarah Williams

Assistant Professor of Urban Planning
and Director of the Civic Data Design
Lab, School of Architecture and Planning
School, Massachusetts Institute
of Technology

Adam White

Co-founder of Groupshot



Research team mapping the network.
Source: Digital Matatus

Conceived out of collaboration between Kenyan and American universities and the technology sector in Nairobi, *Digital Matatus* shows how to leverage the ubiquitous nature of cellphone technology to collect missing data for essential infrastructure - including those with high levels of informality. The project captured transit data in standardized form for Nairobi's semi-formal bus system, developed the first public transit map for such a system and made the map and data free to the public, spurring innovation and improved services for citizens.

KEYWORDS

- TRANSPORTATION
- INFORMAL SECTOR
- DIGITAL TECHNOLOGIES
- TRANSIT-ORIENTED CITIES
- BOTTOM-UP APPROACH

While most cities develop sophisticated IT projects to make their organization smarter, the *Digital Matatus* case suggests the value of a much more modest and bottom-up approach: it encourages reliance on common technologies like cellphones to understand and improve existing urban services – that often involve informality – in emerging countries. By developing the first-ever high quality data set and map of the Matatu network (very common semi-informal mini-buses in Kenya), the projects promotes a new, low-cost and more practical vision of smart and transit-oriented cities.

INTRODUCTION

Transportation is an essential infrastructure of a well-functioning city. While in most cities of developed countries, official transportation systems are available and efficient, many cities in Africa and parts of Asia and the Americas still suffer from a lack of public investment in transportation and have to rely on privately run and often informal transportation solutions. In many of these cities, the majorities do not own cars and rely heavily on these semi-formal transit systems, which often are bus systems of various kinds. In a world faced with climate change and many problems stemming from urban car use, this could be an opportunity to build better, transit-oriented cities by investing heavily in improving transit. A first, incremental step to becoming transit-oriented cities involves using technology to better understand and optimize existing transportation systems and building on top of these to move towards well-functioning transit systems.

Nairobi is a typical example of these cities which have to cope with informal transportation solutions. The Matatus network for instance, made up of 80,000 mini-buses operating within the whole country (20,000 in Nairobi alone), has become a central part of Kenyan citizens' daily life. In Nairobi, less than 20% of the population has a car and 70% of the city's dwellers use Matatus every day. In this context, our research partnership, entitled "Digital Matatus", aimed to use modern digital technology to reveal, understand and provoke debates on this traditional and informal transportation network as well as to provide concrete data and information services to transit users and planners. Our project therefore embraces the challenge of informality and promotes the reconsideration of more externally driven and top down smart city ideas in the African context.

1. THE DIGITAL MATATUS PROJECT: THE FIRST MAP OF AN INFORMAL TRANSPORTATION NETWORK IN THE WORLD

The *Digital Matatus* project emerged from the shared concern of all the members of our consortium (Columbia University, University of Nairobi, Massachusetts Institute of Technology and Groupshot) about how to improve public transportation in Nairobi - and in African cities in general. Aware of the importance of informal practices in these contexts, the four partners joined their efforts and expertise in order to produce the first open data set and map of the *Matatu* network.

The first step of the project consisted in an in-depth exploratory field work in the city. After developing a protocol for identifying stops, from September 2012 to September 2013, six students of the University of Nairobi were each given an area to cover in which they were in charge of mapping the *Matatu* network. Through their mobile phones and very simple GPS technologies, they collected information on the bus routes, schedule, stops, etc. This field work represented a major logistical and organizational challenge: contrary to what is common in developed countries, there are neither signals nor ways to identify the *Matatu* network in Nairobi. In parallel, nine

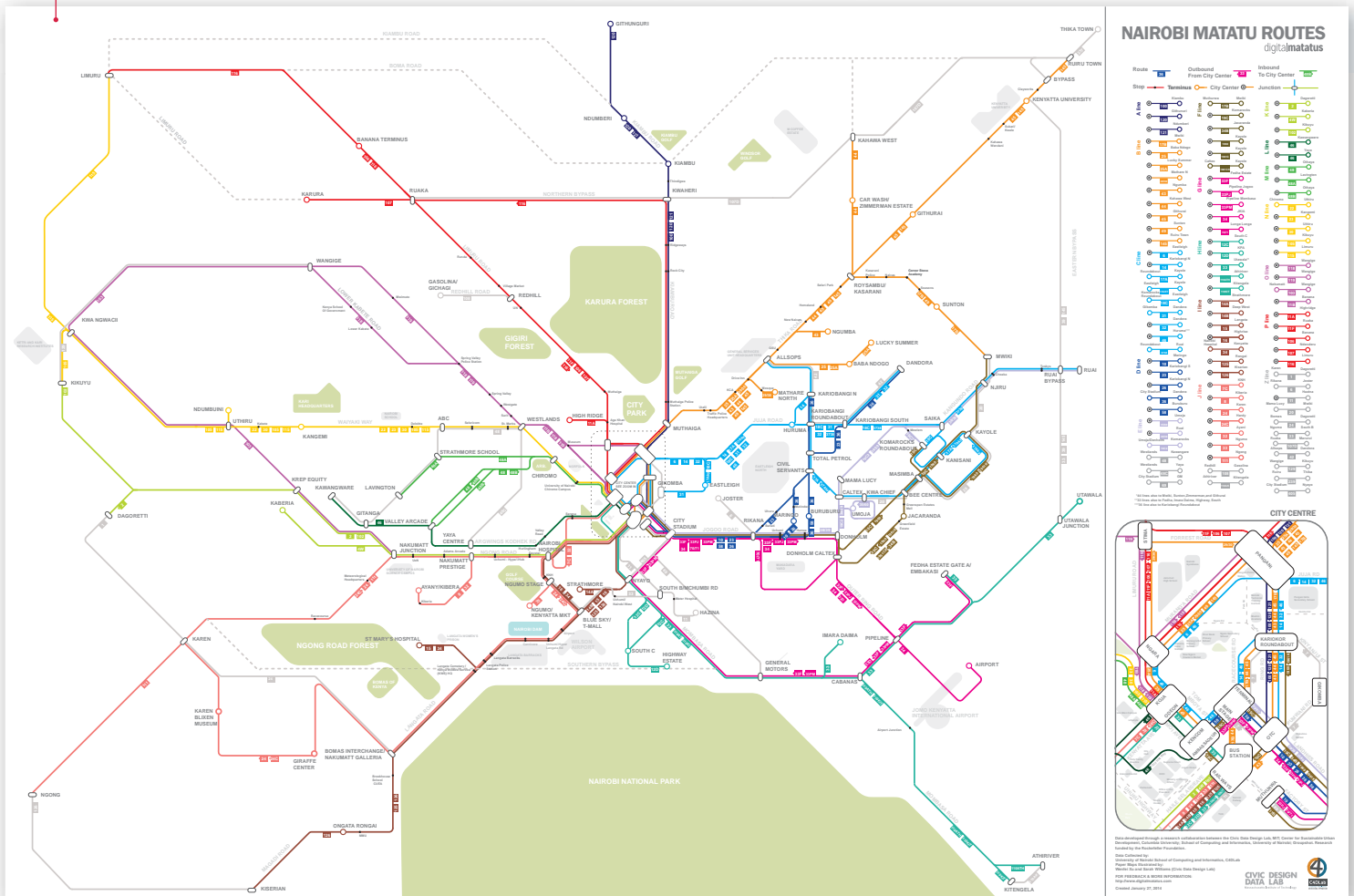
80,000 MINI-BUSES
(*Matatus*) operating
in Kenya (20 000 in Nairobi)

Less than
20% OF THE POPULATION
has a car in Nairobi

70% OF THE CITY'S DWELLERS
uses *Matatus* every day in Nairobi

students from the Massachusetts Institute of Technology were involved at various levels to analyze, process and clean the data collected. The MIT Civic Data Design lab then was able to use this data to create a public transit map much along the lines of a New York or London subway map.

Digital Matatus map and routes - Source: Digital Matatus



This data collection work enabled us to publish this first-ever map of Nairobi's *Matatus*¹ in January 2014. Contrary to common belief, the project demonstrated that the *Matatu* network was impressively well-organized and complex. A visual analysis of the network reveals how extensive the system is and also how overly centralized the system is in the city core causing some suboptimality in service. Surprisingly, despite the availability of mapping technologies and the critical importance of the *Matatu* system of the city, no one before us had taken the time to analyze and visualize this system.

2. A NEW VISION OF SMART CITIES

2.1. ARTICULATING TRADITION WITH MODERNITY: "INFORMAL 2.0"

While many cities are currently developing a wide-range of sophisticated IT projects aiming to make their organization smarter, we promote a much more modest approach: rather than importing expensive new transportation and IT systems, often generating conflict with existing operators and bypassing the local technology community, we encourage cities to draw on their own universities and technology eco-systems to better understand and improve *existing* urban services – that are reliable and functional (as our map demonstrated) – with very simple technologies.

Most of the time, smart cities are built on a top-down approach. Pursuing the objective of building "the" ultimate smart city, big IT companies are developing complex software and high-end technical solutions dedicated to improving the way our cities are organized. IBM's impressive Operations Center in Rio de Janeiro (part of the company's Smarter Cities Program and aiming at overseeing efforts in case of emergencies and crises) is one example of such innovations. Similar state-of-the-art initiatives have been launched in Africa. Google and IBM, for instance, have been trying to set up innovative projects in several African countries for some years, without achieving valuable outcomes. These difficulties are mainly due to the fact that these projects are generally oversized and inappropriate to local conditions. The continent's smart cities development has to be imagined differently, starting from the adoption of a different, more locally driven innovation framework.

Our consortium strongly believes that the informal sector constitutes a window of opportunity for African smart cities. In a context of massive

"SURPRISINGLY, DESPITE THE AVAILABILITY OF MAPPING TECHNOLOGIES AND THE CRITICAL IMPORTANCE OF THE MATATU SYSTEM OF THE CITY, NO ONE BEFORE US HAD TAKEN THE TIME TO ANALYZE AND VISUALIZE THIS SYSTEM."

urbanization and lack of economic opportunities, especially for young people, the informal sector remains a key component of African economies. Kenya is no exception: most Kenyan urban areas rely on informality, e.g. in slums, transportation system (taxi, collective buses, etc.), street trade, etc. Where most people see a hindrance to development, the *Digital Matatus* partnership considered it as an opportunity. African cities could indeed become smarter by combining these existing systems that work even with high degrees of informality with digital technologies. This constitutes the specificity - as well as the challenge - for African smart cities: how can they use digital technologies to optimize and also transform informal practices, with a bottom-up approach that builds on local initiative, creativity and knowledge?

Unlike many "smart city" projects that use state-of-the-art technology such as drones, *Digital Matatus* relies on tools as simple as phones and GPS technology – which are widely available and easy to use. Choosing this kind of data collection tool was strategic in that it made our project low cost as well as more accessible and suitable to the local context and people's involvement by allowing feedback on the system. Going beyond the mere optimization of a city's transport system, the project hybridized a traditional infrastructure with a modern tool. This constitutes a great lever for leapfrog innovation and can turn into a model for African cities' innovation strategy (and more generally, for cities in countries with high levels of informality in their service delivery). Hence, in spite of recurrent pessimistic stances about Africa's issues, our project adopted an optimistic perspective. The continent, far from being limited to catch-up innovations, is sufficiently equipped to address the "informal 2.0" challenges, perhaps in an even more innovative way than any other – as long as it recognizes and takes advantages of its existing assets, improving technology and local knowledge and capacities.

A matatu in Nairobi. Source: Digital Matatus



¹ <http://www.digitalmatatus.com/map.html>

2.2. THINKING SMART CITIES FROM A SOCIETAL POINT OF VIEW RATHER THAN A TECHNOLOGICAL ONE

Digital Matatus is not about technology but rather about understanding existing practices, expectations and concerns of local people. When it comes to smart cities, technology alone should never be seen as the silver bullet: if one wants a technological project to work, it is necessary to couple technology with a larger user-centric perspective. In the *Digital Matatus* project, this approach has been implemented through three main strands.

Firstly, we have always been convinced of the importance of engaging future users in the design process of such projects in order to get them onboard and raise their awareness. Thus, from the very beginning of *Digital Matatus*, we have engaged and built strong relationships with local stakeholders, from civil society to the Kenyan government. Many of them have provided the project with a favorable environment and/or direct support:

- **Nairobi's digital ecosystem:** the project has definitely benefited from the energy and innovation spirit of Nairobi's vibrant digital and tech community ;
- **The Kenyan government:** the government, already involved in technological innovation (e.g. it launched Africa's first online government data portal in 2011) has also been very supportive ;
- **Local academic sponsor:** thanks to the involvement of the University of Nairobi, the project has been strongly anchored in the city of Nairobi – which enabled us to rapidly move forward and spread our project within the community.

This strategic networking has been crucial, as it enabled us to gain important support and enhance the spread of the data and map. Local entrepreneurs were the first to use the data to improve numerous apps that help people find their way around the transportation system and local planners and researchers are also using the data and map for enhanced home grown research and planning processes.

Secondly, the objective of the project was not to produce a map *per se*: we wanted to develop a useful tool that could improve Kenyan citizens' daily life. In this perspective, we made the decision to convert the geo-location data collected with mobile technology from a semi-formal transit system to the General Transit Feed Specification (GTFS) data standard (a sort of "global" data language). This was a crucial choice as it enabled our data to be uploaded to Google and Open Street

Maps and easily used by application developers including Google, which now provides the transit app for Nairobi using our data. The construction of the GTFS data was a time-consuming task; however, these efforts were critical as they secured and strengthened the project's impacts. One of *Digital Matatus'* major objectives is now to make its data accessible to developers in order to enable them to develop useful and user-friendly transit applications. In this perspective, we co-organized in January 2014, the "*Transmobility Hackathon*", a 2-day workshop to develop new applications dedicated to urban mobility. So far, six trip planning applications use our data (Ma3route, FlashCast Sonar, Digital Matatu, Matatu Map, Moovit and Transit App). We can also start using this data to more objectively measure the *Matatu* system performance.

Thirdly, our current challenge is to keep our map updated and useful through time. *Matatu* lines are constantly evolving: new lines are created, others stop, and routes sometimes change. As a result, we aim to improve the data collection tools and approach to data collection and make it as simple and easy as possible and explore its usefulness in other cities. Data needs to be constantly updated and our initial data is now a benchmark that allows us, with each successive data update, to see how the system evolves over time. In this next phase, we are focusing on improving the data collection and updating tools to make easy updates of the data in a GTFS format and hence keep the data useful. This is why our consortium recently teamed up with Google for a two-year partnership to help create systems with local actors in Nairobi that can produce updates of the data. In this initiative, we are encouraging users to suggest updates of the data/map and to innovate in a streamlined way to create needed updates. By the end of this collaboration, a sustained system with relevant data updated -eventually in real time- should be accessible on Google Maps and also to local entrepreneurs for their use. Open data for all is essential to the impact we strive to achieve.

This user-centric project has been made possible mostly through the holistic approach of the team in charge of *Digital Matatus*. Relying upon the expertise of three universities (MIT, Columbia University and the University of Nairobi) and one company (Groupshot), the *Digital Matatus* team is made up of very different profiles: academics, technologists, cartographers, story tellers, designers, technology anthropologists, public policy experts, etc. This diversity helped to confront different points of view and to optimize the design process of the project – always keeping in mind our societal goal and providing for ample input from diverse actors including most critically drivers and users of the *Matatu* system itself.

“WHEN IT COMES TO SMART CITIES, TECHNOLOGY ALONE SHOULD NEVER BE SEEN AS THE SILVER BULLET: IF ONE WANTS A TECHNOLOGICAL PROJECT TO WORK, IT IS NECESSARY TO COUPLE TECHNOLOGY WITH A LARGER USER-CENTRIC PERSPECTIVE”

3. CHALLENGES AND PERSPECTIVES

Digital Matatus – as it invites cities in emerging countries to reconsider the way to innovate and to become smarter – still faces some challenges.

3.1. THE POLITICAL CHALLENGE: CONFRONT THE TRADITIONAL TOP-DOWN POLICY-MAKING PROCESS

Since the release of the map, reactions have been very enthusiastic. Many people and organizations such as UN Habitat or consulting agencies are using our data – which is a very positive signal. However, from a political perspective, the project has received a rather cold reception. Decision-makers in charge of transportation and urban planning in Nairobi were used to a top-down and centralized approach, and perceived our project as too innovative and perhaps, transparent. Conceived by civic activists willing to make cities more functional by promoting open source innovation and data-sharing, *Digital Matatus* is radically new for the political transportation establishment. Therefore, even though they appreciate the project, and of course use the data and map, it has been difficult to get them onboard with the larger vision. Since its inception, *Digital Matatus* has not been followed up by any specific public policy although it has raised public expectation around transit information services. This is surely a main challenge and we continue to engage policymakers and engineers and develop projects to demonstrate the power of this approach.

3.2. THE FINANCIAL CHALLENGE: ATTRACT NEW SOURCES OF FUNDING AND INVESTMENTS

Even though *Digital Matatus* is globally perceived as valuable and useful, only a few philanthropists and investors are willing to finance the project which creates an open data commons in transit information. Until now, the Rockefeller Foundation has been the main funder and our priority today is to find new investors from the private and the public sectors. In Africa, there is a lack of adequate public funding to support and scale up initiatives like this. Ideally, governments take an interest in this grounded and locally anchored vision of “smart” transportation.

3.3. THE SCALE-UP CHALLENGE: STRENGTHEN OUR IMPACT IN KENYA AND ABROAD

Finally, our ambition is to scale-up our project, both in Kenya and abroad.

Digital Matatus - and related applications that use our data - can have a tremendous social impact in Kenya. The project facilitates traditional ways of travelling and opens new opportunities for citizens: they can now use their phone to discover places in the city that they may have never heard of and feel more secure knowing where they are going. They can also feel empowered by suggesting new routes or complaining about existing ones. That is why the reach of our data and map needs to be extended and also used as a way to bring transportation planning more to the ground where it belongs. With a mobile and an Internet penetration of respectively 83% and 58%, Kenya has a flourishing digital environment but there is still room for improvement. The spread of smartphones in Kenya will also benefit the project: more and more people will be able to contribute and upload in-time data to suggest updates to our map. Moreover, *Digital Matatus* needs developers that keep creating user-friendly applications relying upon our data to make our map as accessible

as possible and also layer with other forms of data to create new applications and insights into the system. Our team is currently developing further collaboration with *Ma3route*, a popular application that gives trip planning information but also crowdsources information about traffic conditions and crashes reaching around 300,000 users.

Beyond Kenyan borders, many cities (Accra, Lusaka, Managua, Maputo, etc.) have expressed an interest in the project and are at various stages of replicating it. For the *Digital Matatus* team, it is exciting to see how well the approach travels and what adaptations occur as it moves to different contexts. We are eager to share what we have learned during the last four years with interested cities and also create more of a resource center for them so they do not have to struggle as hard as we did at the beginning. In addition, we will face financial and technological challenges: just like in Nairobi, it is difficult to raise funds for such initiatives in other cities and we will need systematic learning procedures on how this approach needs to be adapted to different contexts and transit systems. Despite these challenges, this scaling-up phase is thrilling. We are convinced that we can learn a lot from other urban areas – not only in emerging countries, but also in advanced ones. For instance, applications developed for Western cities such as Uber Pool (organization of shared taxi) or Bridj (Boston-based pop-up bus service) have some similar features to our approach, and we could take mutual inspiration from these ways to innovate using technology to create more efficient transit services that respond to real time demand.

CONCLUSION

Digital Matatus constitutes, in the African context, a breakthrough innovation that invites us to reconsider the more top down, standard smart cities framework. It is crucial to follow a bottom-up approach to undertake initiatives with, from and for citizens. Local practices married cleverly to popular technology to create data, understanding, and service have huge potential for transformation that should be taken advantage of and built upon. Surely, African smart cities will not be imagined and lived by IT corporations like Google and IBM but by urban dwellers, local service providers like the Matatu operators and local technology entrepreneurs themselves.

REINVENTING LOCAL FOOD SUPPLY IN CONNECTED CITIES:

The example of The Food Assembly

By The Food Assembly team



The Food Assembly
Picking up of members' orders

KEYWORDS

- SHORT FOOD SUPPLY CHAINS
- DIGITAL PLATFORM
- LOCAL CONSUMPTION
- SOCIAL TIES

The Food Assembly (La Ruche Qui Dit Oui ! in French) is a social and collaborative enterprise created following a two-fold observation: crop and livestock farmers face financial difficulties while end-consumers aspire to new modes of consumption.

*By leveraging new technology and a decentralized physical network, **The Food Assembly** aims to encourage the scale-up of short food supply chains. So far, this initiative has met with considerable success, especially in cities. This article looks back at the key factors underpinning the success of this initiative and the way in which digital technology can lead to reinventing food supply in connected cities.*

INTRODUCTION

Over the past decade, conventional food distribution supply chains and modes of consumption have been increasingly called into question, especially in developed countries. On the one hand, crop and livestock farmers are now facing financial difficulties that undermine the viability of their activity. On the other, consumers aspire to new modes of consumption that are healthier, better for the environment and more transparent. This trend is all the more evident in cities with a high concentration of households with high purchasing power.

This joint observations led to the creation in 2011 of The Food Assembly concept in France. Marc-David Choukroun (the current CEO), Guilhem Chéron, and Mounir Mahjoubi created The Food Assembly with the aim of putting producers and consumers directly into contact with each other using new technology. The idea is to draw on the power of digital technology to develop short food supply chains (SFSCs) and to allow consumers to “eat better and shop fairly.”

The Food Assembly platform makes it possible to create and manage a local and independent SFSC community, connected to a network of other SFSC communities.

Seven “Assemblies” were created in 2011 as part of a pilot project in France. The following year, The Food Assembly was certified a Social and Solidarity Economy (SSE) company. In 2013, the initiative won the City of Paris’s Grand Prize for Innovation. Today, there are more than 850 in France – a third of which in urban areas – and more than 300 in other countries (Italy, Belgium, United Kingdom, Spain, Germany, Netherlands, Switzerland and Denmark).

1. THE FOOD ASSEMBLY: AN ONLINE PLATFORM TO SCALE-UP SHORT SUPPLY CHAINS

1.1 DIGITAL INNOVATION AT THE HEART OF THE MODEL

The Food Assembly was created to enable the scale-up of SFSCs, which are defined by the French Ministry of Agriculture as “a method of selling agricultural products either directly by the producer to the consumer or by indirect selling providing there is only one intermediary.” SFSCs have been created over the past few decades in France and elsewhere in the world by a range of stakeholders (Teikeis in Japan, CSA - Community Supported Agriculture – in the United States, Jardins de Cocagne and AMAPs in France, etc.), but they are often difficult to scale up.

To overcome these obstacles, *The Food Assembly* opted to leverage digital technology that can put tens of thousands of consumers and producers into contact with each other simultaneously. The company is now one of the leading stakeholders to have used new technology to create SFSCs.

The 850 Assemblies currently operating in France hold weekly markets where consumers come and meet the producers and collect their food orders placed online. The SSE company is present via an easy-to-use platform enabling consumers to join an Assembly free-of-charge (close to their home or place of work, for example) and then place weekly orders if they want without any particular obligation. All the products sold (fruit and vegetables, meat, dairy products, etc.) are produced near each Assembly, on average within 43 km, in France, and a maximum radius of 250 km. The selling prices are set by the producers themselves. No purchase-resale system is implemented: the consumer pays 100% of the price to the producers. One of the model's advantages is the speed of the transaction: the producers receive payment within two to five working days. They then pay 8.35% of this amount to cover service costs to the “Food Assembly” enterprise (see box below), which supplies the digital tool and back-office, and 8.35% to the Assembly Host who organizes the sale and distribution of the products each week.

1.2. DESIGNED FOR PERI- URBAN AREAS, THE PROJECT WORKS JUST AS WELL IN CITIES

The model was initially designed for consumers in peri-urban areas where communities have limited access to local shops. However, the Assembly model was quickly adopted by city-dwellers, especially in large cities, who have expressed a strong desire for new modes of consumption. For producers, cities provide a new outlet that can, in some cases, make up for the weaker demand in their local area. For example, many producers who sell their products in Paris come from the regions located in the north of the city where there are fewer opportunities for direct selling. Supplying cities is a significant source of income for producers.

“THE FOOD ASSEMBLY IS ONE OF THE FIRST STAKEHOLDERS TO HAVE USED NEW TECHNOLOGY AND SOCIAL NETWORKS TO SPEED UP THE DEVELOPMENT OF SHORT FOOD SUPPLY CHAINS.”

2. IMPACT OF THE MODEL ON URBAN AREAS

The aim of the model is to create bridges between rural producers and urban consumers through the use of digital technology. The impact of the model on cities is environmental, social and economic.

REDUCING THE ECOLOGICAL FOOTPRINT

SFSCs aim to minimize the ecological footprint by encouraging production and consumption at the local level. While no product travelling further than 250 km may be sold through an Assembly, the average noted in France across the network is 43 km. By comparison, the ingredients for an industrial yoghurt travel 9,115 km before reaching the end consumer.

EMPOWERING ASSEMBLY HOSTS

Managers of their Assemblies and organizers of the physical distribution of the products, 60% of Assembly Hosts are self-employed. At present, for most Hosts, this is an additional activity that provides them with the 8.35% of the sales made through their Assembly, or an average of €500 per month. Around 80% of Hosts are women. They generally share the aim of bringing about new modes of consumption and find that this activity not only gives them additional monthly income but for most of them it also provides a springboard for the creation of a new business activity.

CONTRIBUTE TO SOCIAL TIES

In addition to the sale and purchase of products, the Assemblies often provide a means for reducing isolation and encouraging contact between the rural and urban worlds. Many Assembly Hosts arrange visits to producers' farms. Recently, one Association's members helped a market gardener plant 600 trees on his land. The distributions, held in a physical locality, are also opportunities for residents to meet each other as well as producers, some of whom are present during distributions to deliver their products.

The Food Assembly model also allows for social ties to be created within neighborhoods and among network members. The Assembly Facebook groups allow members to send each other messages (advice, share recipes, swap services, loan equipment, etc.). Outside the actual digital tool, many Assembly Hosts unite their community by organizing events. For example, one Parisian Assembly organizes a “Grande Marmuche” or “Big Assembly Meet” every quarter, which is attended by around one hundred members who come together to cook and share a meal.



The Food Assembly
Example of a distribution point

RECLAIM PUBLIC SPACE AND BREATHE NEW LIFE INTO SHOPPING AREAS

Some distribution points are located in public spaces like event centers or public spaces. Others take place in cafes or restaurants bringing in additional customers in exchange for the provision of free space for a few hours a week (people come to collect their order and take something while there: a coffee, drink or even a meal). Recently, *The Food Assembly* also formed a partnership with SNCF-French Railways. Assemblies are held in 35 stations today; the target is to double this number to around 70 by the end of 2017. This partnership is part of an approach for users to reclaim the public space in stations.

“THE ASSEMBLY MODEL WAS QUICKLY ADOPTED BY CITY-DWELLERS, ESPECIALLY IN LARGE CITIES, WHO HAVE EXPRESSED A STRONG DESIRE FOR NEW MODES OF CONSUMPTION.”

3. KEY FACTORS UNDERPINNING SUCCESS: A DECENTRALIZED MODEL ARTICULATING A DIGITAL PLATFORM AND A DECENTRALIZED PHYSICAL SPACE

The main factors underpinning the project's success are:

A DECENTRALIZED NETWORK WITH SEVERAL STAKEHOLDERS:

The Food Assembly model places considerable emphasis on initiative and the entrepreneurial spirit of the Assembly Hosts. This makes *The Food Assembly* a decentralized, diverse and innovative network. It relies on four stakeholders:

THE ASSEMBLY HOSTS sit at the heart of *The Food Assembly* project. There are around 850 independent people who have decided to open their Assemblies and to offer local products for sale in their neighborhood. They identify the producers and must provide products from at least all five of the basic food categories, i.e., fruit, vegetables, meat, dairy products and bread. Once a week, they open the online sales and organize the physical distribution at the venue they have selected, made available free-of-charge or rented, during which the members come and collect their products from the producers. The Hosts can, if they want, organize events to help

develop community life and to create ties between consumers and producers. Since September 2011, more than 67,000 distributions have been held in France.

THE PRODUCERS: *The Food Assembly's* 5,000 producers are professionals, farmers or artisans. They sell directly or online to groups of consumers (Assemblies), which generally are just one sales outlet among many for them. More than €75 million has been paid to the producers registered with the Assemblies in the past five years.

THE CONSUMERS: the 175,000 people who have become members of one or several Assemblies are free to order whatever products they choose and then come and collect their purchases during the distribution. An Assembly's average basket is around €40 in France, with significant differences depending on the region and Assembly.

THE "FOOD ASSEMBLY": this is the SSE company whose task is to provide the tools (web platform) for producers, Assembly Hosts and members to communicate with each other, and to unite the network (support for Assembly Hosts, producers, etc.). One half of the "Food Assembly" team develops the web platform and the other half provides support for the networks of producers and Hosts to help them develop their activity.

This network organization means responsibilities and roles can be shared between stakeholders. It allows the model to evolve and adapt to producers' and consumers' needs. In short, there are as many *Food Assembly* experiences as there are Assembly Hosts' experiences. Each person has the possibility of opening his or her own Assembly and this has allowed the initiative to develop rapidly across regions.

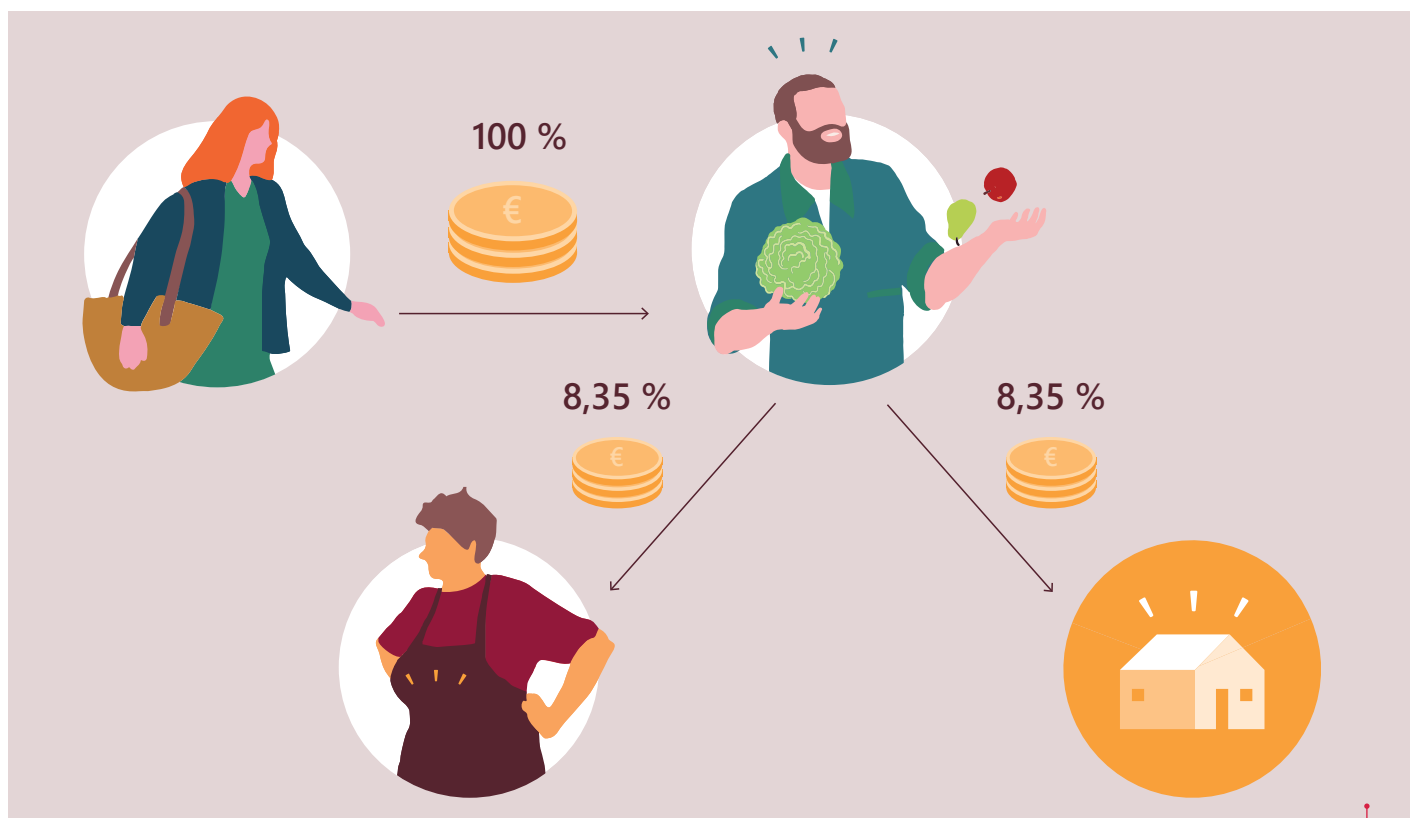
AN EASY-TO-USE DIGITAL TOOL AND CONSTANTLY UPGRADED SOFTWARE

The digital interface has been designed to be easy for all stakeholders to access and use: producers (manage their profile, catalogue, stock and online orders), Assembly Hosts (promote sales) and members (access to the communities and online payment). *The Food Assembly's* success is dependent on making the tools easy to access and use.

There are 40 people engaged in developing the digital interfaces in order to constantly improve them in terms of design, member experience, etc., and to continuously look for technical solutions to the stakeholders' needs.

A HYBRID CONCEPT BETWEEN AN ONLINE PLATFORM AND A PHYSICAL SPACE

The models used by digital platforms are sometimes criticized for their anonymous and impersonal aspects. *The Food Assembly* decided to articulate the online platform with the organization of weekly physical markets. The reality of *The Food Assembly* materializes each week for the consumer through the Assembly Host and the producers they meet.



The Food Assembly
The way the service charge is used



The Food Assembly
Farm in Chauvry (France)

4. THE NEXT CHALLENGES FOR THE FOOD ASSEMBLY

The Food Assembly is facing several challenges at the city scale. These challenges concern the producers, Assembly Hosts and consumer members.

PRODUCER ISSUES

- 1. Optimizing logistics.** Travel time to get to and around cities, parking problems and truck access in cities are major challenges that need to be resolved for SFSCs in large cities. Logistics is often considered one of the obstacles for SFSCs and accounts for 15 to 30% of a product's selling price.
- 2. Integrating urban farmers:** in 2017, *The Food Assembly* tested working with urban farmers, such as Agricool, which grows strawberries in containers in the French capital; Le Paysan Urbain, which grows edible bean sprouts in the Paris region; and French company La boîte à champignons which has created boxes for growing mushrooms in coffee grinds. The aim is to work under partnership arrangements with the various urban stakeholders to invent the city of the future. For example, the City of Paris has made a strong commitment to developing urban agriculture within its territory. It is planned to develop 100 hectares by 2020 on rooftops, walls, etc.). Digital tools can help

develop these urban initiatives by linking more easily and more smartly – to adopt the smart city terminology – urban producers and consumers.

HOST ISSUES

- 1. Access to distribution points:** Assembly Hosts are always looking for visible and accessible places to organize their distribution operations. In many cases, venues can be made available free-of-charge (restaurants, cafes, shops, etc.). Venues can also be public spaces. City authorities could help identify spaces and make them available for distributions when they are not being used for other purposes. Digital technology could again help optimize venue use and provide information more readily (list of available venues on line, etc.).
- 2. Professionalizing Hosts who express the desire to upskill:** here, the issue is to provide these Hosts with daily support for their business. In 2017, more than half of all Hosts expressed the desire to go professional, that is to grow this activity and make it a more significant part of their income.

CONSUMER ISSUES

Greater recognition of the diversity of consumers, their needs and food habits: the model offered by *The Food Assembly* does not work everywhere in the same way. For example, in London, there are 13 Assemblies, but the volume of orders is so far much smaller than in Paris. There are several possible reasons for this: the logistics, mentioned above are more complex for the producers and the existence of several delivery systems, including to small specialist food shops, and Londoners' food habits. *The Food Assembly* needs to adapt its offer to its urban consumers, their needs and their constraints, which can be far greater in urban than in rural areas.

THREE QUESTIONS TO RAPHAËLLE MOREAU, ASSEMBLY HOST AT THE PALAIS DE LA FEMME IN PARIS

**Raphaëlle Moreau, 28, is a business developer/
key account manager at Doctolib, France.**

For the past 18 months, she has also been the Assembly Host at the Palais de la Femme in Paris's 11th Arrondissement.

COULD YOU BRIEFLY EXPLAIN TO US THE ROLE AND DAY-TO-DAY WORK OF AN ASSEMBLY HOST?

Obviously, the first step is to set up your Assembly by applying to The Food Assembly. You will need to have found a venue to organize the distributions. The case of the Assembly I manage is a little different as I took over an Assembly project in the 11th Arrondissement at the Palais de la Femme. This is a Salvation Army establishment for preventing social exclusion among women. The Palais de la Femme offered to provide the venue free-of-charge to open an Assembly on the condition that it included a solidarity component for the center's residents.

Once the venue has been found and the application accepted by The Food Assembly, the Host's task is to put together the offer by contacting producers (site visits, identifying new suppliers and relying on existing suppliers, etc.) to select the products. The Assembly I manage is a "solidarity Assembly." This means the members have access to a list of products while a "basket of products" is provided for the Palais de la Femme residents for €5. This basket is sponsored by our producers. The Assembly members can also purchase solidarity products if they wish, which are then distributed to the Palais residents.

Once the Assembly has been established, the day-to-day role of a Host is to organize sales: contact with producers, selection of products from the producers' catalogue, emailing Assembly members with details of the next sale, etc. The sale is then open on the digital interface and the members have around one week to place their orders. After the sale has closed, the Host organizes the distribution with the assistance of volunteers if necessary along with several producers on site. Then, you have to manage the after-sales aspects (products missing from a basket, any damaged items, call members who have forgotten to come and collect their order, etc.). At the same time as the sales, Hosts also act as moderators of their network of members and producers: they provide recipes online, present the producers, arrange product tastings, etc.

It's very time-consuming at the start – about two days a week for around two months during the opening phase – but over time, things fall into place. Today, it takes me three to four hours prior to sales and one evening a week for the distribution.

WHAT DO YOU GET OUT OF MANAGING AN ASSEMBLY?

I'm a country girl. When I came to Paris, I missed this contact with the rural world. I was a member of an Assembly, but I soon wanted to do more. I like the contact with the producers and the relationships we build up. The idea of making even a modest contribution to reducing our ecological footprint appeals. An Assembly also helps develop community life: a lot of members send us messages saying that the Assembly is a focal point for the neighborhood. The solidarity aspect that we offer with the Palais de la Femme is also a way of feeling useful. Ultimately, it is a gratifying experience because it is a personal achievement.

IN YOUR VIEW, WHAT IMPACTS DO THE ASSEMBLIES HAVE ON A CITY?

I think the Assemblies have a very local impact, at the neighborhood level. People don't know each other and then they start coming to the distributions together, place orders for each other, and so on. We create a mini-community within a neighborhood. This community meets during the distributions but maintains its contact outside these times thanks to the digital interface where people can talk, keep in contact, etc. The Assemblies can also be a way for people to get to know their neighborhood better or to rediscover certain aspects of it. For example, not many people, even the locals, are aware of the Palais de la Femme's existence.

3 PERSPECTIVES: KEY FACTORS OF SUCCESS TO SCALE-UP SMART CITIES



In the final part, we look at practical methods for systematically deploying the best practices highlighted in this issue.

First, Elisabeth Lulin describes public services 2.0, a new framework for creating local public services.

The idea behind public services 2.0. is to offer a conceptual framework for interactions between self-organized collaborative initiatives and more centralized policy strategies.

Public services are generally driven by what can be termed the “vending-machine” approach: people who pay their taxes expect a service in return and are quick to complain if the service delivered fails to meet the expected level of quality. Looking ahead, it will become possible to switch to platform models where users themselves also contribute to the public service. In other words, the trick is to identify how to enable authorities responsible for organizing services to draw on collaborative citizen-led approaches. Those responsible for delivering the service—public authorities and private utility companies—will no longer be the service’s centralizing architects, becoming instead facilitators for collaborative services.

The second issue is to make public-private partnerships systematic, as they alone can foster the emergence of the truly smart city. The key is to use public-private partnerships to interconnect collaborative practices and public policy, combining the common good with citizen self-organization.

This is the position advocated in articles from IBM’s Philippe Sajhau, C40, and Josep-Ramon Ferrer, previously Barcelona City Council’s head of digital. These three articles set out practical steps for cities seeking to construct a smart balance between technological innovation and social change.

They also highlight how these new mindsets apply as much to new ways of making things (fablabs) as they do to new forms of political and environmental mobilization (C40).

David MÉNASCÉ
Coordinator

IBM – BUILDING SUSTAINABLE CITIES THROUGH PARTNERSHIPS and integrated approaches

Philippe Sajhau

Vice-President IBM France, Industry Solution Team, Smarter Cities, Energy-Utilities & Telecom-Media



After graduating from *Supelec* and a year spent with the French Alternative Energies and Atomic Energy Commission (CEA), Philippe joined IBM where he has held numerous positions. In July 2012, he was appointed Vice-President IBM France, in charge of the “Smarter Cities” initiative, one of the multinational’s flagship projects. He also heads up the company’s Energy-Utilities team.

Deputy mayor of Nogent-sur-Marne responsible for the energy transition and digital innovation, he also chairs *Syntec Numérique’s* “City” committee.

Philippe Sajhau is a committed and dedicated man who is passionate about issues involving the city. He is the author of the *Smart Utilities and Cognitive Cities*¹ blog that addresses Smart Cities issues. He also attends many conferences about this topic at France’s Grandes Écoles.

KEYWORDS

- CONNECTED CITY
- URBANISATION
- SUSTAINABLE DEVELOPMENT
- BIG DATA
- ANALYTICS
- COGNITIVE COMPUTING
- DATA COLLECTION

¹ <https://smartercities2016.com/> (in French only)

In this article, Philippe Sajhau first proposes to redefine the smart city in order to understand better the issues it faces, namely, growing urbanisation and the need to adopt more sustainable development.

For the author, technology remains the means for this approach and not the end in itself. In addition to the aim of reconnecting with more sustainable development, other advantages from acting in short term should encourage elected representatives and local authorities to invest in this area: regional economic growth, economic savings for the community, and the tangible benefits for the city’s residents (improved transport, energy consumption, quality of life, etc.). Within this context, IBM’s role is to support smart city projects by working closely with industrial partners and service operators, in France and abroad, and to provide its expertise in data collection, analysis and intelligence.

INTRODUCTION

What do we really mean when we talk about “Smart Cities”?

This term grates for many. Does it imply that city dwellers are smarter than country folk? In order not to enter into this pointless debate, IBM has rather opted to use the term “Smarter Cities”. Various terms are currently used to refer to this “smart city”: connected cities, sustainable cities, ingenious cities and inclusive cities, to name just these. So, how to define the smart city?

Two elements need to be taken into account. First, the prerequisite remains technology and Internet connection. The connected city is not a new subject and has been around in France for some two decades. The current projects for the installation of high-speed networks across the country are part of this rationale. Technology therefore remains the necessary basis for any smart city strategy. Then came the concept of the “smart city”, which aims to respond to the new challenges of urbanisation. A dual phenomenon is indeed at work here: on the one hand, high demographic growth with the world’s population doubling in 50 years, and on the other, massive urbanisation, as evidenced in the multiplication of metropolises in France. At the global level, this means that 70% of the population will live in cities by 2040. In this new context, the question is to know if technology will improve how we experience this urbanisation

phenomenon, from the perspective of sustainable development, that is, enabling us to pollute less, consume less, travel more intelligently, etc. The smart city can therefore be defined as the clever balance to be found between technology, as the basis, and the ambitious goal of sustainable development and improved urban living conditions.

We currently have at our disposal a certain number of technologies: big data, analytics², mobility solutions (that is, the app), social networks, the cloud (which remains the essential technological basis that has allowed a step change and so lower costs for the sector), etc. Two new solutions, currently being rolled out, will in the future allow us to go further in data collection and processing: connected devices—the Internet of Things or IoT—and cognitive computing. As the ‘all-technological’ is not the aim, the challenge now is to know how to apply these tools to achieve more sustainable development.

² Analytics corresponds to the analysis of large quantities of data using mathematics, statistics and computer software. Analytics can identify trends, assess performance or analyse the effects of certain decisions with a view to improving knowledge in the relevant field.

1. AN ATTEMPT TO DEFINE THE SMART CITY

The topic of the city and digital technology dates back 25 years. So why talk about the smart city today? It is difficult to precisely define what a smart city is. There is no yardstick or criteria for measuring a city’s level of ‘intelligence’. We can only say that this or that city is a prime example (Barcelona, Lyon, Amsterdam, etc.), thanks to various rankings published each year.

At IBM, we have identified three criteria that can be used to characterise a city as being ‘smart’ (and to distinguish it from a digital city):

- **The presence of data platforms** that can collect and aggregate a vast volume of data from different sources.
- **Relevant information available at the regional level.** Data platforms must make it possible to redistribute useful information in an intelligible manner: data observed through open data as well as predictions made using analytics³ and cognitive computing.
- **Citizens’ participation in the process.** This participation may be more or less active. For example, IBM has signed a partnership with the car manufacturer PSA to collect and analyse data from car sensors, with a view to developing the car of the future. In this case, the drivers’ participation is passive, although it is of course essential they authorise the data’s collection. Similarly, under its Environmental Urban Monitoring project in Nice, for which IBM works with Veolia⁴, we analyse when cars’ ABS controllers are activated. The data is then used to identify the areas where ABS are frequently activated, and to send out agents onsite to rectify

³ Analytics is the analysis of data in large quantities, through mathematics, statistics and computer software. Analytics can identify trends, evaluate performance or analyze the effects of certain decisions, with the objective of improving knowledge in the field.

⁴ See article about this topic: “Urban Environmental Monitoring”, page 24

“AS THE ‘ALL-TECHNOLOGICAL’ IS NOT THE AIM, THE CHALLENGE NOW IS TO KNOW HOW TO APPLY THESE TOOLS TO ACHIEVE MORE SUSTAINABLE DEVELOPMENT.”

any problems (potholes, poorly sequenced traffic lights, etc.). In other cases, citizens’ participation needs to be more active, such as when each individual contributes to entering data. Apps, like Waze, are based on this type of process.

The smart city goes well beyond mere technology. The “all-technological” is not an end in itself and many criticise such a perspective. Digital tools are only of limited interest so long as they are not serving a greater ambition, that of changing citizens’ behaviour. We should not lose sight of the real aim: more sustainable development. Over and above mobile apps, it is a behavioural change that is targeted. Sites like Blablacar, Uber or AirBnb invite us to adopt new ways of getting about, travelling, etc. But without technology, these platforms would not have existed. And without these platforms, behaviour would certainly not have evolved as quickly as it has.

2. WHY CREATE SMART CITIES?

While the long-term aim of smart cities is sustainable development, some of the advantages are visible in the shorter term. And they may help convince decision-makers—local and regional authorities in particular—to invest in this area.

These benefits are evident on three levels:

- **Regional economic growth.** Investments in the smart city will attract numerous economic players to the region (start-ups, companies, universities, competition hubs, etc.). They will unify new investments, create jobs and new professional dynamics. Several French cities can testify to this economic upsurge: Lyon, which has invested heavily in the new Confluence district; Nice, with its Nice Méridia project involving IBM; or Montpellier, where, as a key stakeholder in French Tech, we have contributed to this region’s recognition.

- **Economic savings for the community.** The smart city then allows the local authority to make savings in its operation and management budgets. In Lyon, the Hublot project led by Veolia has improved the drinking water network's efficiency and reduced non-revenue water (due in particular to leaks) from 20% to 15%, by using an app to observe the network in real time and to respond to any malfunction in under two hours. In Nice, savings of around €200,000 to €300,000 have been made in the waste collection system thanks to sensors we have installed at several drop-off points and which transmit data (container fill rate, temperature, etc.). Cross-referenced with other data (road traffic, cultural events, etc.), this data optimises the collection trucks' rounds.

In addition to strictly economic savings, these initiatives are also an opportunity to renew the relationship between the city and its operators. With real-time network supervision, the smart city can recreate a relationship of transparency between the operator and the contracting authority. These savings are now crucial to devising a smart city policy.

- **Benefits for the citizen.** While sustainable development remains the long-term goal, in concrete terms it means improved day-to-day quality of life for all: spending less time commuting, consuming better, guarding against pollution or allergies, etc. Still, this aspect of the smart city raises new questions. While all stakeholders agree on the benefits of digital technology for citizens, the issue of who will pay remains. Not all regional or local authorities are ready to take this step. And yet, a simple analogy could convince them: local authorities are prepared to subsidise associations, so they could similarly finance start-ups that develop useful apps for their citizens. Apps that minimise citizens' travel time, for example, also tie in with a public interest rationale: citizens save time, feel reassured, etc.

However, most authorities currently believe that it is the operator who should pay for such apps. But the operator is not in a position to launch into such projects for which it does not have control over all the elements. For example, a bus network operator does not simultaneously manage the rail network and so is unable to create a relevant app by itself. The smart city requires a high degree of cooperation between the stakeholders. This can only be achieved by the client (local authority or other management authority), which must therefore provide the funding. However, most authorities have not yet clearly grasped this dynamic or the central role they must play.

Hence, the challenge is to get them to understand these arguments, especially regarding return on investment and responsibility.

The three issues discussed above are the three pillars that must support any smart city ambitions: a time savings for citizens, money savings for the authority, and economic growth benefits for the region. These three elements have one thing in common: sustainable development.

There is one final point that needs to be kept in mind: when we refer to sustainable development we are not just talking about the mere "ecological aspect". It is in fact a vital issue for human survival in the years ahead. Given the rate at which urbanisation is increasing and given that 77% of the French already live in cities, it becomes obvious that new solutions are needed to make living in cities easier, and to protect the life of each individual. For this reason, at IBM, we are convinced of the importance of these initiatives. It's not a question of aesthetics but of survival.

3. FACILITATE DECISION-MAKING

IBM has never stopped reinventing itself to provide its clients with even more value and anticipate or even create new technology. Our strategy today is mainly based on three areas:

- **Cognitive computing with the Watson program.** The aim is to make structured and unstructured data intelligent and to improve decision-makers' 'intelligence', in which case, we refer to augmented intelligence. This system is in no way intended to replace individuals, but rather to help them make decisions, to anticipate and process masses of data generated in particular by the IoT, which current technology will be increasingly incapable of processing.
- **The cloud.** This goes hand-in-hand with the SaaS (Software as a Service) approach. It completely changes the scope of costs and allows for far more agile action and development by testing faster the new projects clients are working on, and to test them very quickly with the user.
- **Industry.** Our aim is to extend the scope of our value added for industry solutions and to upskill our teams to work better with our clients.

Through the 3000 projects we have developed in the field of smart cities, we have progressed our approach in response to cities' needs and the new possibilities provided by digital technology.

a) Adopt a partnership approach

Our core business is data and will continue to be so. Beyond that, there are many major stakeholders working daily with cities on buildings, energy, water, waste and transport, for example, such as Veolia, Bouygues, EDF, Vinci and Transdev. We have therefore decided to provide our expertise to these companies around digital topics, to help them step up their digital transformation both in terms of solutions and internal transformation.

Our strategy also involves signing partnerships with some of these major operators to share our respective expertise and learn from each other: IBM contributes expertise in digital topics, and the operator brings its business knowledge.

We have signed a global partnership with Veolia covering water network optimisation topics. As a result we have jointly taken to market digital solutions for water network managers worldwide, and we are already having success internationally.

We are also working in France with SPIE on electric charging stations, and with Engie on video-protection.

We believe this approach is the most relevant and will deliver the greatest agility. The city's difficulties are no different to those facing all industries (transport, water, mobility, buildings, energy, health tomorrow, etc.). It is not our role to become an expert in each field; it is to support operators with their projects and to work with them on their customer paths, optimising their contracts, and reducing the investment needed so they can win more business.

For example, we have in our offices, a design thinking studio, which can work on a client issue in 48 or 72 hours, often dealing with the digital interface in their customer paths, bringing together, on their behalf, various internal and external stakeholders, to describe this path and then create a prototype to solve the question. We are then in a position to provide the means to industrialise this solution and assist the company with its transformation and rollout by generalising the approach.

The support we provide can benefit large groups and startups alike. We have just inaugurated our 'Scale zone' which is open to 'classes' of startups throughout the year based around a major company or shared topic, and we work with them to achieve industrial scale and to meet potential major clients.

For example, at present we are hosting startups that use the Sigfox network (the main network used in the area of the IoT, and so for smart cities).

b) Facilitate collecting and aggregating data

Our second mission involves facilitating the collection of data from various sources (notably thanks to big data and the IoT), and then to aggregate it. A smart city needs to pull together on the one platform all the data concerning its territory. Then, companies can use this data through big data and analytics or cognitive computing to develop new mobile apps and come up with new services for the city's residents. This first data aggregation step is crucial. It is necessary to cross-reference the data of the various stakeholders operating across the region. The example of mobility platforms is, in this respect, particularly evocative.

FOCUS – EXAMPLE OF THE IBM-VEOLIA PARTNERSHIP IN LYON

In 2013, Greater Lyon, with a population of 1.3 million and 400,000 metres of water pipes, published a call for tenders to delegate drinking water production and distribution for 25 years. There were four challenges: increase the network's efficiency, modernise the service, provide new user services and offer solutions to eradicate dysfunction. All the while keeping the price of water relatively low for the consumer, which meant minimising capital outlay. Veolia chose to work with IBM and won the contract.

We installed 60 sensors to measure water quality, 5000 acoustic leak detectors, and 20 valves to reduce the pressure. An operation centre now receives in real time all the data transmitted by the sensors together with all that available through open data (weather, incidents, etc.).

With its 'hypervision' system, this operations centre encourages transparency. This builds trust between the elected representatives and operators, on the one hand, and between the elected representatives and their citizens, on the other. This concern for traceability was paramount for Veolia. Residents had to be provided with real-time information about the status of the network and assured of a rapid response to any problem (under two hours in this instance). Citizens want to be assured that public assets are being used to their full potential.

Following this first project, Veolia installed a similar system in Lille.

“THANKS TO BIG DATA, ANALYTICS AND COGNITIVE COMPUTING, WE CAN NOW PREDICT EVENTS AND PROVIDE THE RELEVANT STAKEHOLDERS WITH THE BEST INFORMATION POSSIBLE TO HELP THEM RAPIDLY MAKE THE BEST DECISION.”

FOCUS – THE EXAMPLE OF MOBILITY PLATFORMS TO OPTIMISE RIDES

Mobility is defined as the sum of the various means of transport. To get from point A to point B, a user may have, for example, to take a bus, then the metro and walk. To provide residents with an app allowing them to see their trip in real and predicted time, it is obviously necessary to collect data from all the operators involved. And yet, this approach is relatively recent. Take the example of Paris: until the recent arrival of the City Mapper app, no app of this type was available. Users had to log onto the Vélolib⁵, then Autolib⁵, then the RATP or Citadins (for the suburbs), etc. apps to build their ride.

We have worked on this problem in Lyon and Montpellier when creating mobility platforms as part of R&D projects. In Lyon in particular, we worked on a “smart delivery” project that involved coming up with solutions to optimise route times for goods delivery drivers. This led to the creation of the Optimod’Lyon⁵ mobility platform thanks to a partnership with eight companies including four SMEs, and research units. The app tells delivery drivers the state of the traffic in real time and in the following hour, so they can adjust their route at any time. As part of this project, we established a partnership with three delivery companies. The companies enter the delivery rounds the previous evening, that is, the order of the drop-off points. Throughout the day, the identification of their location by the Lyon traffic central command centre

⁵ For more information about the Optimod’Lyon platform, go to: <http://www.optimodlyon.com/en/>

makes it possible to warn drivers of any obstacles along their route. The drivers are then redirected to minimise their travel time. Following this experiment, the traffic central command took over the topic. It is now in the pilot phase. Christine Solnon, a professor at INSA-Lyon (French Institute of Applied Science) and a researcher at Liris (Computer Science Laboratory for Image Processing and Information Systems), has in particular carried out research work on this project, honoured with an “IBM Faculty Award”. Another emblematic example is the Waze app in which the data is generated by the drivers themselves. This data obviously has a lot of value and can be intelligently fed into local authorities’ mobility platforms. It is equally useful for Waze to recover public data held or certified by the authorities (accident or traffic jam warnings will have greater value for users if they are confirmed by an official source). For Waze and for the local authority, the creation of a partnership then becomes a real opportunity. Such initiatives have been taken in Boston (United States) and Versailles (France). A mobility platform really only comes into its own once it starts collecting data from all parties (public and private data, data from companies, etc.). Each is just one of many input sources, but together they form a complete data chain. Once the data has been aggregated on a platform, start-ups can use it to devise new apps. At that point, IBM’s contribution is based on cognitive and predictive computing with a view to facilitating decision-making.

c) Facilitate decision-making by making the data collected meaningful

Another way to make data meaningful is to make it speak to facilitate and speed up decision-making. Thanks to big data, analytics and cognitive computing, it is now possible to anticipate events and to inform all relevant parties so that they can rapidly make the best decision. This support quickly becomes useful in emergency situations for which any decision delay can have serious consequences.

“THE PRECONCEPTION THAT IT IS STILL SIMPLER TO BUILD CITIES STARTING FROM SCRATCH, AND SO IN EMERGING COUNTRIES, CONTINUES TO HOLD SIGNIFICANT SWAY. [...] THE DIFFICULTIES ARE CERTAINLY MUCH GREATER IN EUROPEAN CITIES, BUT THAT FORCES US TO BE MORE IMAGINATIVE AND MORE INNOVATIVE.”

FOCUS – ANTICIPATE AND REACT TO POLLUTION EPISODES IN BEIJING

IBM has developed in Beijing (China), a program to predict pollution levels with between 48 and 72 hours’ prior warning at the scale of a square kilometre. This system is based on simulation tools developed by our laboratory and uses data from local stakeholders as well as The Weather Company, recently acquired by IBM. Our simulation tools use analytics and cognitive computing. The pollution map for the coming three days helps authorities rapidly make the best decision: temporary shutdown of factories, reduce traffic speed limits along specific sections of the road network, etc.

Once again, our role is not to take the place of the decision-makers, but rather to inform them and help them quickly make the right decision.

4. THE CONDITIONS FOR ROLLING OUT SMART CITIES

We are often asked about the future of these smart cities. Will they develop massively in the coming years or will they remain small-scale experiments? Some also criticise the so-called developed countries for falling somewhat behind emerging countries, Asian in particular, where we are witnessing the very fast construction of smart cities from scratch. At the opposite end of the scale, in Europe, we are asking ourselves if the emergence of smart cities is really realistic—take for example, the recent roundtable in which we took part called “Can we make smart cities in Europe?” The preconception that it is still simpler to build cities starting from scratch, and so in emerging countries, continues to hold significant sway.

First, we should bear in mind that a city at the cutting edge of technology does not always result in the best quality of life. Take the example of Songdo in South Korea: created from scratch in 2003, it was to be one of the world’s most complete smart city projects. But it is struggling to attract residents. Then, some Asian mushroom cities are a sort of anomaly driven more by the need to build than by technology. Finally, we are convinced that already highly urbanised areas can also accommodate smart city initiatives. The difficulties are certainly much greater in European cities, but that forces us to be more imaginative and more innovative—which in itself is both inspirational and an opportunity.

Still, the question of scale-up remains fundamental. How do we stop the smart city from being limited to certain districts but rather ensure it achieves its potential for our regions? A minimum of two conditions must be present:

- **Elected officials and public stakeholders’ awareness of the advantage of these approaches.** This change will come about when these parties realise what digital technology can provide them in terms of speed, savings, consistence and even fluidity. This awareness must obviously go hand-in-hand with financial commitments: building a smart city has a cost and requires decision-makers allocate sizeable budgets for it. Launching an app or financing a hackathon is a significant step but it is not enough: it is important for cities to seize this subject more ambitiously, like Lyon which initiated large projects for water, then mobility, or Nice for urban monitoring
- **Improved training courses and appropriate recruitment policies.** Today, few people have the digital knowledge and skills to lead these types of projects, and local authorities are not equipped to attract and recruit the appropriate people, especially because of the gap between the skills sought and the salaries or careers offered, with the exception of several major metropolises. These are new professions that demand new skills and attitudes to the city and technology. Awareness of these changes is a slow process in companies, and that is even truer for local authorities.

“IN ADDITION TO TECHNOLOGICAL TOOLS AND ACCESS TO A WEALTH OF INFORMATION, THE SMART CITY IS INSCRIBED IN AN INCLUSIVE PROJECT FOCUSED ON CITIZENS AND MORE SUSTAINABLE DEVELOPMENT. FOR THIS REASON, IT NEEDS TO BE THE SUBJECT OF A COLLECTIVE AMBITION TRANSFORMING THE RELATIONSHIP BETWEEN THE VARIOUS PLAYERS.”

CONCLUSION

While the smart city is being increasingly welcomed into the day-to-day management of cities, it still faces many challenges. It remains a vast field of future innovation to be explored, both in emerging and developed countries. For the latter, being creative becomes crucial given that the space available for these initiatives generally only concerns 1% of the city with the remaining 99% being the built environment.

- *Technology allows us to overcome these hurdles, especially thanks to the cloud, big data, analytics and cognitive computing. We have to hand three elements enabling us to build the smart city of the future:*
- *The massive collection of data from many sources and its aggregation and correlation to obtain information for making decisions closely tied to urban businesses (water, waste, energy, transport networks, security, etc.)*
- *Information shared in real time and predictively to facilitate the development of new uses*
- *Citizens contributing actively to data production.*

The role given to residents is crucial for these initiatives. In addition to technological tools and access to a wealth of information, the smart city is inscribed in an inclusive project focused on citizens and more sustainable development. For this reason, it needs to be the subject of a collective ambition transforming the relationship between the various players.

POLISDIGITOCRACY: Citizen Engagement for Climate Action through Digital Technologies

Shannon Lawrence
Director of Global Initiatives, C40

Júlia López Ventura
Regional Director for Europe, C40

Léan Doody
Smart Cities Leader, Arup

Pedro Peracio
Chief Digital Officer of the Municipality
of Rio de Janeiro



The article has been co-written by authors from the following institutions:

- C40 Cities Climate Leadership Group (C40), a network gathering more than 80 of the world's largest cities, focused on tackling climate change;
- Arup, a global consultancy firm which specializes in delivering innovative and sustainable designs that reinvent the built environment: Arup has partnered with C40 since 2009 to deliver research on how cities contribute to climate change mitigation and adaptation;
- The Rio de Janeiro Municipality, particularly advanced on smart city strategies and where the concept of "polisdigitocracy" comes from.

KEYWORDS

- POLISDIGITOCRACY
- DIGITAL TECHNOLOGIES
- CLIMATE CHANGE
- DEMOCRACY
- CITIZENS' PARTICIPATION

The article documents some of the actions currently undertaken by cities across the world to fight climate change by engaging citizens through the use of digital technologies, based on an extensive survey conducted by C40 and Arup in 2015.

In addition to being a strategy employed to fight climate change, the authors note examples of cities engaging citizens in the design and implementation of their "smart" or "digital" strategies more broadly.

The article goes into the concept of "polisdigitocracy", a term first coined by the mayor of Rio de Janeiro, Eduardo Paes, in 2013, that refers to a new form of governance in which digital technologies can help to renew citizen engagement while enabling cities to tackle climate change and address other urban challenges more efficiently.

INTRODUCTION

Cities are already experiencing the effects of climate change and are increasingly taking action to reduce emissions, adapt to the new risks and mitigate the worst impacts of a warming planet. With the rates of urbanization increasing around the globe, the role of cities in global climate change mitigation and adaptation will be of even greater importance in the coming decades.

Created and led by cities, the C40 Cities Climate Leadership Group (C40), which connects more than 80 of the world's largest cities, is focused on tackling climate change and driving urban action to reduce greenhouse gas emissions and climate risks.

Digital technologies offer a powerful tool that cities can leverage in order to mitigate and adapt to climate change. The notion of "smart city" has recently gained momentum and almost all cities are now implementing their own "smart" strategy; notably, C40 cities are taking over 500 actions to deliver improved services through the use of ICT/smart city technologies. A lot of cities tend to focus only on the technical elements of smart city programs and the efficiency and economy gains that digital technologies bring. But there is also the opportunity to promote the political element of "smart cities" by engaging citizens in through digital means. This vision of "digital cities" embraces a holistic approach to the efficiency, economy and political benefits that technology can offer.

The concept of "polisdigitocracy", outlined by Eduardo Paes, Mayor of Rio de Janeiro and C40

Chair, is particularly relevant in this context. It calls for engaging citizens through the use of digital technologies when designing and implementing climate action and other urban strategies. C40 and Arup recently produced a report entitled “Polisdigitocracy: Digital Technology, Citizen Engagement and Climate Action”¹ that aims to assist cities in designing and implementing effective participatory climate action, with the help of digital technology. “Polisdigitocracy” can be an important strategy for creating more sustainable, livable and equitable cities.

¹ “Polisdigitocracy: Digital Technology, Citizen Engagement and Climate Action”, C40 and Arup, November 2015 (http://publications.arup.com/-/media/Publications/Files/Publications/P/C40_Polisdigitocracy_Report_v2b.asx)

1. A NEW CONTEXT FOR CITIES: A GROWING VULNERABILITY TO CLIMATE CHANGE

Today cities are on the frontline of climate change. They are both vulnerable to climate impacts and responsible for a significant share of global emissions.

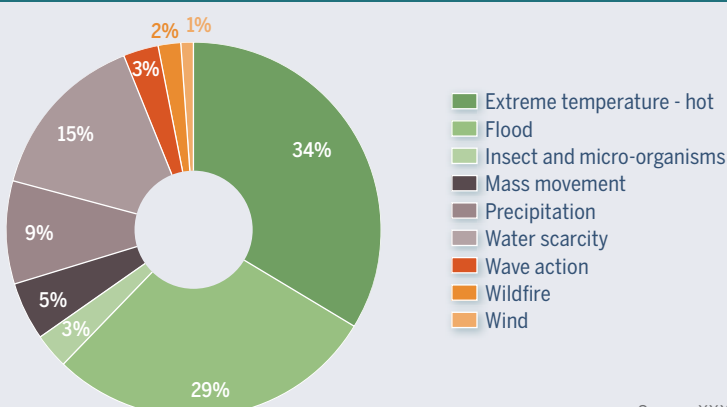
1.1. CITIES ARE HIGHLY VULNERABLE TO CLIMATE HAZARDS

Cities are particularly vulnerable to climate hazards, from sea level rise to severe heat waves, which can disrupt city services and pose serious hazards to citizens’ health and wellbeing, as well as vital infrastructure. The locations and human and economic densities of cities are factors of high vulnerability. Many urban areas are coastal, putting cities at greater risk of flooding from rising sea levels and powerful storms. High population density also increases cities’ vulnerability to climate change.

70% of C40 cities report they are already experiencing the impacts of climate change. Extreme temperature and flooding are the most common hazards experienced by cities, accounting for 63% of all climate change hazards reported globally².

² “Climate Action in Megacities 3.0”, C40 and Arup, December 2015 (<http://cam3.c40.org/#!/main/home>)

Most common climate hazards currently experienced in C40 cities



Source: XXXXX

70% OF ENERGY related global CO₂ emissions originate in cities today

Since 2011, C40 cities have taken over

10,000 ACTIONS to reduce emissions and adapt to climate change

1.2. THE NATURE OF CLIMATE HAZARDS IS CHANGING

While cities have long managed the risks posed by both sudden and chronic climate hazards, they are also increasingly facing hazards that they had rarely, if ever, experienced before. As a result, the proportion of adaptation actions as a percentage of overall climate actions has been continuously increasing since 2011. While it represented 11% of all climate actions reported by C40 cities in 2011, it increased to 16% in 2015³.

Major threats also significantly differ from one global region to the other. North American cities experience more extreme temperatures (40%) than any other region, while European cities report the highest proportion of flooding hazards (30%). 62% of all mass movement hazards (e.g. landslides, earthquakes) are reported by Latin American cities.

As urbanization increases, building resilience, both against immediate climate hazards and to withstand the longer-term impacts of climate change, is an increasingly important agenda for mayors and city governments.

2. CITIES: A LEADING FORCE IN TACKLING CLIMATE CHANGE

2.1. CITIES HAVE A CENTRAL ROLE TO PLAY IN CLIMATE CHANGE MITIGATION

While cities are particularly vulnerable to climate change, they are also partly responsible for it. Indeed, cities concentrate the majority of energy consumption and CO₂ emissions. Today, 70% of the world’s energy is consumed in cities and 70% of energy-related CO₂ emissions originate in urban areas. With the many countries expected to rapidly urbanize in the following decades, these trends are only likely to increase. As such, cities must be key players in global efforts to tackle climate change.

³ “Climate Action in Megacities 3.0”, C40 and Arup, December 2015

World cloud for the climate hazards cities expect to face in the future: the size of each word indicates the number of times it was mentioned by cities as a future hazard.



Research produced by C40 and Stockholm Environment Institute has shown that a third of the global safe carbon budget – the total amount of greenhouse gas emissions we can risk putting into the atmosphere – will be determined by urban policy decisions made between now and 2020. Therefore, the mayors in office now are pivotal actors in delivering climate change solutions.

The co-benefits of climate action – beyond greenhouse gas emission reductions – are also critical for cities. The same actions that reduce carbon emissions also help reduce air pollution, improve public health, and help cities attract new residents and businesses.

2.2. CITIES ARE INCREASINGLY UNDERTAKING CLIMATE ACTIONS

Founded in 2005, C40 is a network of the world's megacities committed to addressing climate change. C40 supports cities to collaborate, share knowledge and drive meaningful, measurable and sustainable action on climate change. Today the organization connects more than 80 of the world's greatest cities, representing 650 million people and one quarter of the global economy. Through their involvement in the network, C40 mayors have made ambitious commitments to take substantial action on climate change by reducing their emissions by more than 3 gigatons of CO₂ by 2030 – the equivalent of taking 600 million cars off the road.

Anne Hidalgo, Mayor of Paris, summarized the ambition of the network as follows: “As mayors, we all face similar challenges and have to innovate to solve them, often in the same ways. The C40 network connects us all, enabling us to share ideas and collaborate, working together towards a greener, healthier future.”

Since 2011, C40 cities have taken over 10,000 actions to reduce emissions and adapt to climate change. 30 of C40 cities' members have also reported an absolute reduction in their greenhouse gas emissions since 2009⁴.

While the number of climate actions undertaken by cities has increased in recent years, the scale of actions is also increasing. For example, in 2011 the majority of climate actions were at a “pilot” stage, but the latest data shows a significant shift towards citywide projects (51% of climate actions undertaken in 2015 were implemented at city level).

By demonstrating that climate action is possible to deliver, scalable, and relevant across all regions, cities are leading the charge to achieving the ambitious climate action required on a global scale and act as real change-makers in addressing climate change.

2.3. ICTS ARE A KEY TOOL TO IMPROVE CITY MANAGEMENT AND COMBAT CLIMATE CHANGE

Information and communications technologies (ICT) provide a powerful tool for cities to deliver climate action. Urban sensing (through the use of environmental sensors), big data and analytics enable better understanding of the real-time functioning of cities as well as informing longer-term planning and policy decisions.

C40 cities are taking over 500 actions to deliver improved services through the use of ICT/smart city technologies. These range from improved public transport through smart cards and real-time route information, to smart meters driving building energy efficiency, to improving connectivity through access to public computers and wireless hotspots. Over 80% of C40 cities are dedicating staff with specific responsibility to support citywide ICT services. Approximately 80% of C40 cities are sharing online data sets with citizens publicly and 90% of cities directly connect the mayor and city officials with citizens through social media and web platforms.⁵

As illustrated above, there are many different ways that ICTs, including digital technologies, can be used in fighting climate change today. Examples include flood-related actions (e.g. flood mapping using digital technologies), lighting-related programs (e.g. smart outdoor lighting systems), and energy-optimization programs (e.g. smart grids and intelligent transport systems).

70% OF C40 CITIES are already experiencing the impacts of climate change and adaptation actions have increased from 11% of all actions reported by C40 cities in 2011 to 16% in 2015

Over **80% OF CITIES** are dedicating staff with specific responsibility to support citywide information and communications technologies services

Approximately **80% OF CITIES** are sharing online data sets with citizens publicly

⁴ “Climate Action in Megacities 3.0”, C40 and Arup, December 2015

⁵ “Climate Action in Megacities 3.0”, C40 and Arup, December 2015

FOCUS 1: CENTER OF OPERATIONS IN RIO DE JANEIRO

Sea level rise or heavy rain can lead to flooding in both coastal and inland cities and this issue is becoming an increasing concern as extreme weather events become more frequent. Some cities have turned to ICTs to guide their flood management strategies, through the identification of flood-prone areas, the detailed mapping of high-risk neighborhoods or broader GIS modelling undertaken for the entire city. A key outcome of such programs is that data is available online to keep citizens in high-risk

neighborhoods informed of the risk they face.

In Rio de Janeiro, after heavy rains and flooding led to landslides that killed more than 50 people in 2010, Mayor Paes established a city operations center in partnership with IBM and Oracle. The Rio Operations Center (COR, acronym in Portuguese) was created primarily for risk management and prevention though it soon became clear that it was also a strategic tool for managing urban mobility and coordinating large-scale events.

The COR ensures coordination across almost 30 city departments, public agencies and utility companies, as well as State Government's representatives. It enables a new administration model that provides communication and coordination between public entities, facilitates information sharing and enables prompt and efficient decision-making processes. The COR also provides and exchanges information with the public through the media and social networks.

FOCUS 2: CHANGWON'S SMART GRID AND COOL ROOFS INITIATIVES

Changwon in South Korea decided to test a new smart grid project: the smart grid will be connected to 60 small and medium-sized companies to facilitate response to increased demand and energy efficiency, and enable a greater integration of renewable energy resources, thus reducing emissions. This smart grid requires an investment of more than \$10 million, some of which will be financed through grants and subsidies.

Changwon has also developed a pilot program to subsidize cool roofs (heat-reflective surfaces) and applied techniques developed in Tokyo to improve its heat reduction measurement methodologies. The result is to reduce the urban heat island effect and vulnerability to extreme heat waves. The need for air conditioning systems will also be reduced, thereby cutting greenhouse gas emissions.

FOCUS 4: CREATING COLLABORATIVE SUSTAINABILITY MAPS WITH CITIZENS IN BARCELONA

In 2015, the City of Barcelona created the B+S Map (Barcelona Més Sostenible)⁶, a web-based virtual, interactive and collaborative map that visualized everything that the city was doing to increase its sustainability. The map provides practical information and details of projects, signposted with QR codes, as well as citizen feedback about their experiences. By making such information available the map is intended to be a tool for community recognition, communication and awareness.

⁶ <http://www.bcnostenible.cat/en/mapa/index>

FOCUS 3: STRENGTHENING ENERGY EFFICIENCY IN BUILDINGS IN CAPE TOWN

In Cape Town, the *Energy Efficiency in Buildings program* helps reduce electricity consumption through a range of behavioral and technological changes. Cape Town has completed retrofitting of approximately 26% of its large municipal buildings and has installed smart electricity meters in more than half of its largest administrative buildings. The meters will allow the continuous monitoring of electricity usage by each department. This is combined with technical and practical training of city staff on how to extract, read and interpret the smart meter data. The city also runs a behavior change program to enable building managers and users to effectively manage electricity consumption within their buildings. A campaign on energy savings was launched at the same time, targeting residential and commercial consumers. For the commercial sector, a knowledge sharing forum was set up in partnership with the public utility provider and the South African Property Owners Association (SAPOA).

Approximately
90% OF CITIES
directly connect the mayor
and city officials with citizens
through social media and
web platforms

Arup's research predicts that
the global market for smart
systems will be around
\$400 BILLION
by 2020

FOCUS 5: DISTRICT-SCALE DEVELOPMENTS: CONSTRUCTING STOCKHOLM ROYAL SEAPORT

The Stockholm Royal Seaport⁷ is a major urban development project that will provide 10,000 homes and 30,000 workspaces when finished in 2025. The new district is built in the city center, adjacent to Frihamnen docks. Stockholm Royal Seaport will be the first city district in the world to feature full-scale smart grids.

Stockholm Royal Seaport will be a living and integrated city district, built with the human scale in mind. Co-benefits include: cost savings due to lower resource use (energy, transport, waste) over the long term; green growth by creating green jobs in the clean tech sector; a stronger community through the creation of IT-based networks, project groups and residents association; and the proximity to and availability of green structures.

7 <http://www.stockholmroyalseaport.com/en/>

The potential co-benefits of using digital technologies in the fight against climate change are numerous. Research by Arup identified five main potential outcomes of the digital city⁸:

- Functional benefit: improving the efficiency and integration of urban systems
- Humane benefit: supporting citizens through greater connectivity and improving their well-being
- Economic benefit: developing a market for smart systems (Arup's research predicts that it will be around \$400 billion globally by 2020⁹)
- Environmental benefit: increasing resource efficiency and reducing carbon outputs
- Political benefit: driving community engagement and empowerment

To achieve those benefits though, cities have to go beyond the simple implementation of technologies. Citizen engagement in digital programs is one of the best ways to enable broader public buy-in and participation in climate action.

8 "Delivering the Smart City", Arup, 2014: http://publications.arup.com/publications/d/delivering_the_smart_city

9 Department for Business Innovation & Skills, "The Smart City Market: Opportunities for the UK", BIS, London, 2013: https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/249423/bis-13-1217-smart-city-market-opportunities-uk.pdf

3. "POLISDIGITOCRACY": HOW DIGITAL TECHNOLOGIES CAN SUPPORT CITIZEN ENGAGEMENT TO DRIVE CLIMATE ACTION

Technological fixes alone cannot solve the problem of climate change or other major challenges faced by cities, which is why citizen engagement is essential.

First, because the most relevant and accurate data about the impacts of climate change is in the hands of citizens themselves, as Mandy Ikert, Head of C40's Water and Adaptation Initiative, pointed out: "A lot of the data we need to understand city climate change adaptation and resilience at a local level resides in the citizenry. Our cities are starting to experiment with digital platforms that can crowd-source this data and put it to use both in emergency situations and to inform longer term planning decisions¹⁰."

Also, technologies will bring their best results only if they are coordinated with behavior change efforts (such as in the case of energy efficiency programs). Zoe Springs, Head of C40's Energy Initiative, stated: "Cities in the [C40] network have been grappling for a long time with how they might better use energy data to cultivate enhanced citizen action – and begin to encourage a change in energy usage behaviors¹¹."

As digital technologies continue to define and redefine how cities function and are organized, there is significant opportunity to leverage them for effective climate action. "Polisdigitocracy" can be applied to climate action with great success. The objective is to build upon the nexus of digital technology, citizen voices and climate action in order to maximize the response to climate change.

3.1. "POLISDIGITOCRACY": ENGAGING CITIZENS THROUGH THE USE OF DIGITAL TECHNOLOGIES

The term "polisdigitocracy" was first coined by Mayor Paes of Rio de Janeiro and chair of C40 to refer to a new form of government: "what we are witnessing is the birth of something I call 'polisdigitocracy'. This is a form of government that counts participation and transparency as its cornerstones and uses technology as its guide", Eduardo Paes wrote in *The Huffington Post* in 2013¹².

As analyzed by Mayor Paes, ICTs and globalization facilitated both a crisis of representative democracy and a revival of democratic aspirations: "Debates among citizens are now more agile and much more varied than they were in the Greek agora. [...] People want more participation and collaboration with their government. They demand to be closer to institutions and authorities. The Polis is back and the Internet is the new Agora¹³."

Mayor Paes insists on the opportunity this evolution represents to reinvent democracy and adapt it to contemporary times: "The digital revolution is allowing democracy to recall its foundations and evolution is modernizing and reinforcing our fundamental values¹⁴."

10 "Climate Action in Megacities 3.0", C40 and Arup, December 2015

11 "Climate Action in Megacities 3.0", C40 and Arup, December 2015

12 "Polisdigitocracy", by Eduardo Paes, Mayor of Rio de Janeiro, and Chair C40 Cities Climate Leadership Group, *The Huffington Post*, April 10th, 2013.

13 "Polisdigitocracy", by Eduardo Paes, Mayor of Rio de Janeiro, and Chair C40 Cities Climate Leadership Group, *The Huffington Post*, April 10th, 2013.

14 "Polisdigitocracy", by Eduardo Paes, Mayor of Rio de Janeiro, and Chair C40 Cities Climate Leadership Group, *The Huffington Post*, April 10th, 2013.

3.2. DIGITAL PARTICIPATION FOR CLIMATE ACTION: FROM BETTER CITY MANAGEMENT TO MORE DEMOCRATIC EXPRESSION OF CITIZENS

In “*Polisdigitocracy: Digital Technology, Citizen Engagement and Climate Action*¹⁵,” C40 and Arup investigate and document how digital technologies are being used to drive citizen engagement for climate action. The aim of the report is to understand how cities are increasingly using digital platforms, social media, open data, crowdsourcing, hackathons and other engagement tools to create truly participative solutions and unlock climate action. Documenting various examples of programs that belong to the “*polisdigitocracy*” framework also enabled the identification of key success factors for mainstreaming innovative uses of technology for community engagement and empowerment. Findings were drawn from a series of interviews with city governments in the C40 network and key C40 staff, as well as a C40-hosted webinar with representatives from Mexico City, Buenos Aires and Rio de Janeiro.

The report categorizes “*polisdigitocracy*” initiatives by four objectives¹⁶:

- Improving services to citizens
- Improving city planning and projects
- Unlocking community action
- Responding to external pressure

Improving services to citizens

Using digital platforms to crowdsource information from citizens about the real-time functioning of the city can improve services to citizens. *Street Bump*¹⁷ is an example of a mobile application developed in Boston that enables drivers to collect road condition data while driving. The city then aggregates the data across users to provide the city with real-time information to fix short-term problems and plan long-term investments.

City operation centers are another example of programs relying upon technology that enable to better manage a city, in particular in case of emergency. In Rio de Janeiro, a city operation center was created by Mayor Paes in 2010 in response to a landslide that killed more than 50 people (see *Focus 1*). Built in partnership with IBM and Oracle, it is used by decision makers in the city to operate general city services as well as responsive services in case of emergency issues. The center is open to both citizens and media and has a mission to keep citizens informed at all times (through radio stations and a Twitter account). Rio’s operation center thus aligns with the government’s aim to improve transparency and engage citizens.

Improving city planning and projects

Improving city planning by incorporating online engagement into the city’s existing and proposed projects is another objective supported by digital participation. It consists of allowing citizens to participate more directly in decision making through online consultation and participatory budgeting for instance, while ensuring that projects are appropriate for the communities in which they are implemented.

**“CITIES ARE NOT JUST SETTING TARGETS
TO REDUCE EMISSIONS; THEY ARE
MAKING STRONG COMMITMENTS TO
ACHIEVING THOSE WITH PRACTICAL
ACTION PLANS AND INNOVATIVE
SOLUTIONS [...] MAYORS ARE PIVOTAL
ACTORS IN DELIVERING GLOBAL
SOLUTIONS TODAY.”**

*Mapeando*¹⁸ is a project implemented in Rio de Janeiro which enables citizens to suggest physical changes to the city by marking them on an online map. For example, citizens can request where they would like to see new bike lanes through *Mapeando*.

Since 2014, a participatory budgeting experiment has been tested in Paris with the “*Madame la Maire, j’ai une idée/ Madame Mayor, I have an idea*”¹⁹ initiative: citizens can propose and vote for sustainable projects they want to see implemented (e.g. green walls, urban agricultural projects, cycle infrastructure, etc.).

Unlocking community action

Making city data available can also enable citizens to develop their own solutions to climate-oriented challenges, hence unlocking community action and innovation to help tackle climate change. Interesting examples of programs achieving this objective can be found in citizen communication platforms operated in cities around the world.

*Talk London*²⁰, a citizen communication platform designed by the Greater London Authority (GLA) to facilitate online community discussions about the city’s big issues, got its start in 2010 when the GLA crowd-sourced ideas for climate change mitigation. A recent conversation hosted on the platform explored how Londoners could mitigate air pollution in the city.

*LabRio*²¹ is run by a group of young people who caught the mayor’s attention when they used social media to organise protests about bus fares. The Lab now supports citizens in challenging the decision-making processes in Rio City Hall to make them more participative. Lab Rio now manages several different programs, including *Mapeando*, mentioned above.

15 “*Polisdigitocracy: digital technology, citizen engagement and climate action*”, C40 and Arup, November 2015

16 “*Polisdigitocracy: digital technology, citizen engagement and climate action*”, C40 and Arup, November 2015

17 <http://www.streetbump.org/about>

18 <http://mapeando.rio.gov.br/#/>

19 <http://www.nesta.org.uk/news/10-people-centred-smart-city-initiatives/madame-mayor-i-have-idea>

20 <http://talklondon.london.gov.uk/>

21 <http://www.labrio.cc/>

An interesting example of open-data competition is *Climathon*, a hackathon on climate issues that took place simultaneously in 20 cities around the world in 2015. The objective was to tackle climate change issues by leveraging participants' talents. Each participating city set specific climate challenges (e.g. the increase in the take up of solar panels in Beijing), which were then tackled by local participants.

Responding to external pressure

Private companies and community groups are able to leverage digital platforms to make their voices heard, lobby government and hold them to account for their climate commitments and other responsibilities. This new form of external pressure through digital technology is beginning to prove disruptive to city systems, requiring city governments to reassess existing policies as well as manage often very controversial change. One example is Uber, the mobile platform that allows users to 'source' rides by communicating with private vehicle drivers, which has proved disruptive for taxi providers in cities across the world. In Mexico City, where there are 140,000 registered taxis in operation, the introduction of Uber was extremely controversial and incited mass demonstrations. In response the government's CityLab, LabCDMX, hosted a debate with 50 figures from both sides, as well as transportation experts. The core recommendation emerging from this debate was to reduce and simplify fees and formalities aimed at regulating taxis.

3.3. KEY SUCCESS FACTORS FOR SCALING UP INNOVATIVE USES OF TECHNOLOGY FOR COMMUNITY ENGAGEMENT

C40 and Arup's report also identified four building blocks²² that need to be addressed by city governments that seek to develop robust and sustainable digital engagement programs:

- Let everyone participate: raising awareness of and fighting against the digital divide
- Use data effectively: making the right data accessible

²² "Polisdigitocracy: digital technology, citizen engagement and climate action", C40 and Arup, November 2015

- Create capacity to try new things: learning from others to drive innovation
- Work out how to pay for it: encouraging innovative financing and partnerships

Let everyone participate

While digital technologies present an opportunity to increase citizen engagement, not everyone has access to this technology or is comfortable using it. Furthermore, many cities don't have adequate ICT infrastructure to allow the effective use of digital technologies. Cities must seek to reduce the digital divide on the one hand and increase the number of digitally literate people on the other.

Many marginalized groups do not have the political, social, educational or technological capital to raise their voices through social media. On the contrary, other voices may be amplified through social media despite being non-representative. A major challenge for cities is thus to minimize the impact of the digital divide when implementing digital participation. To address this, some cities, like Mexico, Buenos Aires, Paris and New York, combine digital and physical engagement – for example, organizing neighbourhood meetings and consultations in addition to seeking citizen input via an online platform – so as to mitigate the digital divide and have a more inclusive dialogue.

Cities also try to leverage social media and consider the factors responsible for a high take up of social media among citizens in order to foster wider digital participation. For instance, some cities have found that crowdfunding projects for a civic activity tend to be more engaging than city-hosted discussion forums. This is because the former utilizes social media platforms, like Facebook and Twitter, where people are already actively participating, rather than creating separate platforms.

Use data effectively

The second building block is to use data effectively, streamlining and efficiently sharing data across various government agencies and platforms while managing issues around data protection, privacy and maintenance. Privacy and data protection issues can pose a significant challenge and have been a barrier to the implementation of digital programs in some cities.

To try to overcome these challenges, the City Council of Melbourne has convened a "risk board", populated by different representatives of the council, in order to build a consensus on how to manage risk around the city's Open Data Platform.

The *Digital Catapult Trust Framework*²³ has taken another approach to address this issue. It is a voluntary service established by the UK's *Digital Catapult*, part of a network of innovation centers in the UK. The framework enables individuals to unlock the value of their personal data by sharing it freely with the public and private sector.

Create capacity to innovate

Cities also need to ensure that there are mechanisms within city government to take risks and innovate around service provision if they want to foster the use of digital technology. For this, collaboration amongst cities is a powerful tool. Cities are working collaboratively,

²³ <https://www.digitalcatapultcentre.org.uk/open-calls/trust-framework/>

“MAYORS ARE BEGINNING TO REALIZE THE BENEFITS OF INCORPORATING CITIZENS INTO THEIR CITY PROCESSES USING DIGITAL TECHNOLOGY.”

including through C40, to share their experiences and results, and support one another in driving innovative projects.

In Boston, MONUM (*Mayor's Office of New Urban Mechanics*²⁴) acts as a civic innovation incubator and R&D lab organized as a network of innovation groups that connect residents and governments to improve services and opportunities for all. Philadelphia and Utah Valley adopted the same initiative, and the three cities now share *Citizens Connect*, a mobile application incubated at MONUM. Through the application residents can report public issues directly from their smartphones into the city's work order management system so that each problem gets to the right person in City Hall who can fix it.

In Latin America, Mexico City, Buenos Aires and Rio de Janeiro have also decided to join forces and launch a *City Labs* network to support one another in driving innovative projects.

Work out how to pay for it

Finally, innovative financing and partnerships are crucial for the implementation of effective "*polisdigitocracy*". For example, Stockholm used a €70 million budget surplus to create a central pot of money for innovative ICT projects proposed by different city departments which are now able to pitch their ideas to the central budget holder.

In Chicago, the city council partnered with the MacArthur Foundation, which is one of the largest philanthropic foundations in the US, and with the Chicago Community Trust to form the *Smart Chicago Collaborative*, a civic organization focused on technologies so as to improve the quality of life in the city. This partnership enabled the leveraging of funds from the public and third sector to support city government objectives.

²⁴ <http://newurbanmechanics.org/>

CONCLUSION

As cities increasingly face the impacts of climate change and simultaneously scale-up their action to combat it, they will need every tool available to them. ICT and digital technologies are powerful ones, offering cities the opportunity to make efficiency and economy gains in the delivery of services and development of low-carbon infrastructure. But a focus on technology alone fails to address the political element of a "smart city." Engaging citizens and facilitating their participation in city programs through the use of digital technology is key for the success of these programs and for climate action more broadly. This approach, referred to as "polisdigitocracy" by C40 Chair, Mayor Eduardo Paes of Rio de Janeiro, offers a new form of governance for cities seeking to deepen the interest and participation of their citizens in urban policy.

A number of C40 cities are developing more inclusive and effective digital participation programs as a means of tackling climate change. Key factors influencing the success of these programs include broad participation (overcoming the digital divide), the effective use of data, fostering the capacity to innovate within city agencies, and pursuing creative financing options. C40 and Arup will continue to support their city partners to learn from and collaborate with cities around the world in order to scale-up "polisdigitocracy" initiatives to drive deeper, more participatory, and more durable climate action – ultimately creating more livable, sustainable and equitable cities.

"STRIVING TO LET EVERYONE PARTICIPATE, USING DATA EFFECTIVELY, CREATING CAPACITY TO INNOVATE AND ELABORATING INNOVATIVE FINANCING PARTNERSHIPS APPEAR AS THE FOUR MAJOR KEY SUCCESS FACTORS THAT NEED TO BE ADDRESSED BY CITIES, WHEN DESIGNING AND IMPLEMENTING DIGITAL, PARTICIPATORY CLIMATE ACTIONS TODAY!"

SMART CITIES AND SHARING CITIES:

How to foster collaborative local public services

An interview with Elisabeth Lulin

Managing Director of Paradigmes et cætera, a research and consulting company



Elisabeth Lulin founded Paradigmes et cætera, a research and consulting company specialising in forward-looking studies and innovation, in 1998. Before starting the business she continues to head up today, Elisabeth Lulin was a senior civil servant. She began her career at the French Inspection Générale des Finances, served under prime ministers Edouard Balladur and Alain Juppé as special advisor then technical advisor, and ran the external communication and marketing department at INSEE, the French National Institute of Statistics and Economic Studies. She also works with several think tanks in France and abroad including the Aspen Institute France (inter alia as chair from 2007 to 2010), Futurbulences (as chair) and the Lisbon Council (as board member).

KEYWORDS

- PUBLIC SERVICE 2.0
- SHARING ECONOMY
- PLATFORM
- LOCAL COMMUNITIES

At a time when traditional public service is struggling for financial, social and even political reasons, public-service co-production by governments and citizens seems poised to emerge as an alternative model for public administration. The advent of new technologies and the population density inherent in cities seem likely to pave the way for new participatory public services. Elisabeth Lulin provides real-life examples of community-based websites and applications to shed light on the concept underlying “Public Service 2.0”.

David Ménascé: You've been promoting an alternative public-service model, which you call "public service 2.0", for several years now. The idea basically revolves around users co-producing services, and digital technologies are opening up exciting opportunities for this type of model to flourish. Can you tell us more about this concept?

Elisabeth Lulin: Sure. Public service 2.0 is a model where citizens co-produce a number of public services. The goal is to build systems where people do more than just use public services: they also use their skills, talents and time to help provide public services.

In Switzerland, for instance, there is a very simple system to encourage mutual aid. People living in a village or a neighbourhood can stick pictograms on their letterboxes or front doors to tell others about any services they are willing to provide within the community (lending a drill, helping children with their homework, etc.).

MySOS is a similar idea, but uses digital tools. It's a civic social network that people can use in an emergency in France. It's an app you can use if you're in danger, to warn the people you have listed and the relevant rescue services. So you can use this platform to alert everyone who is willing to help you, in seconds. And you can also sign up as a "guardian angel" to help other people in the network when they need it.

The interesting thing here is that public service 2.0 is a third option. It steps in when the public sector is unable to help (for financial or practical reasons) and the private sector is uninclined to provide a service (because the market is too small or not lucrative enough). The goal, here, is not to create brand new collaborative public services in areas where the traditional public sector is already doing a good job: it's to use this approach in specific areas on the fringes of the services that others are already providing.

D.M.: Do you think cities are the best scale to provide participatory public services? In other words, is the public service 2.0 you are championing mainly supposed to target municipalities and cities?

E.L.: Yes. Most of these initiatives – which can be for-profit, not-for-profit or relate to the social and solidarity economy in other ways – are actually emerging in cities today. For a simple reason: these services work better when the population density – meaning the number of people on the supply side and demand sides – is higher.

But they don't just work on a citywide scale: the possibility of networking cities is also opening up very exciting opportunities for these services to proliferate. Some apps actually got off the ground when they started connecting cities. In the UK, for instance, you have Spice Time Credits, a digital system you can use to earn points every time you help someone out through the platform. And, if you don't use your points, you can now give them to someone who will – usually an elderly relative living in another city. So you can see this kind of inter-city network effect at work there.

D.M.: The public service 2.0 approach you are talking about sounds very bottom-up. It's the people themselves who set things in motion. Does that always work? What role can local government play in the production of these new types of public services?

E.L.: Yes, the bottom-up approach is essential – but it's nowhere near enough by itself. These initiatives are very fragile without proper channels or matchmaking mechanisms to encourage people to opt in. So the challenge is to connect the services that people co-produce with the issues public service is addressing. The big issue here is service continuity.

From this perspective, "platform tooling" is essential. One of the main things that the public sector can do is supply initiatives with the structures and tools they need to thrive. The government-as-a-platform concept was developed in 2009 by Tim O'Reilly¹, an Internet theorist who also coined the term "2.0". What he says is that, when government provides a platform that puts people and the administration in touch with each other, it can coordinate collective action among citizens. Following his line of thought, a public-service platform is a tangible or intangible piece of infrastructure that helps people contribute and get involved – i.e. produce and consume services – and consolidates their contributions.

One great example of the role that these platforms should play, including the bottom-up approach, is participatory science. Vigie Nature is one of the many participatory science programmes out there today. The Muséum Nationale d'Histoire Naturelle is running this platform to provide everyone with an opportunity to further research by observing biodiversity. Vigie Nature gives you a set of simple, solid tools (instructions, scientific protocols, reporting forms, etc.), which are essential to help people who are not professional researchers to contribute.

On the other hand, many cities that embarked on open-data policies to share a wealth of data with the public are having trouble now. This shows that intermediation and proper tools are important. If you throw a mass of raw data at people, they can't do much with it. It's the same with carpooling: for the system to work on a large scale, someone had to invent the Blablacar platform to provide a proper framework and make the service convenient.

¹ Tim O'Reilly, "Gov 2.0: The Promise of Innovation", Forbes, 10 August 2009

“PUBLIC SERVICE 2.0 IS A THIRD OPTION. IT STEPS IN WHEN THE PUBLIC SECTOR IS UNABLE TO HELP AND THE PRIVATE SECTOR IS UNINCLINED TO PROVIDE A SERVICE.”

D.M.: Do you think communities – especially cities – are in the best position to provide this kind of service? Couldn't private platforms do it just as well, or maybe even more efficiently?

E.L.: Well, we can always make believe public services aren't there and try to imagine the whole system from scratch. But would that really be the most productive way to go about it? We're starting with something that's already there, up and running, and which will be there for a long time. It makes more sense to think about how we might improve the time-tested foundation we already have.

There are at least two reasons why governments should take over digital tools to develop service platforms in-house rather than let someone outside do it: (1) the public sector is in a position to provide a service that the private sector is reluctant to provide because it will have trouble monetising it, and to build enduring economically sound models, and (2) cities need to keep control over a few key areas or they'll lose their sovereignty.

Carpooling is an example of the first reason: Blablacar did a fantastic job making money from long-distance prearranged carpooling services. But many startups tried and failed to move into the short-distance non-prearranged carpooling market. And many of the issues the public sector is trying to deal with have to do with short-distance non-prearranged travel, precisely. Then Ecov, a French startup established at the end of 2014, managed to find a model and signed its first partnership agreement with Val d'Oise departmental council. This partnership includes a €150,000 subsidy to set up stops for local non-prearranged carpooling services near secondary schools, suitable signposting and bays for passengers to get in and out of cars safely. This service also blends into the local travel scheme. So the public sector stepped into this market where it's not easy to monetise services, and played a vital role. And the subsidy it granted is only a fraction of what it would have had to pay to provide public transport services for those schools. In this case, the fact that the public sector got involved turned the situation into a win-win deal.

D.M.: Where does that leave the public sector's responsibility for control and regulation?

E.L.: Municipalities have every reason to keep an eye on new platforms emerging from the collaborative economy, to make sure that those platforms provide proper public services and, most importantly, that they don't undercut the council's sovereignty. It's interesting to look at two initiatives, reflecting very different attitudes, in Boston and Columbus. The mayor of Boston organised a mobile app connected to a digital map – Citizen Connect – that anyone in the city can use to report and geolocate any problems on the streets (graffiti, broken lights, etc.). Boston developed this app in-house so it still owns the data. Columbus, Ohio, on the other hand, ran a call for tenders to improve mobility in the city and decided to team up with Sidewalk Lab (Alphabet/Google). But Google stipulated a number of conditions: it wanted to be able to decide what modes of transport it would use and embed a payment platform. So, if a bus stop is crowded, Sidewalk Lab can decide to send chauffeur-driven cars to pick up some of the passengers. The problem is that the day Sidewalk Lab decides to pull out, Columbus will have nothing. This is one example of the technological dependence that can appear.

I can think of another example: privately-developed apps such as Waze raise issues relating to a city's sovereignty. Waze tells users what alternate routes they can take to get to where they need to go. The thing is that the algorithms that calculate these backroad routes don't factor what the municipality wants into the equation. So, for example, they could route more traffic onto roads where the city wants less traffic (near primary schools or kindergartens for instance) or onto roads that need repairs. If the council can't have a say on the routes that Waze recommends, it is de-facto relinquishing some of its power over traffic in its city.

D.M.: In what other ways can the public sector do a better job than other players?

E.L.: In a society that has trust issues, most people still look to the public sector as a trusted third-party that guarantees universal rights and equal opportunity. That's not entirely the case but it's the goal.

The main advantage of Pôle Emploi (the French government-run job centres), for example, is that they endorse vacancies. Pôle Emploi checks every vacancy it advertises, so it's safe to assume that the job will comply with employment legislation, that there will be no discrimination in the recruitment process, etc. It's true that other channels may be very efficient but they don't provide the same kind of guarantees. You can argue that mechanisms to score and rank those channels could serve the same purpose as official endorsement but there's still a long way to go before we can rely 100% on these new mechanisms to build trust in the system. There will be plenty of room for both models for a long time.

The public sector is also at the centre of the value chain that collaborative models are trying to enhance or improve. For instance, hospital-patient unions can do a great job when it comes to defending their general interests without necessarily being active in a community. But, when one of their members needs medical care,

they can do a lot more when they have a direct line to the nearest hospital. Collaborative initiatives usually work best at local levels (meaning in a local school rather than the ministry of education, a local hospital rather than the ministry of health and so forth).

D.M.: If people have little or no financial incentives to get involved, how can you encourage them to help out with one of the cornerstones of France's public service, i.e. service continuity? And do you think that the fact that stewardship is in public or private hands will make a difference in the way people will contribute?

E.L.: The key to prompt people to get involved is to foster their sense of community. That is what encourages them to serve interests beyond their own. The public sector holds sway precisely because it can nurture this shared sense of belonging more than anyone else. Private-sector businesses can do a great job but, at the end of the day, people will always tend to see themselves as customers, not as members of a community. And the local level is the best place to kindle this sense of community, by harnessing local pride.

That said, some companies have managed to create very strong bonds. Blablacar is a great example. It opened an online forum where new users can ask questions and experienced users can answer them pro-bono. Today, more than 90% of the questions that people post on this forum are answered in seconds! That's much faster than any professional customer service system can respond.

But there are other ways to motivate people to contribute to participatory public services. Gamification, one of them, encourages people to opt in by providing a symbolic reward and using fun. That's a powerful tool. The Fun Theory, an experimental action-research programme in Sweden, has shown that this works in several ways. To encourage Swedes to recycle glass, for example, they have developed "smart" bins that make jackpot-like sounds when people drop the right kind of items in them. In Australia, ticket-stamping machines enter passengers in a lottery, meaning passengers get a chance to win a prize every time they stamp their ticket on the bus.

Social currencies are another way of rewarding contributions. When he was mayor of New York, Michael Bloomberg introduced a time bank, under the NYC Service initiative, in several boroughs. So anyone who spends a few hours providing a community service can use their account for similar services they need in return.

These mechanisms are important, and complement the feeling of belonging in a community. But you need to innovate a lot if you want them to keep on working over the long term.

D.M.: Your study² on public service 2.0 was published three years ago, in 2013. Do you feel that mayors and councils have warmed to the idea of participatory public service since then?

E.L.: Yes. We've seen some significant steps in the right direction. A few years back, central and local governments were very uncomfortable with this idea. They were worried it would undermine their legitimacy and authority or simply zap their control over the services they provided. Today, there are several experiments underway, led by startups (the Ecov carpooling app and other cutting-edge solutions) and led by public authorities. Voisins Vigilants, for example, is a neighbourhood-watch platform that puts people living in the same neighbourhood in touch with each other to help prevent burglaries. So, for example, people can let their neighbours know when they will be away on holidays, send alerts if they see anything suspicious, etc. Hundreds of French mayors are supporting this initiative and the interior ministry has backed it.

At central government level, the Secrétariat Général pour la Modernisation de l'Action Publique (SGMAP) has introduced a number of programmes, including Futurs Publics (basically using design-thinking methods to revamp service processes, often including a collaborative component). Over in the digital arena, Etalab is running about 30 projects – called Start-ups d'Etat (State startups) – in many cases using open data and digital architectures to devise new services or simplify existing procedures by focusing on the bottlenecks (for example complex administrative protocols).

In a similar move, the CNAF (the family branch of the French social security system) organised a hackathon for 17 developer teams in October 2015, for its 70th anniversary. All the projects that came out on top included a collaborative element. One of the projects, WeCAF, for example, involved a search engine for beneficiaries to get in touch with each other and help each other out.

So the public sector is starting to understand this collaborative component and to feel comfortable with the idea. But of course we still have to take it further and move faster. And, most importantly, an administrative ecosystem where system thinking and conforming have traditionally prevailed needs to embrace a more experimental approach that involves a lot of learning through trial and error.

“THE PUBLIC SECTOR HOLDS SWAY PRECISELY BECAUSE IT CAN NURTURE A SHARED SENSE OF BELONGING MORE THAN ANYONE ELSE. IN THE PRIVATE SECTOR, AT THE END OF THE DAY, PEOPLE WILL ALWAYS TEND TO SEE THEMSELVES AS CUSTOMERS.”

2 Elisabeth Lulin, "Service Public 2.0", L'Institut de l'Entreprise, July 2013

BARCELONA'S SMART CITY VISION: an opportunity for transformation

Josep-Ramon Ferrer

Former Director of Barcelona Smart City and IT Program and Deputy CIO at the Barcelona City Council, International Senior Advisor at Doxa Innova & Smart



Josep-Ramon Ferrer was Deputy Chief Information Officer at the Barcelona City Council and Director of the city's Smart City Program. He was in charge of designing the city's IT strategy that led Barcelona to win the "European Capital of Innovation Award" in 2014. He is now International Senior Advisor at Doxa Innova & Smart, a Barcelona-based consulting company with 25 years of experience in the field of Information Communications Technology consultancy and services.

KEYWORDS

- BARCELONA
- INFORMATION REVOLUTION
- TRANSFORMATION
- GOVERNANCE
- CITIZENS

Based on Josep-Ramon Ferrer's experience as director of Barcelona's Smart City Program, the article details the ten key factors of success that are essential to successfully transform cities into *smart cities*. The article underlines the unique opportunity that new technologies represent for cities to embark on a more sustainable path, by engaging citizens

INTRODUCTION

With the rapid urbanization of the world, the concept of "smart cities" has been gaining momentum in the international political agenda. The transformation of cities into digital cities brings along an incredible opportunity for improving citizens' welfare and fostering economic progress.

While cities represent more than half of the global GDP and 70% of energy consumption, and considering that over one billion people has moved to urban areas since 2000, it is clear that future urban planning and policy-making will have to focus on the role that digital technologies can play in order to transform cities and guarantee their livability and sustainable growth on the long term.

Undoubtedly, the 21st century will be the most fast-changing century in History. The fact that more data has been created in the last two years than ever before is quite revealing of this very rapid transformation. Of course, the 20th century represented a huge step forward with regards to demographics, industrialization, scientific and technological revolution, etc. Additionally, from an economic point of view, it embodied the acceleration of globalization and the development of capitalism. Yet, it was also characterized by a growing awareness of resource scarcity, an increasing pressure on the environment, the aggravation of wealth differentials, as well as higher concerns about how citizens can impact – positively or negatively – the world they are living in.

The 21st century started out with the UN Millennium Development Goals (MDGs) that sought to tackle the biggest social challenges the world was facing. In 2015, they were replaced by the Sustainable Development Goals (SDGs), which acknowledge that information, technology and Internet can play a significant role in achieving these ambitious goals. This undoubtedly confirms that the 21st century will be the century of knowledge. Every minute,

around the globe, 168 million mails are sent, 6,600 pictures are uploaded on Flickr and 100,000 tweets are posted.

This is a powerful transformation: Internet is actually changing our habits, the way we communicate, how we get together, and even how we see and experience the world. It has, inextricably, changed the way citizens organize their lives. As a direct consequence, Internet will have a radical effect on cities' organization and relationships with their citizens. Indeed, Internet will change the lives of people living in cities because it will change the way productive processes are organized, how economic transactions take place and even how citizens consume culture and leisure services for instance. One can already see some examples of those changes through the development of new services and apps at the city level. Yet, the challenge is still huge for many cities. As the architect Vicente Guallart puts it: "Internet has changed our lives, but it has not changed our cities yet!"

The information revolution, based on big data and Internet of Things (IoT), will nurture the development of digital cities: cities will operate as networks - so as to optimize their structure and scale - and information will be turned into knowledge.

1 Guallart, Vicente (2012), The self-sufficient city, Barcelona: RBA Libros S.A

1. THE INFORMATION REVOLUTION: AN UNPRECEDENTED OPPORTUNITY FOR DIGITAL CITIES

Contrary to common belief, what one calls "Smart City" or "Digital City" - or previously "Information Society", or even today "Internet of Things" - is neither a fashion, a project, a brand, nor a marketing concept, but a way to define, under the same concept, the outcomes of the information revolution. The Internet revolution - that has begun at the end of the 20th century - is indeed impacting all parts of the planet and all the dimensions of our lives.

At the same time though, one should understand that this revolution is not only about technology, or, to put it differently, that technology is neither the goal nor the final objective of this revolution. This revolution is about how we can get the most out of the new Internet-based technologies in a distributed knowledge and globalized network model, and build the cities of the future, taking all areas into consideration: economic, social, cultural and political.

The technology of the 21st century and its potential applications enable us to consider ambitious goals for digital cities. The information revolution indeed represents a unique opportunity to build more livable and socially fair cities, where citizens' lives can constantly be improved and where economic growth is created through innovation and new business-models. Hence, it will put our economies towards a more sustainable path, generating opportunities for all, and getting the most out of existing resources, in a self-sufficiency perspective. Again, this is not simply about technology: this is about politics, strategy and transformation.

If we do it well, digital cities represent a unique opportunity for us to transform the urban world we are living in.

We had this intuition in Barcelona, some years ago. We understood that Internet and new technologies were a unique and incredible opportunity to transform the city and to rethink every single aspect of it: logistics, energy, education, healthcare, infrastructure, city management, public space, housing, security, mobility, etc. in a holistic approach.

2. BARCELONA'S SMART CITY STRATEGY

In 2011, the City Council of Barcelona launched a new IT strategy to encompass a global transformational plan aimed at introducing the use of new technologies in an innovative way in order to improve the overall operation and management of the city, fostering economic growth and strengthening citizens' welfare.

This strategy was strongly aligned with the targets of the Horizon 2020, the European Union's strategy to improve its growth model for the next decade, and create a more sustainable, smart and inclusive path for development. Barcelona's strategy also responded to the challenges the city was facing regarding its own organization (Place), the integration of citizens (People), private companies (Private) and the local administration (Public).

The project indeed focused on replicable processes that bring the city closer to citizens through open data initiatives which offer valuable information to individuals and private companies. The City Operating System (City OS) for instance is a decoupling layer between data sources and

By 2050,
**70% OF THE
GLOBAL POPULATION**
will live in cities

Cities represent more than
50% of the global GDP
and 70% of the overall
energy consumption

ONE BILLION PEOPLE
has moved to urban
areas since 2000

smart cities solutions, within which different open source add-on modules can be added and connected with each other. The open data platform, Smart Citizen, is another example of replicable process implemented in Barcelona that can bring the city closer to its citizens. It is an open data platform designed to generate participatory processes in the city. By connecting data, people and knowledge, it serves as a node for building productive, open and distributed indicators and tools - hence enabling inhabitants to collectively build their own city. The purpose of Barcelona's smart city strategy was also to generate a sustainable city growth, by encouraging initiatives related to smart lighting, mobility (e.g. e-vehicle) or residual energy (e.g. heating and cooling networks) but also related to social innovation. With the «Social Innovation for Communities» project for instance, the Barcelona City Council catalyzed the efforts of organizations, entrepreneurs and investors for the implementation of proven and successful international solutions to Barcelona's local context.

The implementation and promotion of alliances between private and public partners was also within the scope of Barcelona's smart city strategy. In fact, we facilitated alliances between companies like CISCO, IBM, Philips, SAP, Schneider and GDF Suez/ Engie amongst others, and research centres and universities such as i2CAT, CESCO, the Dublin Institute of Technology, business schools such as IESE and ESADE, and international organizations like the World Bank, the European Commission (through our participation at the European Innovation Partnership on Smart Cities and Communities) and the United Nations (UN Habitat).

The strength of Barcelona's smart city strategy relied on its cross-cutting approach. Indeed, the objective of the Barcelona City Council was to engage and keep all stakeholders connected, in order to ensure strong support from everyone and to foster innovation in a continuous way. Additionally, the city started working through a

cyclic and cross-cutting innovation model, with all the departments of the City Council, in order to provide innovative and useful services to citizens - that they have progressively integrated into their daily habits in a flexible, continuous and agile way.

3. LEARNINGS FROM BARCELONA'S EXPERIENCE: THE SMART CITY DECALOGUE

Based on the model and experience of Barcelona's smart city strategy, ten key concepts can help to improve, and perhaps simplify, the way smart cities will have to be designed in the future.

This "*decalogue*" summarizes the ten key success factors of tomorrow's digital cities:

1. Anticipate the 21st century's main challenge: fast-growing urbanization
2. Consider technology as a facilitator, not a goal in itself
3. Anchor the strategy into an ambitious transformational city project
4. Define a long-term vision
5. Define a clear action plan responding to local challenges
6. Define the action plan through a holistic and cross-cutting approach
7. Align the strategy with existing frameworks and funding schemes
8. Engage citizens in the process
9. Ensure an efficient governance model, integrating all key stakeholders
10. Build alliances: industry partnerships and ecosystem

3.1. ANTICIPATE THE 21ST CENTURY'S MAIN CHALLENGE: FAST-GROWING URBANIZATION

By 2050, 70% of the global population will live in cities. This growing urban population will put more pressure on cities, inducing more energy consumption (cities consume around 70% of global energy today), more resources to be allocated, etc. Cities will also face a growing concentration of economic activities. Currently, large cities alone make up 55% of economic output. In this new context, smart city management means ensuring citizens' quality of life, with new and more complex needs, and allocating resources efficiently. This is a big challenge but also a great opportunity to rethink the system and the type of cities we want to build in the future. Undoubtedly, technology plays a key role in it.

3.2. CONSIDER TECHNOLOGY AS A FACILITATOR, NOT A GOAL IN ITSELF

Smart city is strongly associated with technology. Indeed, technology plays a key role to rethink the way our cities are organized: it helps to gather information, to deploy efficient solutions and policies and to enable new communication channels relying upon big data, mobile technology, applications, cloud services, sensors, hyperconnectivity, 3D printing, etc.

However, technology should not be seen as a goal in itself. Technology is simply a *facilitator*. The purpose of data analysis is not to generate big amount of data. The ultimate goal – in fact, the only one that matters - is to help better decision and policy-making at the city level. Technology is at the core of the current smart city revolution, but most importantly, it represents a *tool* to govern and

“WE UNDERSTOOD THAT INTERNET AND NEW TECHNOLOGIES WERE A UNIQUE AND INCREDIBLE OPPORTUNITY TO TRANSFORM BARCELONA AND TO RETHINK EVERY SINGLE ASPECT OF THE CITY: LOGISTICS, ENERGY, EDUCATION, HEALTHCARE, INFRASTRUCTURE, CITY MANAGEMENT, PUBLIC SPACE, HOUSING, SECURITY, MOBILITY, ETC. IN A HOLISTIC APPROACH.”

organize our cities in a smarter way - particularly because it enables to engage and empower citizens, and make them participate in the policy-making process. All this results in more open, transparent and participatory urban systems.

3.3. ANCHOR THE STRATEGY INTO AN AMBITIOUS TRANSFORMATIONAL CITY PROJECT

Smart city should be consider as an opportunity to transform a city (like what happened in Barcelona with the 1992 Olympic Games for instance). Therefore, a smart city strategy should really be embedded into an ambitious “transformation” plan.

In this perspective, the current revolution that Barcelona is experiencing could be described as “Barcelona 5.0”.

This revolution started with “Barcelona 1.0”, which pretty much relates to the Roman period. Then came the medieval period – or “Barcelona 2.0” – with the building of the city walls, off to the 19th century’s “Barcelona 3.0” with the Cerda Plan (current urban grid). Then, the post-Olympic “Barcelona 4.0” was about the expansion of the city center to the sea, the building of new infrastructures (ring roads, airport, etc.), and the inclusion of the city into a larger metropolitan area.

The last stage of this evolution is the new Barcelona that we are currently designing: “Barcelona 5.0” will be an inclusive, productive, self-sufficient, smart and innovative city, favoring communities and public spaces.

3.4. DEFINE A LONG-TERM VISION

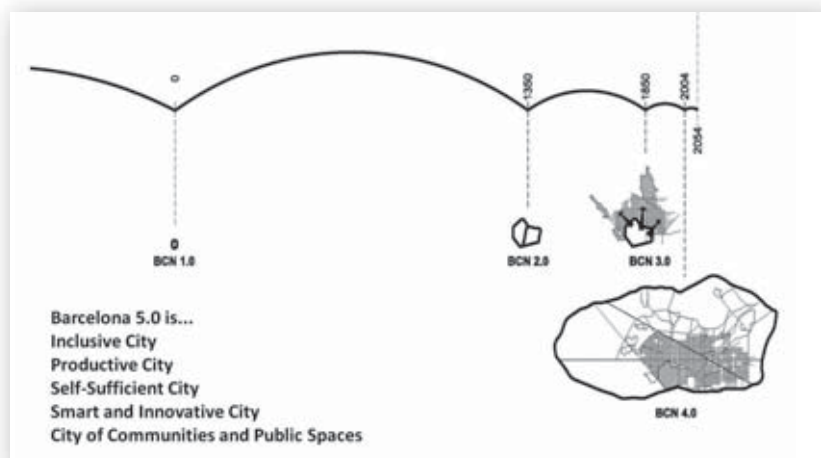
When designing a smart city, a long-term and ambitious vision is highly valuable. It must address the central question that is: what do we want to become, as a city, in 20 or 30 years from now?

In Barcelona, we defined the city’s mantra as following:

“To become a self-sufficient city of productive neighborhoods at human speed, inside a hyper-connected zero emissions Metropolitan Area”.

3.5. DEFINE A CLEAR ACTION PLAN RESPONDING TO LOCAL CHALLENGES

At local level, all cities have specific idiosyncrasies. But at a more macro-level, all cities face more or less the three same challenges: citizens’ welfare, economic growth and sustainability.



1	Telecommunications networks	12	Citizenship
2	Urban Platform	13	Open Government
3	Smart Data	14	Barcelona in the pocket
4	Smart Light	15	Smart Garbage Collection
5	Energy self-sufficiency	16	Smart Regulation
6	Smart Water	17	Smart Innovation
7	Smart Mobility	18	Health and Social Services
8	Renaturation	19	Education
9	Urban Transformation	20	Smart Tourist Destination
10	Smart Furnishings	21	Infrastructure and Logistics
11	Urban Resilience	22	Leisure and Culture

Barcelona Smart City's 22 programs

In this context, cities must advocate for a long-term vision that guarantees resources (in the present and the future), fair redistribution among people and welfare policies, relevant urban planning, and solutions to the environmental challenges. But then, the big question is how will cities be able to guarantee a balance between growth and sustainability in the long run?

In this context, it is important for cities to define overarching, ambitious long-term goals. But it is also very important to define local and specific short-term objectives and actions that will contribute to improve urban strategic planning, and, in the end, to achieve the longer-term vision. After identifying big challenges and opportunities for growth, job creation, activity development and welfare, cities have to design a clear action plan, with priorities and locally-customized solutions.

3.6. DECLINE THE ACTION PLAN THROUGH A HOLISTIC AND CROSS-CUTTING APPROACH

In Barcelona, our transformational city vision embraces all areas and corners of the city. Our smart city strategy proposed a holistic approach and vision of the city. This holistic approach has been declined into 22 programs (each one of them including different initiatives, projects and strategies), engaging all types of stakeholders: the public sector, the private sector and, of course, citizens. In our opinion, the sum of these 22 programs should be the basis of any digital city in the future.

3.7. ALIGN THE STRATEGY WITH EXISTING FRAMEWORKS AND FUNDING SCHEMES

In Europe, and more generally in the world, the use of Information and Communication Technologies (ICTs) has been widely stated as a way to improve policy-making. All major institutions agree on the fact that ICTs can help to overcome the challenges that current urbanization processes raise for cities. Therefore, many strategic policy frameworks, plans and even funding schemes have been implemented by different institutions (e.g. European Commission, European Investment Bank, Generalitat de Catalunya, Inter-American Development Bank, etc.) in order to help cities to address these challenges by relying upon ICTs and digital solutions.

Therefore, cities should try to get the most out of these existing funding schemes, policy frameworks and regulatory programs in order to facilitate and accelerate the execution of their projects. Thanks to these mechanisms, they can indeed have access to funding and many useful

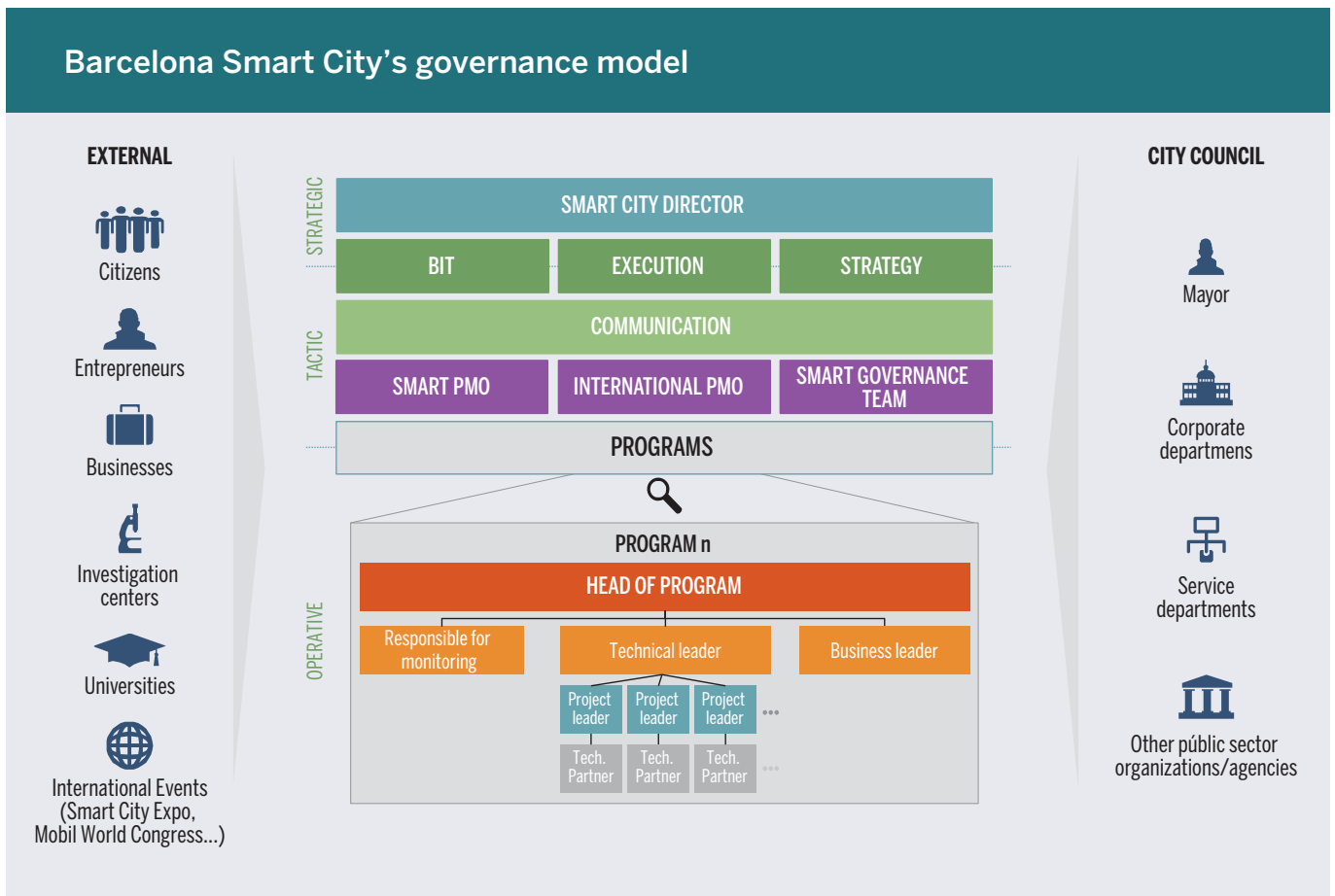
tools – particularly to measure and report their performance (economic and social returns on investment), which is very valuable, both in terms of continuous improvement of practices and communication.

3.8. ENGAGE CITIZENS IN THE PROCESS

The premise is simple: “no smart city without smart citizens”. Citizens play a key role in the development of smart cities. In Barcelona, we developed specific programs to encourage the adoption of citizen-driven innovation policies (e.g. implementation of “Barcelona in your pocket”, a program that promote the development of mobile-supported apps and services related to Barcelona, or the development of municipal Fab Labs). In fact, this is thanks to this set of policies that we won the “European Capital of Innovation Award” by the European Commission in 2014.

Engaging citizens means doing everything in an open, inclusive and participatory way. It means engaging citizens in the definition of programs and making them participate in the execution and in the evaluation afterwards.

Smart government is about citizen participation and even more about citizen engagement.





**“BARCELONA’S MANTRA:
TO BECOME A SELF-SUFFICIENT
CITY OF PRODUCTIVE
NEIGHBORHOODS AT HUMAN
SPEED, INSIDE A HYPER-
CONNECTED ZERO EMISSIONS
METROPOLITAN AREA.”**

3.9. ENSURE AN EFFICIENT GOVERNANCE MODEL, INTEGRATING ALL KEY STAKEHOLDERS

Identifying all stakeholders concerned by the implementation of the smart city policy’s programs – be they public or private – and defining a model that integrates all of them, from citizens and other external stakeholders, to the different municipal management layers (strategic, tactical and operational) will result in a more efficient governance model and, in the end, in the generation of efficient and synergy-based ecosystems that will be able to develop relevant solutions.

The definition of a clear governance model will also result in a better coordination of the different “internal” players involved (e.g. municipality’s departments), as well as external players. Finally, it will help to structure a model that will enable to define and manage priorities, to follow the achievement of the different objectives as well as the allocation of resources, and to integrate everyone’s perspectives and actions.

3.10. BUILD ALLIANCES: INDUSTRY PARTNERSHIPS AND ECOSYSTEM

Cities, regions, and even countries are increasingly in competition in our globalized world. Cities in particular compete for the attraction of capital flows, investments, talents, etc. as well as on the quality of life and leisure activities offered to their citizens. Nevertheless, they all face similar challenges. Therefore, public-public and public-private collaboration should be strengthened.

In particular, we believe that standards should be developed in order to encourage industrial players to invest in the development of innovative services and products that can gain critical mass.

Additionally, the development of spaces dedicated to innovation (e.g. urban innovation labs), aimed at testing urban solutions developed by companies seems to be critical. Beyond playing a key role in

encouraging companies to launch new products and services, these innovation labs also represent a way to engage citizens in the innovation process. Smart cities are mainly about lively spaces in constant evolution where anyone should be able to propose innovations to improve the organization of cities. In order to overcome the growing complexities of city management, cities will have to take advantage of every talent, and rely upon citizens’ creativity. In this perspective, Barcelona has succeeded in becoming a neuralgic knowledge hub, where innovation has turned the city into a creativity center – encouraging entrepreneurship at every level.

CONCLUSION

Barcelona appears to be one of the most advanced cities in terms of digital transformation. The Barcelona City Council’s experience provides key insights and learnings on how a smart city policy should be designed and implemented. The above Decalogue, which has been jointly developed by the City Council and the consulting company Doxa Innova&Smart, can help other cities to integrate digital technologies in order to transform and enhance the way they are organized and the way they engage citizens in order to respond to their needs and concerns.

“ Smart cities are at a crossroads. Fêted by some as the bright future of urban policies, very high levels of investment have been plowed into them over the past 10 years or so in both the northern and southern hemispheres. But a plethora of questions are now being asked – their legitimacy, the ways in which they are being deployed and their real impact are all going under the microscope. ”

David Ménascé

Associate director of Azao
Professor HEC Paris, as part of the
“Social Business/ Enterprise and Poverty Chair”

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