THE **DIGITAL** REVOLUTION IN THE **PARIS REGION**

LES CAHIERS N° 174
DE L'INSTITUT D'AMÉNAGEMENT ET D'URBANISME - ÎLE-DE-FRANCE

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THE DIGITAL REVOLUTION FOR EVERYONE


ÉLODIE GRÉGOIRE

Among all the forward-looking policies a territorial authority needs to develop, the one that aims to put the digital revolution at everyone's service is of critical importance for several reasons: digitalization is the new engine of growth and therefore of employment; the ecological transition calls for "smart" urban planning; daily mobility is becoming multimodal and variable; people now work anywhere, anytime; today, high school pupils do not study in the same way as their counterparts did in the 19th century; democracy is becoming more participatory; and finally, an attractive metropolis or megacity is seen as a connected, creative and innovative metropolitan area.

For all these reasons, and because the world is changing, Paris Region is putting in place a strategy aimed at making it Europe's smartest region. The goal is not only to provide very high-speed broadband for the entire Paris Region population, but also to profoundly transform it in order to align it with the digital revolution. Everything possible must be mobilized to ease the lives of the Paris Region's 12 million inhabitants, including big data, artificial intelligence, the Internet of Things and the development of the collaborative economy.

The first steps towards creating the Smart Paris Region have already been made thanks to initiatives such as the "digital second chance" training program for job-seekers, online services to improve the welcoming of tourists or the plan to develop 100% digitalized high schools.

It is now time to move up a gear and disseminate the Smart spirit across the whole region and in all areas of activity. This is the purpose of the Smart Region Initiative, a program based on the uses and needs of Paris Region inhabitants aimed at developing "smart services". The first step is the creation of a regional data platform based on information collected by the region and its public partners - including the IAU - but also by its private partners and via the Internet of Things.

The cross-referencing, analysis and 3D-modelling of these data will drive the emergence of a series of new applications to enable people to find available parking spaces, calculate the level of atmospheric pollution in their environment, find out in real time about the current waiting times at the entrances of tourist sites, identify shared coworking spaces nearby, etc.

However, the Smart Region Initiative goes even further than this: its ultimate aim is to lay the foundations of a new collaborative, more agile and inclusive society.

This edition of *les Cahiers de l'IAU* adds a valuable building block to the edifice by showing that the Smart Region is not only a matter of providing infrastructures and facilities but is also everyone's responsibility. Our role is to help the inhabitants of the Paris region to take ownership of the digital revolution. This comprehensive and educational document contributes fully to achieving this common objective.

Valérie PÉCRESSE
President of the Paris Region
President of IAU îdF


J.-M. SIGOT

ANTOINE PICON : "SMART THINKING ON A REGIONAL SCALE"

Professor of the History of Architecture at the Harvard Graduate School of Design and a teacher at École des Ponts Paris Tech engineering school, Antoine Picon has written numerous books and conducted research work on the city of the future and its infrastructures. He explains why it is necessary to think about a digital strategy on the scale of a geographical area that does not encompass urbanised spaces alone.

What would be your definition of a smart city?

Antoine Picon First and foremost, a Smart City is a more efficient city due to enhanced urban transport and an extensive supply of services...

In recent years, the concepts of Smart City and green/resilient city have converged significantly. To a large extent, this explains the widespread enthusiasm for the Smart City concept, notably in Paris. Of course, everything is related: needless to say, a more efficient city is less energy-intensive, less wasteful, enhances its natural resources, and so on.

Finally, the idea behind the Smart City concept is that of a different urban experience, i.e. a new quality of urban living. Many people see the Smart City as a way of rethinking urban life (the city concept) in answer to the following questions: what does 'living together' in urban areas mean? What are the pleasures of urban life? What opportunities does it provide?

In fact, the greatest challenge we are facing today when discussing the Smart City topic is that it refers both to a set of ideals, some of which are almost utopian, and to numerous very practical and diverse experiences.

At what point can we consider a city as Smart?

A. P. We can consider a city as Smart when it has developed a critical mass of applications intended to make it more efficient, more liveable and so on. But we must avoid giving in to the craze for urban "benchmarking", which consists of quantifying everything. This does not make much sense and leads to certain aberrations, such as, for example, the proliferation of league tables that rank towns and cities in terms of the "best place in which live" or of "the most 'student-friendly' environment", etc. Personally, I prefer a more qualitative criterion: a town or city is truly smart when the quality of the urban experience really begins to change. This is the case, for example, when apps help you diversify and optimize your modes of transport. After all, ultimately, what counts is the quality of life.

Is there such a thing as a Smart City model?

A. P. For the moment, we see the same technologies being used in towns and cities almost everywhere across the world: featuring sensors, smartphone applications, etc. At the same time, in addition to this convergence of tools and issues (e.g. the rise in urban events or in attempts to redefine the role of urban policies), we see some necessary adaptations and divergences. In fact, we are going to discover that, as happened in the 19th century at the start of the network-based town or city, the Smart City concept will be applied in very different ways depending on urban situations. However, we are still at a very early stage in the diversification of models, namely the exploratory stage.

Does the Smart City stop at the limits of each urban area?

A. P. It would be absurd to think that a Smart City is limited to urban areas. However, the question of the transition from one local area or intermunicipal authority to another has received little attention so far because the differences between areas pose problems of comparability and ranking given their unequal levels of development. We cannot position sensors everywhere. Although it may be worthwhile in the dense heart of metropolitan areas, it is not so in low-density areas. In the outer suburbs, the number of economic hubs does not justify massive investment in all sectors, which means that choices must be made. Historically, the mayors (leaders of municipal governments) have been making the case for the Smart City and have asked their territorial administrations to "act Smart", in conjunction with major IT operators (IBM, Cisco, etc.) or start-ups. Until now, there has not been any truly regional policy. And yet, in my view, the region is the most relevant scale on which to address certain related issues for several reasons. To begin with, the region is the body capable of regulating different Smart systems at municipal level and making them compatible with each other. Next, the regional scale compels us to take geographical features into account. For instance, in the Paris region, there are still large natural areas, woods and lakes. Integrating the management of these vast natural areas into a smart approach by digitizing the management of the environment on a regional scale seems to be an important challenge that is not spoken about very much. Quite clearly, the question of the environmental future of Paris cannot be addressed only on the scale of the core city of Paris.

The regional scale also allows us to address the issue of the social divide. This is particularly true in the Paris Region, where economic, social and cultural disparities are wide from one end of the territory to the other. The Smart approach could be used as a tool to strengthen social cohesion.

How can digitalization be spatially deployed across all areas and what challenges does it pose?

A. P. For centuries, we have been obsessed with the idea of regularly reviewing our urban planning and composition to help us find our way around the town or city thanks to the "legibility" of its physical space. Digitalization, by expanding the "physical space of atoms", by developing "the digital space of bits" has changed our relationship with urban space and led to new urban practices. This is true, for example, of the growing number of people here and elsewhere who walk with their mobile phones in their hands at the same time, feeling equally at ease in New York as they would in the winding streets of a medina thanks to the small blue dot that geolocates them. Similarly, Uber is changing our relationship with urban mobility, which used to be embedded in the urban fabric by regular bus lines and even more so by metro or tramway lines. Thanks to chauffeured cars, mobility is becoming an almost gaseous form of service that crystallizes when you order it. This form of mobility structures urban life very differently: instead of traditional flow management, an organization system that aims to match supply and demand takes over. This platform-based approach very deeply changes the way we think about infrastructures.

Of course, we are not going to redesign the centers of Venice or Paris, but all of this is going to have some real impacts on the way urban areas and territories function.

In terms of urban planning, what is the significance of the advent of digitalization in all aspects of territorial development?

A. P. We have experienced a change of era. We no longer think about towns and cities as people used to in the days of Le Corbusier, when modernity was identified as the triumph of planning. Plan-based thinking has given way to scenario- or narrative-based thinking. Today, there is also the cult of iconic architectural structures or "trophy buildings", as illustrated by the Elbe Philharmonic hall in Hamburg, the Gherkin in London and the Guggenheim museum in Bilbao, etc. Such monuments are supposed to embody the destiny of a city or territory. At the same time, public stakeholders now exert only partial control over the destinies of towns and cities, which are increasingly in the hands of private stakeholders and dependent on the financialization of production cities. Today, towns and cities rely on agencies to locate their trophy buildings, whereas in the past buildings went up in places assigned to them by a plan. However, when all is said and done, designing scenarios and narratives may well be a more effective way of shaping the future of a town or city.

The tools currently used in urban planning are ill-suited to this trend, especially given that we are witnessing an acceleration in the production of scenarios driven, a trend driven by big data and the urban modelling concept. Urban modelling is not a matter of planning: planning used to be willfully proactive, whereas modelling looks at how a territory actually functions in the present and then extrapolates on this basis, using narratives to communicate.

In the face of this acceleration in scenario- production, how can we anticipate future regional development and shape it? How can we draw up a digital strategy for a 15-20 year period?

A. P. It is difficult, if not impossible, to draw up a 15-20-year digital strategy. The real issue is the aging of digital technology. Taking the example of architecture, the formats of architectural drawing files dating from the late 1990s are almost unreadable today. This explains why all archives across the world have bet on the PDF format. The same question applies, for example, to geolocated data formats: will they last a long time?

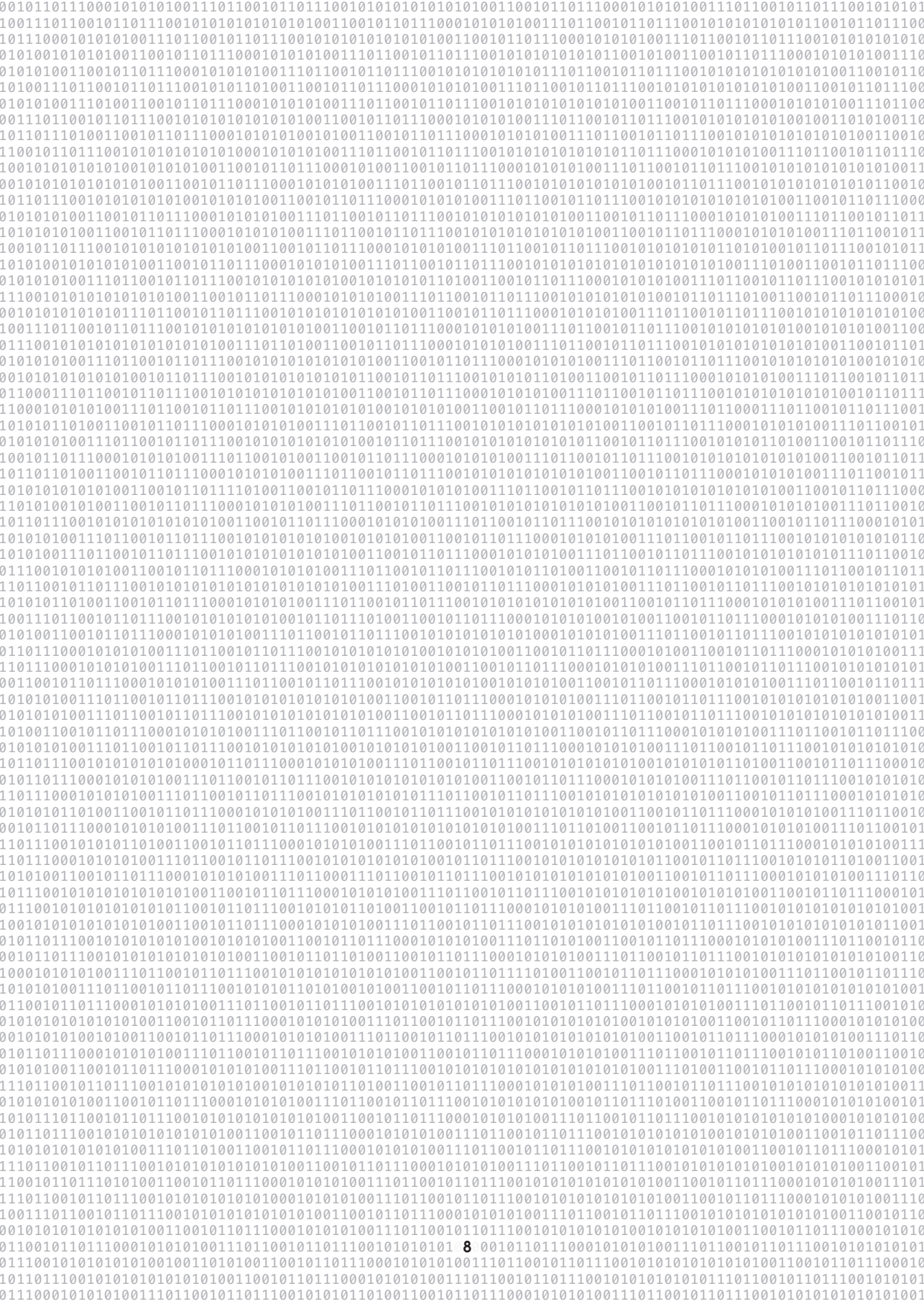
My second concern is to refrain from overrating digital technology by vaunting its neo-avant-garde status. Atoms remain more expensive than bits of information; in Paris, the price of a piece of property per square meter is much higher than that of a terabit. We can digitize as much as we like, but we still need to rely on networks in good condition, i.e. on a high-performance physical infrastructure. And yet, strangely enough, we do things backwards: the digital world prevails over the physical world, whereas in the day-to-day lives of Paris Region inhabitants it is still the physical world that prevails over the digital. My third major concern is the depletion of the Earth's natural resources. Digital technology, which has its own environmental footprint, should enable us to manage the growing scarcity of physical resources. This is what really threatens the Earth, more than the scarcity of digital resources. ■

Interviewed by Daniel Thépin, Cécile Diguet and Sophie Roquelle.

Antoine Picon is notably the author of the following:

- L'ornement architectural : entre subjectivité et politique, PPUR.
- Smart Cities, a Spatial Intelligence, Wiley (english), November 2015.Presses Polytechniques, pochearchitecture, June2017.
- Smart Cities, théorie et critique d´un idéal auto-réalisateur, Éditions B2, November 2015.
- La ville des réseaux - Un imaginaire politique, Éditions Manucius, February 2014.
- Co-author with Clément Orillard of, De la ville nouvelle à la ville durable, Marne- la-Vallée, Parenthèses, November 2012.

The digital revolution in the Paris Region
Interview with Antoine Picon
https://youtu.be/2f6yj7nlJxw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FROM SMART CITY TO SMART REGION

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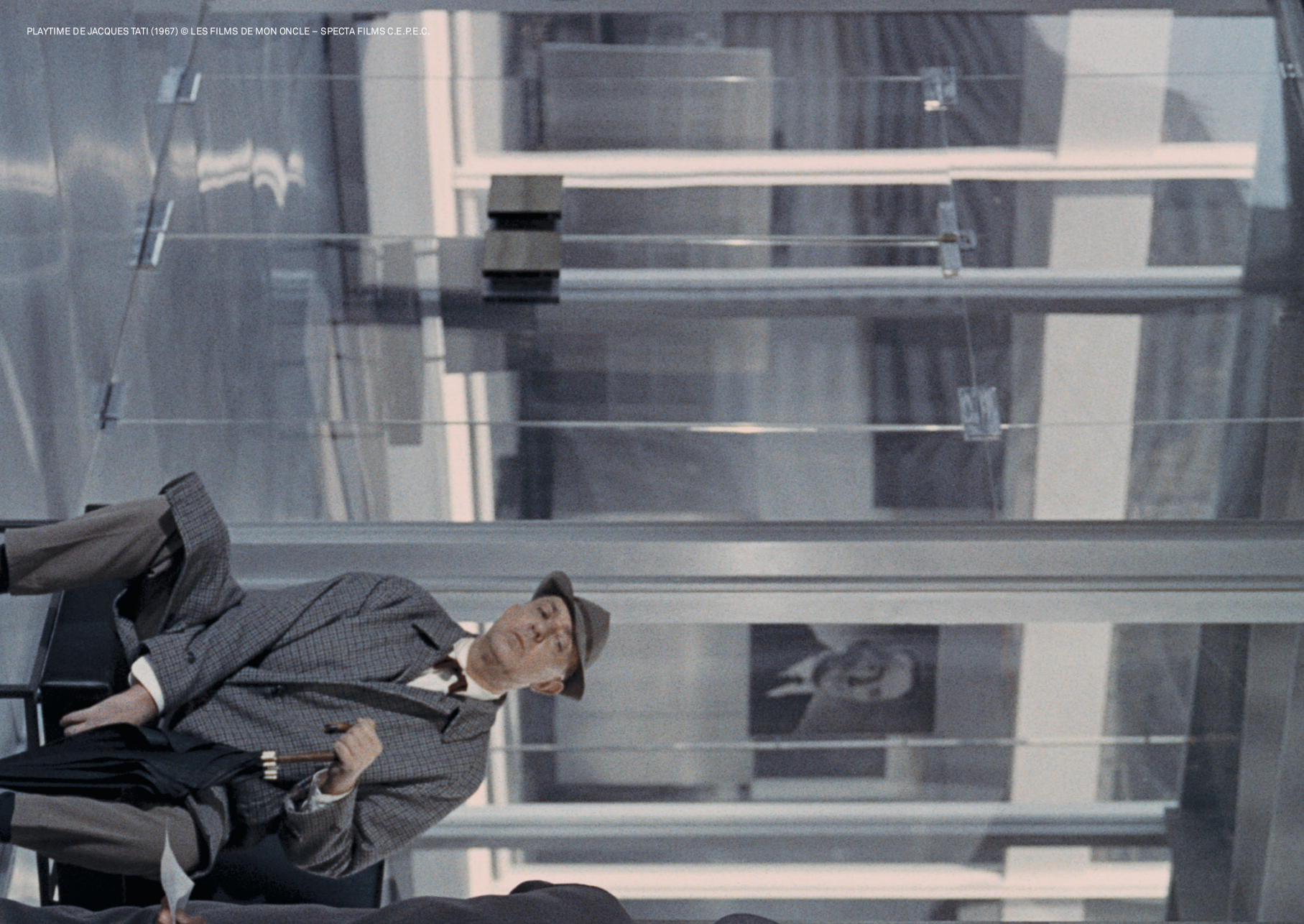
The desire to preserve the environment has given rise to a new concept that cities have gradually taken over. Based on technological progress, “smart city” policies help rationalise energies, pool expenses and skills to improve quality of life. In constant evolution, smart cities don’t stop at the traditional boundaries of cities and take a whole new interest at a broader, regional scale. From local to global, the new concept of “smart region” promotes the networking of actors and territories, giving added value to the services offered to citizens, and a renewed, more resilient, inclusive and sustainable regional identity.



PLAYTIME DE JACQUES TATI (1967) © LES FILMS DE MON ONCLE – SPECTA FILMS C.E.P.E.C.

A **MULTIFACETED** CITY

To preserve and optimize their resources, reduce their organizational costs and foster high-quality urban life, Smart Cities develop shared collective intelligence. The inhabitants are at the heart of this revolution, which blends innovation, environment protection and governance. This presentation focuses specifically on this shared concept, which seems to hold out infinite prospects for use.

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Daniel Thépin, economist, IAU îdF

In recent years, in the world of urban planning, much has been written about the Smart City concept, a source of much controversy. Today, the emerging consensus of opinion seems to be that there is no single definition of it: in a way, it is also tempting to say that there are almost as many models as there are towns and cities. As indicated by Carlo Ratti, the architect, another finding is that no link has been established between the Smart City concept and architecture, i.e. it is unlikely that we will witness the birth of an architectural model that would apply to almost all towns and cities.

The concept is applicable to both new towns in South Korea and the ancient towns and cities of Europe. For some people, it is based, above all, on interaction with citizen residents, whereas for others it is a technological solution to the problem of managing oversized metropolitan areas. Yet, in spite of these differences of opinion, the concept relies on converging objectives and component parts. Among these, as emphasized by Antoine Picon in his interview[1], what truly characterizes the Smart City is the quest for more effective use of information technologies, in whatever form. This quest may focus on a great variety of topics: mobility, housing, energy, sustainable development, urban administration, services to inhabitants and citizen participation, etc.

URBAN SENSORS OF ALL KINDS ARE EMBEDDED IN THE URBAN FABRIC TO TAKE ITS PULSE IN REAL TIME

HIGHLY INTENSIVE USE OF TECHNOLOGY

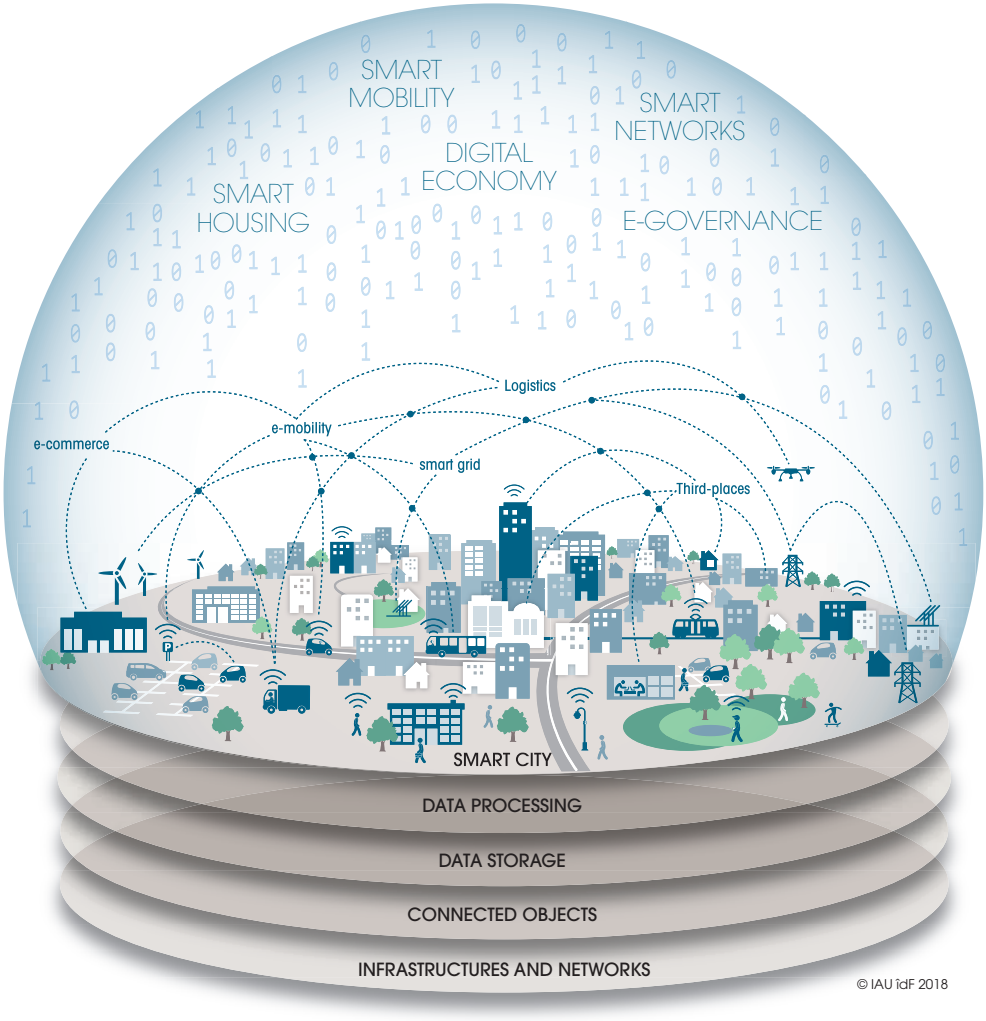
The second point of convergence of all Smart Cities seems to be their highly intensive use of technology. Indeed, all smart cities feature a set of infrastructures that make up what could be described as a "digital base" made up of dense high-performance telecom networks, be they wired or free-to-air, including optical fibre networks, coaxial cables, ADSL, WI-Fi, bluetooth, mobile telephone networks, etc. These networks are many and their performance levels and technologies are continually changing. Among the other components of this base are sensors of all kinds, fixed or embedded, cameras and connected objects, all of which cover urban areas and take their pulse in real time by monitoring road traffic, air or sound pollution, security and safety, etc. These urban sensors are also continually changing and multiplying. Their flows interconnect and even clash, because their sources are becoming complex and sometimes compete with each other. Today, it is possible to measure urban traffic using the traditional method featuring sensors embedded in the asphalt, or cameras, or so-called connected vehicles, or the smartphones of vehicle drivers or their passengers. In a completely different area, we can measure, for example, flows of tourists using the geo-tracking function on our mobile phones.

Sensors are massively spreading across the urban fabric, a trend which is only beginning. The first generation of fixed urban sensors, whose deployment was slow and expensive albeit planned, is now complemented or even rivalled by the new generations. Smartphones with their geo-tracking feature represented the first wave. The imminent arrival of a very large number of connected objects known more specifically as the "Internet of Things" (IoT) will be the second wave.

Data are indeed the lifeblood of the Smart City, the third convergence. Whatever its shape and objectives, the Smart City is based on a continuous flow of data. These data may come in many different forms because they are complex, heterogeneous, unstructured and ever more voluminous, which explains why they are now called "big data".

The exponential growth in sensor data combined with the increase in computing power is making it easier and easier to measure, analyze, anticipate and, in short, to model the ever more secret pace of the Smart City. Thanks to the embedding of RFID (Radio Frequency Identification) chips, it is possible to track the route of urban waste disposal in order to optimize the

SMART CITIES:
WHERE DATA FLOWS CONVERGE



recycling circuits. According to the MIT (Massachusetts Institute of Technology), analyzing waste water can be of interest to urban planners (to better understand the inhabitants' way of life), to public health authorities (to prevent epidemics) and to law enforcement (by providing, for example, unexpected information on areas of high drug consumption). These are only two examples, as the range of possible applications seems limitless. For cities, this represents both an extraordinary opportunity and a challenge: although the Smart City as a territory is a site for the intensive production of data, as a public institution is not necessarily a systemic point of convergence and will face competition from new stakeholders.
Within a Smart City there are many operators who position themselves as solution-providers, whereas others aggregate data in order to provide information that helps diversify the supply of services. However, in this regard, the borderline between complementariness and competition is particularly fuzzy. The key to success is a city's ability to federate, organize, bring together and simplify things, with a view to delivering an integrated offering to city-users.

THE EXAMPLES OF RENNES AND LYON

Digital modelling is an illustration of strategies adopted by Smart Cities to keep their urban service offering under control. The virtual Singapore program is probably one of the most ambitious examples of digital modelling. In France, the cities of Rennes and Lyon are notable examples that show the scale of the task and the need for stakeholders with different strategies to form complex partnerships.

Finally, the fourth and last (but not least) key issue: the inhabitants. No matter how effective technology may be, it is not the main driver of urban development, which is the focus on inhabitants. There can be no Smart City without Smart inhabitants. The challenge facing a Smart City is to be collaborative and inclusive. The Smart City reshuffles the cards of participatory democracy. Beyond being a political expression, putting the citizen-user at the heart of the Smart City is also a basic condition for its effectiveness. Indeed, to outperform, for example, in the fields of energy consumption or waste recycling, a Smart City requires that its smart inhabitants should behave as responsible citizens.
These few examples do not summarize all the facets and aspects of a Smart City, but they do show its diversity and the complexity of the ongoing changes. As we have seen, there will not be a single type of Smart City, nor is there likely to be a major architectural upheaval. Becoming a Smart City is not so much a matter of reaching a stage of development that features certain characteristics; rather, it is a matter of undertaking a cycle of continuous changes that ceaselessly reinvent themselves. ■

1. See the interview with Antoine Picon, p. 5.

In the port of Amsterdam, cyclists can adjust the street lighting thanks to a smartphone app.
LUMINEXT BV SMART LIGHTING, THE NETHERLANDS

DIGITAL MANIA IS SWEEPING THROUGH **EUROPEAN CITY REGIONS**

Encouraged by the EU, almost all of Europe's large cities have undertaken strategies in favor of Smart Cities. In addition to meeting urban planning and ecological concerns, these programs have become economic development tools, but also sources of competition between metropolitan areas.

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Éric Huybrechts, architect-urbanist, IAU îdF

In 2010, the member states of the European Union adopted the Europe 2020 strategy aimed at better coordinating their economic and social policies. This strategy included a commitment to foster the development of digital cities and to invest in information and communication technology infrastructures. The purpose of this was to create a digital, sustainable and inclusive economy by investing 3% of Europe's GDP in research and development and in innovation.

Many of Europe's cities took up the challenge immediately. By 2011[1], over 240 cities of over 100,000 inhabitants had already drawn up and planned actions in favour of digital cities (43% of cities of between 100,000 and 200,000 inhabitants and 90% of metropolitan areas with over 500,000 inhabitants). Around half of these initiatives were being led and implemented, most of them in the fields of environment protection, mobility and e-governance.

To date, the European cities of Amsterdam, Barcelona, Copenhagen, Helsinki, Manchester and Vienna seem to have been the best in terms of achieving their urban development objectives. The factors of success depend on the real involvement of citizens, elected officials and local economic agents in the dissemination of best practices at all levels of society.

THE IMPACT OF DIGITAL CITIES IN EUROPE HAS GONE BEYOND THE PROVISION OF URBAN SERVICES AND BECOME A DRIVER OF ECONOMIC AND SOCIAL DEVELOPMENT

Within a few years, Amsterdam has become one of Europe's most innovative cities. The municipality's definition of a Smart City is: "a city whose social, infrastructural and technological solutions enhance and accelerate its sustainable economic development". Thus, as early as in 2009, it launched the Amsterdam Smart City initiative. A digital platform[2] connects people and communities, who can thus share their expertise, accelerate their project implementation and face the challenges of their city's urban development. To date, Amsterdam Smart City has supported over 80 pilot projects, such as: bike paths, bus lanes, shorter garbage truck routes, parking payments by mobile phone, Smart Citizens Lab, City-zen (smart-grid), City Alerts, open data, etc. Amsterdam has also invested in developing co-working spaces close to residential areas (network of des "smart work centres", which reduced traffic jams by 20% between 2008 and 2013, according to the municipality.

Barcelona has also developed a digital platform[3]. In 2015, the city set up a special team called 'Smart City Barcelona' to integrate innovative projects and identify new opportunities to improve urban services in 12 areas of intervention (transport, water, energy, waste, open data, etc.). It initiated 22 programmes made up of 83 projects: parking spaces, bike sharing, digital bus-stops, smart public lighting, smart management of public parks... The city is connected by a large fiber-optic network that links up 90% of homes, thereby allowing the city to communicate directly with the inhabitants.

The data are made available in the form of open data, thereby strengthening the relationship between citizens and the municipality. Moreover, the 22@Barcelona project has enabled Barcelona to position itself as the European leader in centres of innovation in competition with Sao Paulo, Seoul and London. This has favoured the production of innovations related to urban development goals. Thanks to the digital city model, Barcelona has cut its consumption levels, increased its revenues and has reportedly created 47,000 jobs.

The impact of digital cities in Europe has gone beyond the provision of urban services and become a driver of economic and social development. The interactions generated by new sharing tools (digital platforms) have paved the way for the emergence of innovative collaborative projects, thereby facilitating direct relations between citizens and elected city officials and the dissemination of innovative solutions at local, national and international levels. ■

1. EU "Directorate General for internal policies", Mapping smart cities in the EU, Brussels, 2014.
2. http://amsterdamsmartcity.com
3. http://ajuntament.barcelona.cat

SHIOTA CHIHARU, LETTERS OF THANKS, 2017, KUNSTHALLE ROSTOCK © ADAGP, PARIS 2017.
PHOTO: THOMAS HANTZSCHEL / FOTOAGENTUR NORDLICHT.

THE ESSENTIAL **TRANSFORMATION OF TERRITORIES**

Digital transformation has been a major source of progress and economic growth. However, the scale of the initiatives taken has often remained too restricted to meet all the needs or to optimize investments. It is within this context that the 'Smart Region' approaches were initiated, which have driven the Smart Cities and accelerated the improved competitiveness and quality of life of their territories.

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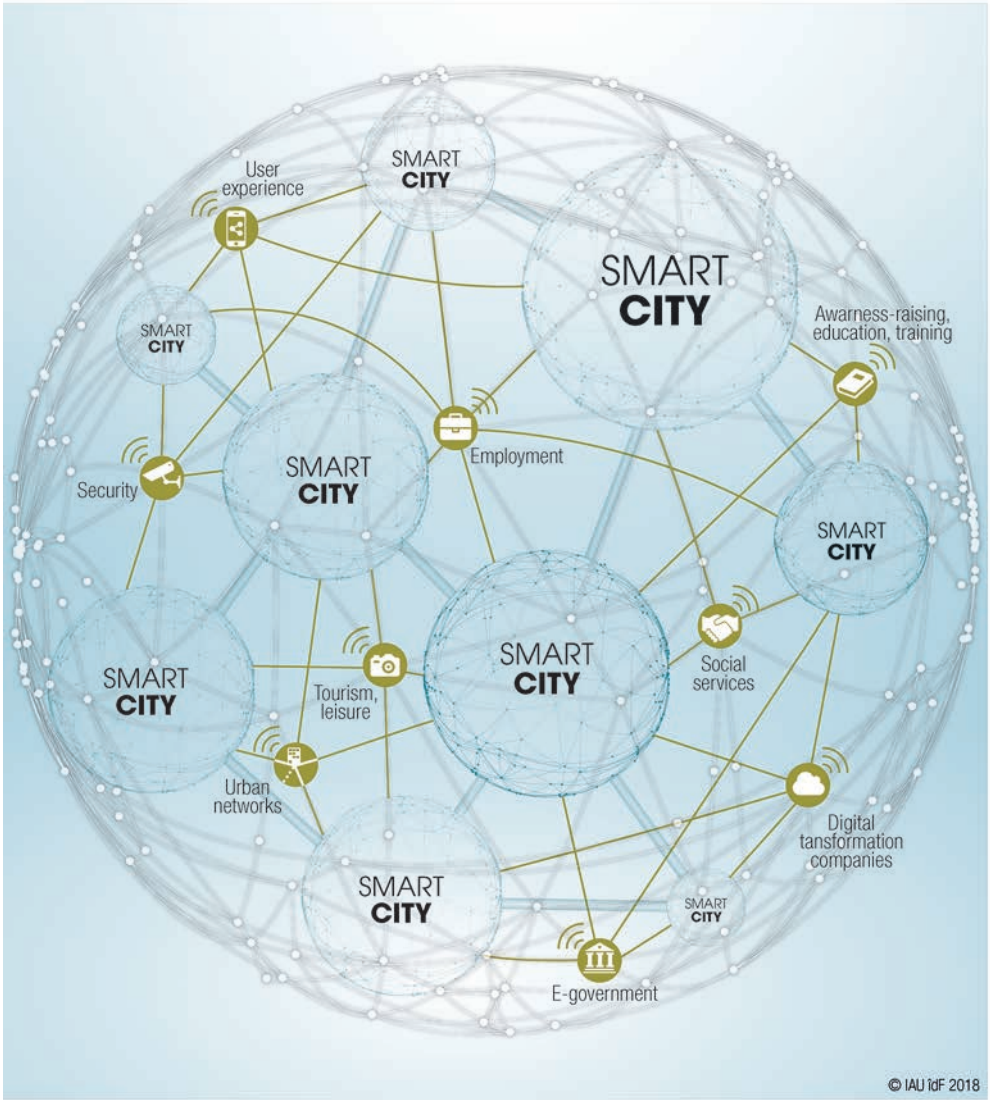
Vincent Gollain, Head of the Economics Department, IAU îdF

Smart Region approaches are based on concepts and practices developed in the corporate world to match the increasing complexity of company business lines and provide efficient services to customers who are more and more mobile and connected. When applied to regional areas, these approaches first focused on economic development and

HOW A SMART REGION NETWORKS
STAKEHOLDERS AND TERRITORIES



A smart region acts on a suitable geographical scale to meet the needs of different sections of the public by mobilizing digital technologies through collaborative platforms that make for fluid and shared management of the data collected.
A Smart Region is a system of local systems conducive to fostering compatibility and to improving the quality of daily life. It networks Smart Cities as well as interstitial spaces to efficiently meet the needs of stakeholders such as inhabitants, tourists or companies.

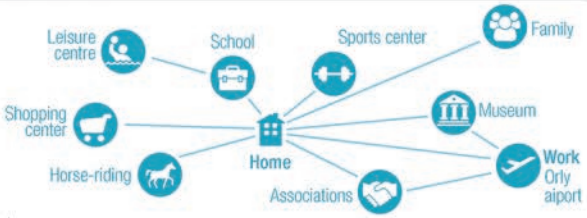
FACILITATE, PERSONALISE, DEVELOP

INHABITANTS' LEISURE ACTIVITIES

TODAY

Marion and Cédric have 2 children and live in the West of the Paris region:

- 6 places regularly visited for leisure activities
- 20 websites used to find the most useful information



TOMORROW

1 regional application
operated with Paris Region stakeholders and capable of instantaneously meeting their information needs

SMART REGION

- Shared collaborative platform
- Sharing of data collected, processed and secured as open data

INTERNATIONAL TOURISM

TODAY

Chang lives in Shanghai and is preparing to visit the Paris Region:

- 7 business centers, 7 monuments, 2 hotels
- 50 possible websites available to find useful information

TOMORROW

1 information website
personalized to enable an enhanced experience pre-visit to the Paris Region

SMART REGION

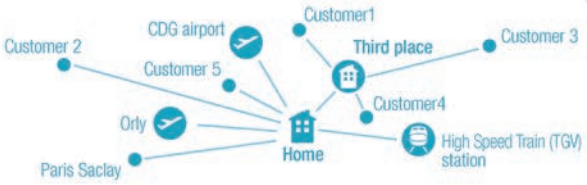
- AI-based applications that provide personalized information in Chinese
- Centralized and shared feedback to improve what is offered to visitors

EXPERIMENTS CARRIED OUT BY COMPANIES

TODAY

Jack approaches each customer individually:

- his experiments are not shared with other organisations
- no regional community of users exists



TOMORROW

1 regional collective
the experiments are facilitated and highlighted by the Smart Region

SMART REGION

- Creation of a regional stakeholders' collective dedicated to experiments
- Development of successful experiments carried out in the region

innovation before broadening their focus to cover all topics relating to territorial management, namely: public services, planning, mobility, tourism and leisure, etc. Setting up a smart region requires four key components.

THE FOUR PILLARS OF SUCCESS

First, success depends on a proactive determination to support the sustainable transformation of the economy and of society. This calls for reconciling the achievement of objectives as diverse as economic competitiveness, social well-being and the ecological transition. Such an approach must go hand-in-hand with the introduction of a project management style that intelligently involves all the stakeholders concerned on a regional scale.

Second, choosing a relevant geographical scale - a living area - that includes the areas around several Smart Cities and interstitial spaces is the key to connecting up and intensifying local initiatives.

The third pillar is giving priority attention to meeting the needs of various sections of the public - namely inhabitants, professionals, visitors, academics, etc. - in terms of how they use the territory concerned. A Smart Region should go beyond silo-based offerings and provide solutions that best meet the needs for mobility, starting up new businesses and discovering regional tourist attractions. This alignment of resources and tools also ensures that investment and operating expenditures are optimized.

DATA AT THE SERVICE OF GOVERNANCE IN WALLONIA

Wallonia exemplifies a policy in favor of the development of digital transformation businesses and bodies. Through the "Digital Wallonia" agency, a collaborative platform has been established with four major functions: to map the stakeholder ecosystem; to propose a shared calendar of digital-related events; to share the components of the regional digital strategy; and to propose substantive content and news items on digitalization. This collective platform forms part of a collaborative system of governance involving regional stakeholders and is based on a "data-driven and services-oriented" approach. ■

To build the fourth and last pillar, a smart region mobilizes a set of digital technologies. Setting up a regional system made up of local systems makes it possible to create effective collaborative platforms that bring together local and regional stakeholders within a neutral framework. These platforms also provide a range of benefits: shared management of data and skills; optimization of expenditures; sharing and dissemination of experiences; possible exchanges of views on planned projects. These benefits, in turn, enable partners to draw up joint actions or facilitate the conception and implementation of public/private policies and initiatives.

A good illustration of this approach is provided by the reorganization of public transport in the Paris Region. The quality of the offering of transport and related services to travelers has been enhanced by the setting up of a regional agency called Île-de-France Mobilités[1], which brings together all the stakeholders (travelers, elected officials, builders, carriers, infrastructure managers, etc.). Even better, this has made it possible to deploy the future Smart Vianavigo application. Thanks to its broader package of e-services, this will provide travelers with an even better offering.

FIVE PRIORITIES AND EIGHT KEY TOPICS

A smart region's objectives can be summarized under five priorities: to deploy policies designed to meet the needs of the public; to enhance the effectiveness of public policies thanks to digitalization and collective efficiency; to support the deployment of economic experiments and ecosystems at the heart of the digital transformation; to amplify the impacts of projects involving private, public and non-profit stakeholders; and to enhance regional competitiveness and hospitality. Developing a smart region also means identifying thematic areas of intervention, such as: user experience, security, employment, tourism and leisure, urban networks, awareness-raising, educating and training inhabitants, social services, digital transformation companies and bodies, and finally e-government. ■

1. Former Syndicat des Transports d'Île-de-France (Stif).

IMMEUBLE HAUSSMANNIEN RESTRUCTURÉ PAR ATELIERS 2/3/4/. PHOTO : VINCENT FILLON.

PARIS REGION: THE CHALLENGES OF **"SMART" PLANNING**

With 500,000 jobs in the digital sector, the deployment of fiber-optic networks for all, the existence of numerous early adopters and the multiplication of data centers, etc., the Paris Region is extensively involved in a digital transformation process which has mobilized its greatest strengths. However, faced with challenges that are continually changing, it is essential to involve all the Region's inhabitants and territories in the dynamics of this process.

****

Nicolas Laruelle, urbanist and **Daniel Thépin,** economist, IAU îdF

Although digital transformation processes often seem to find it difficult to come to terms with existing cities, the Paris Region's first steps towards becoming a Smart Region were paradoxically driven by its history and geography. What are this Region's strengths? Its density and diversity, of course, but also its Haussmann period urban fabric in the heart of the agglomeration whose investment properties have proved to be highly adaptable to new technologies (the central business district is still home to the most attractive buildings). Another heritage from the Haussmann

period is the large sewerage network (visitable by technicians) thanks to which the fibre optic network has been rapidly deployed. Another strength is the region's industrial past, which provided the first data centres with locations in the heart of the agglomeration very well-equipped with electric power.

DENSITY, DIVERSITY, PROFITABILITY

Although the Paris Region's density and diversity are its unquestionable strengths, they are unequally spread across the territory. With around 1,000 inhabitants per square kilometer, the Paris Region is 10 times denser than the rest of mainland France. This density operates in favor of the profitability of networks, because, for the same linear cost, a similar segment serves a larger number of potential users. This diversity, however, is very unequal, being much greater in Paris (which used to be the densest city in Europe because it had been walled) than in the rest of the Paris Region which is home to only one tenth of the population, which occupies three quarters of the surface area of the Paris Region. Another advantage is functional diversity. Even though relatively recent monofunctional zones (featuring housing estates, business parks, etc.) have stamped their mark on some of the region's landscapes, the housing, business, education and leisure functions remain very intermixed within the Paris Region. Thus, 70% of jobs are spread over the mixed urban fabric rather than concentrated in dedicated areas. Functional mixing lowers the profitability threshold of infrastructures by allowing operators to market a professional and residential offering based on the same infrastructures. Moreover, when combined with density, functional mixing increases the intensity of the economic and social interactions that are indispensable to innovation in the fields of services and digital uses. However, as for density, this functional mixing is much greater in Paris than in the rest of the agglomeration and region.

FIBER OPTICS FOR ALL BY 2020?

Like all the regions of France, the Paris Region has undertaken to generalize access to very high-speed networks with complementary public and private sector investments. Due to its relatively high density, the "private initiative" zone covers the entire urban agglomeration and concerns nearly 90% of Paris Region inhabitants. This special situation has enabled public and private stakeholders to agree on the objective of generalizing access to fiber optic networks with a view to becoming the leading fiber optic region in Europe by 2020. Although the deployment of fiber optics is under way, it is unlikely to be completed by 2020 because some public initiative networks have suffered delays. In addition, the agreements between the two major private operators seem to have been called into question. This delay is a cause for concern as major inequalities remain. Thus, in Paris, nearly 100% of homes and business premises potentially have access to a very high-speed internet connection (bandwidths higher than or equal to 100 Mbits/s). In *Hauts-de-Seine* county (west of Paris), this percentage remains high at 92% but falls to only 62% in *Seine-St-Denis* county (north-east of Paris). In the outer suburbs, the rate is 54% in *Yvelines* county, whereas in *Val-d'Oise*, *Essonne* and *Seine-et-Marne* counties, it varies from 33 to 35%.

IMPROVING TOMORROW'S MOBILE NETWORK

As regards mobile networks, the quality of coverage is good in the Paris Region. According to the operators, there is general coverage on 1G, 2G and 3G networks. Around 20 white areas remain, which are located in the rural areas of the outer suburbs and are generally quite small. As regards the 4G network, the coverage rates vary according to the operators, ranging from total theoretical coverage to offerings aimed only at urbanized areas. However, these positive results must be qualified if we take into account the capacity of existing networks to meet future changes in demand. There will be a sharp growth in needs for mobile communications. Current capacity will not be able to meet this growth. The densifying of networks, if only to relay mobile Wi-Fi in trains, will require considerable investments by operators. Finally, the forthcoming introduction of the fifth generation (5G) mobile network is a crucial issue. This technology has been designed to meet the expected explosive growth in connection volumes, notably due to

the multiplication of connected objects or the introduction of self-driving vehicles. Rapid generalization of the 5G network on the scale of the Paris Region will therefore be a major challenge.

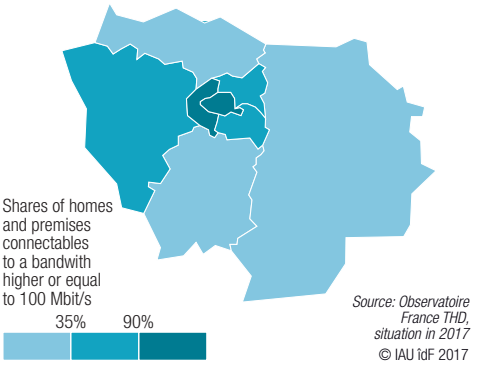
DIGITALISATION WILL REQUIRE ELECTRICITY

Telecommunication networks have turned data centers into the "invisible" substructure of the information society, the digital economy and the Smart City. Contrary to certain preconceived ideas, data centers cannot free themselves from the constraint of being relatively close to their users for both technical and psychological reasons. In the Paris Region, the data centers are mainly located in three areas: central Paris, the *La Défense* business district, and especially *Plaine Commune*, which probably has the highest concentration of data centers in continental Europe. Given the development of the digital economy, their number will continue to grow. Although they are getting more energy-efficient, the rise in consumption due to new arrivals should represent a consumption level equivalent to a city of one million inhabitants by 2030. Faced with such an increase in demand, the risks of undercapacity in the near future are real, because the adaptation of electricity networks is slow for structural reasons. It is therefore urgent for operators and planners to do some collaborative thinking about how to increase the capacity for accommodating newcomers and new activities.

DYNAMICS THAT NEED TO BE SHARED

The core area of the Paris Region creates the new services that it uses, but there is still a need to make them accessible to everybody. The Paris region, within a geographical area that represents 2% of France, accounts for half of all the digital jobs in the country and provides an ecosystem that is very conducive to innovation in the field of digital services, featuring a diverse network of large corporations, start-ups, universities and laboratories which rely on a wealth of human, financial and institutional resources (such as the Cap Digital and Systematic competitiveness clusters). This network is also embedded in physical locations conducive to fruitful interactions mainly in the heart of the agglomeration (70% of digital jobs are concentrated in Paris and the *Hauts-de-Seine*), but also in *Cité Descartes* in *Champs-sur-Marne* (Seine-et-Marne) or near the campus of the prestigious *École polytechnique* in *Palaiseau* (Essonne).

VERY HIGH-SPEED BROADBAND:
UNEVEN DEPLOYMENT



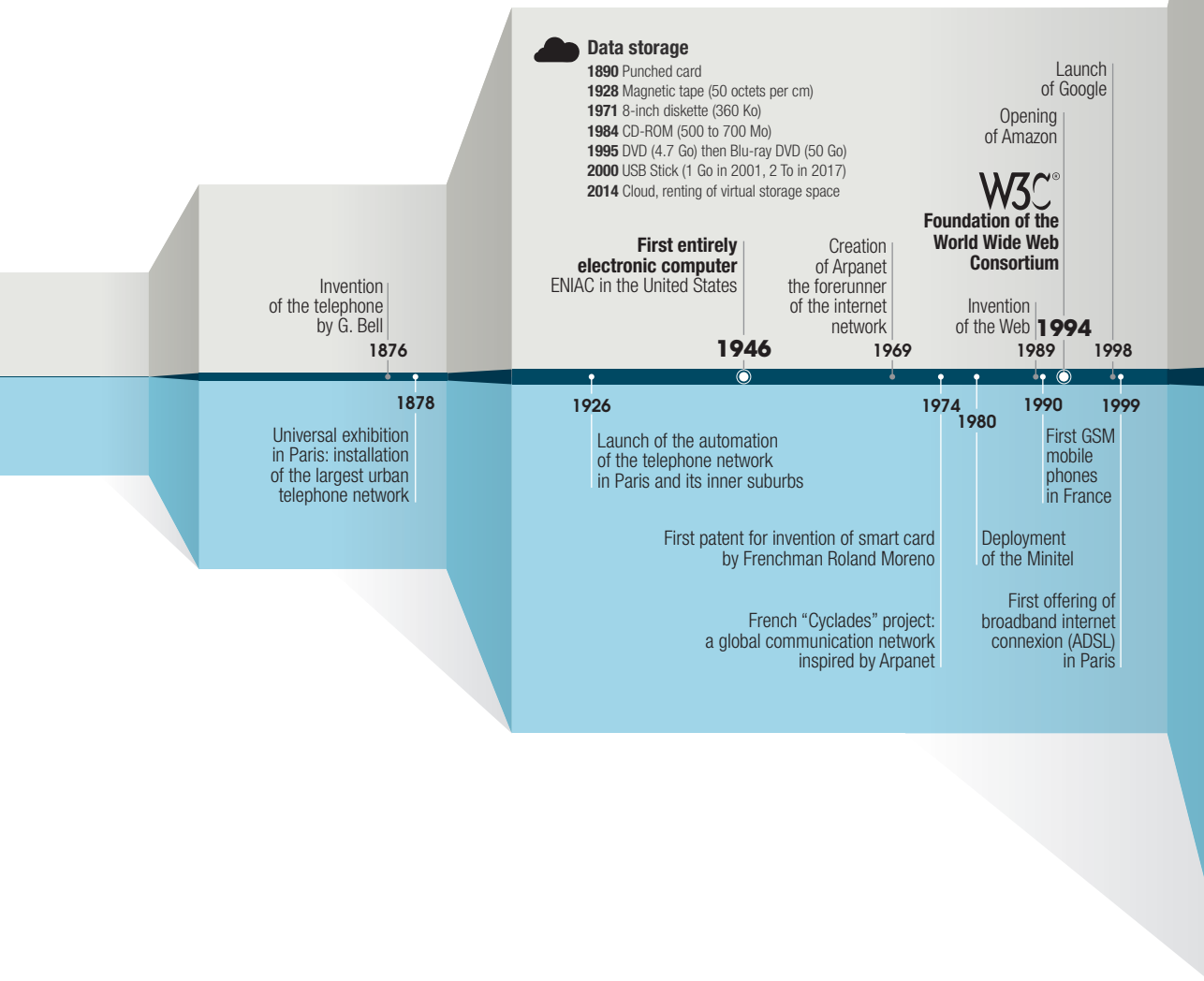
Source: Observatoire France THD, situation in 2017
© IAU îdF 2017

This ecosystem also benefits from the presence in the Paris Region, for a long time the cultural and economic capital region, of a large population of people hungry for digital technology and with an international outlook. These people tend to be young, cultured and often affluent. They form a diverse group of entrepreneurs, high-potential executives, start-up founders and the invisible multitude of early adopters, the pioneers who set the trends. This group functions as a breeding ground for imagining, creating, testing, validating and disseminating new applications almost in real time. This population provides an opportunity for the Paris Region to help define and influence the digital world of the future.

By porosity, it shapes the digital city by enabling the majority of people to take ownership of its uses. Today, this population is, to a large extent, concentrated in the heart of the agglomeration and could in future be more selective as regards its spatial choices (home, work, leisure, etc.). This outcome would be detrimental to areas less well endowed with digital infrastructures and services. As a result, without any upgrading to correct disparities, there is a greater risk that the Paris Region will once again have two very different faces. ■

FROM ANALOGICAL TO DIGITAL: THE BIG BANG IN A FEW DATES

This chronological review aims to relate the extraordinary growth of digital technology by evoking some of the key events in the Paris Region, in France and in the world. The dates range from 1876, the year in which the telephone was invented, to today, where the pace of innovation and its spread continues to accelerate.



Digital interfaces

1971 Invention of the Intel microprocessor
1973 First portable mobile telephone (Motorola)
1977 Apple: first personal computer
1981 Commercialisation of the IBM PC
1984 Sony: first digital walkman
1986 Canon: first digital camera
1990 Virtuality: arcade game using virtual reality headset

Services

1992 Introduction of Gallica, the digital library of the BNF (National Library of France)
1995 eBay, first internet sales platform
1998 Launch of the Carte Vitale (French healthcare card)
2000 Creation of Wikipedia, a free and open encyclopaedia
2004 Launch of Google Maps
2008 Opening of Airbnb platform
2009 Launch of Waze navigation application

WORLDWIDE

395 million web surfers
Google indexes over one billion web pages

3 billion web surfers
i.e. 46% of the world's population
1 internet consultation out of 2 is by mobile phone
2.3 billion people signed up to social networks
Google indexes 30,000 billion web pages

The 3 most popular social networks are accessible on mobile phones

Facebook Youtube Twitter

MySpace 1st social network

Formalisation of Internet of Things concept

Generalisation of Wi-Fi

Launch of the iPhone by Apple

Launch of Uber platform

Launch of bitcoin, first application of blockchain technologies

Emergence of Li-Fi, light fidelity internet

Expansion of 3D printing in industry

2000 **2003** **2004** **2005** **2006** **2007** **2009** **2011** **2012** **2013** **2015** **2016** **2017**

INSPIRE directive on geographical information infrastructure in the European Community

1st 4G licenses in France

Launch of the programme: "Paris Region 100% fibre-networked by 2020"

Experimenting with 5G

620 third places in Paris Region

Launch of the annual Paris Region digital festival: Futur en Seine, an innovation showcase

The Region becomes competent to animate a platform of geographic information

Law (of 7 October 2016) for a digital Republic: public bodies must communicate their data bases on the internet free of charge

Birth of OpenStreetMap France: open source geographical data

Uses of the internet:
14% of French people have access to the internet
47% own a mobile phone
34% own at least one computer

Uses of the internet:
85% of French people have access to the internet
93% have a mobile phone, 65% have a smartphone,
82% have a computer, 40% have a tablet.
On average, we spend 18 hours per week on the internet.

60% of French people made at least one online purchase in 2016,
25% use the internet to look for jobs,
56% are registered with at least one social network.
On average, we spend 1 hour and 16 minutes per day on social networks.

FRANCE

Sources: Histoire illustrée de l'informatique, *E. Lazard et P. Mounier-Kuhn, EDP Sciences 2016* / Baromètre du numérique 2016, *CREDOC / blogdumoderateur.com / IAU îdF 2017.*

THE SMART LIFE

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Smart technologies are everywhere, from digital transformation of economic life to fundamental changes in the workplace, including the transformation of secondary education and teaching methods, intermodal mobility and expanded digital provision of healthcare and connected sport. Smart technologies are part of everyday life. Spurred by technological developments, enterprises from start-ups to major international groups are picking up and adapting the innovations relayed and experimentally developed in FabLabs, which are fundamentally transforming our lifestyles. In these times of revolutionary digital advance, our concepts of city life are radically changing. At the point of convergence of the digital and physical worlds, city life is full of smart new opportunities for all to participate in the transformative re-invention of urban life.

OFFICES UNDER DIGITAL INFLUENCE

It is now possible to work anytime, anywhere and in networking mode. This revolution, driven by connected mobility and collaborative economic development, is conducive to the opening of new work places, i.e. third places suitable for collaboration, temporary occupation and the sharing of resources. At the same time, traditional offices are adapting to new uses, their watchword being 'flexibility'.

****

Pascale Leroi and **Renaud Roger,**
economists, IAU îdF

Digital tools continue to be used more and more in work practices. Today, more than half of salaried employees (56%) have access to their professional messaging when they are not at their places of work. Beyond simple messaging, 17% of them have access to their company's servers and intranet, a trend which is accelerating because of cloud computing. The use of mobile telephones for professional purposes continues to develop (45% of salaried employees in 2013), while working at home on a computer is four times more frequent than 15 years ago (24% of salaried employees). Unsurprisingly, this use of nomadic tools concerns executives more than workers or clerical staff.

DIGITAL TECHNOLOGY IS EXPANDING THE FRONTIERS OF MOBILITY...

Digital technology is expanding the frontiers of mobility by allowing people to work anywhere, at any time, and to collaborate with people who are sometimes very far away. Working «outside the walls» when on the move, in third places or at home has become more frequent. In 2012, The French Ministry of the Economy estimated that the proportion of French employees in large companies practicing teleworking for over eight hours a month represented 12% of the workforce. According to J. Damon, 17% of the working population practice teleworking from home or nomadically. Although teleworking remains under-developed, the popularization of digital practices provides favorable conditions for the take-off of teleworking, which would reduce home-to-work travel, salaried workers' fatigue and pollution, and would enhance the attractiveness of certain geographical areas. Recently, the French General Commissariat for Territorial Equality issued proposals for a National Teleworking Plan.

The Paris Region seems to provide fertile ground for teleworking: saturated means of transport and great pressure on land are encouraging the development of connected mobility in all its forms (from teleworking to co-working). This is partly due to the fact that executives, who use digital tools more than other people, are more numerous in the Paris Region than elsewhere in France. The practice of teleworking illustrates this trend well. In answer to the question: «Do you sometimes work at home instead of at your workplace, with your employer's consent?", 11% of economically active inhabitants of the Paris Region answer: «yes, regularly or occasionally», compared with 7% of people in the provinces. The gap is particularly wide regarding occasional teleworking, and is almost exclusively due to Parisian workers, who represent a very large proportion of teleworkers.

... AND ENCOURAGING THE CREATION OF NEW WORK PLACES

Thanks to digital technologies, shared places that provide flexibility, such as co-working spaces, FabLabs, Repair Cafés, telecentres, etc. have been developing fast. They are used by self-employed people, entrepreneurs, very small businesses and mobile employees.

The number of third places in the Paris Region is estimated at around 600, according to the IAU ÎdF. In Paris and its inner suburbs, co-working spaces have considerably multiplied in recent years. The outer suburbs, in which 43% of the Paris Region's economically active population (aged 15-64) live and work, have not followed this trend, even though they are home to numerous employees who work in the center of the agglomeration, and despite the efforts made for several years to develop new work places in these suburbs.

The needs for third places are far from being met: thus, 30% of self-employed workers do not work in a third place «because there aren't any near their home». Today, the aim is to cover the whole region and notably the areas that are underequipped, but to do so by considering location criteria that will ensure a high number of users. Many projects in the Paris Region are based on this principle and are initiated by both private- and public-sector stakeholders.

- Through the *Initiatives Télécentres 77* project, *Seine-et-Marne* county pioneered the networking of telecentres and co-working spaces. Established in 2012, this association

aims to provide a joint offering of workplaces situated halfway between workers' homes and their workplaces. It also provides office property solutions for self-employed workers and entrepreneurs.

- Around 50 workspaces were set up between 2013 and 2015 with the support of the regional council. In 2016, the Paris Region financed 41 third places, particularly in the outer suburbs. The goal is to establish 1,000 third places in the Paris Region by 2021, giving priority to doubling the number of third places in rural areas from 2016.
- French railways (*SNCF*) has set up teleworking spaces in several stations in the Paris Region. Its affiliate, *Île-de-France Mobilités* created 70 micro-working places in 2017 and 80 more are planned for 2018. The "Work and Station" concept began to be deployed in 2016.
- Specialized private stakeholders have emerged, such as WeWork®, which opened a 12,000 sq. m. coworking space in 2017 in the Paris Central Business District (CBD) as well as a 7,000 sq. m. space in the Marais District. Long-standing office development operators have launched new third place concepts, such as Nexity's "Blue Office" development and Bouygues Immobilier's "Nextdoor" development.

NOMADISATION "WITHIN THE WALLS" OF A COMPANY GENERATES INCREASED NEEDS FOR SHARED COLLABORATIVE SPACES

THE OFFICE IS DEAD, LONG LIVE THE OFFICE!

The rise of third spaces and of nomadism does not signal the end of the traditional office as a collective workspace for use by a company. Businesses will continue to be defined in spatial terms by providing a workspace that projects a sense of belonging. Even the digital giants are having dedicated campuses built. Thus, since May 2017, Apple Park in California has been home to 12,000 employees. In the Paris Region, digital stakeholders have massively invested in the Central Business District in which only banks and insurance companies used to be located. More generally, demand for offices in the Paris Region remains high, as indicated by the constant increase in the volume of property leased over the last five years. Decision- making, innovation and management processing will always require physical spaces, as these foster exchanges between salaried employees and ensure a certain degree of confidentiality.

Nevertheless, by changing working methods, the digital transformation process is helping to reshape office buildings and to rethink the lay-out of office spaces. This adaptation process is not new. To meet the needs of changing economic, financial, technical and social conditions, the office space sector has had to make many adaptations, including: the out-posting of production functions from headquarters to production plants; the separation of back office functions from decision-making centers; and the introduction of modular and then open space offices. The most immediate impacts, which are already under way, are of a technical nature. The development of cloud computing means that office buildings must be connected to fiber-optic networks. Constraints on computer rooms have been diminishing. The spread of sensors and other connected objects makes it possible to watch over buildings in real time. These are becoming smart buildings whose operating expenses are finely adjusted to needs, with savings on expenses as a bonus.

The new working methods enable businesses to optimize the potential of office buildings. Nomadization of work "within the walls" of a company has led to a greater need for shared collaborative spaces. These spaces may be hybrid, i.e. open to people from outside the company, or they may host business incubators related to the company's activity. Thus, the new campus (called *Les Dunes*) of Société Générale bank in *Fontenay-sous-Bois* near Paris includes 1,000 sq. m. of space for hosting internal and external start-ups. The distribution of businesses within the space changes without affecting the overall surface area available.

However, nomadization "outside the walls" may result in a reduction in the number of work stations and, later, in the surface areas of space owned by a company. Since employees are spending more and more of their work time outside the company, fixed offices are being replaced by flex offices, in which employees do not have allotted offices. In the restructured headquarters of the Danone company on Haussmann boulevard in Paris, two thirds of the 650 employees work in flex offices. In this case, the 40% cut in the number of offices has been offset by an increase in collaborative spaces. However, in other companies, the cut has led to a reduction in the surface area of leased spaces. In some cases, the reduction in the number of fixed work stations is combined with the provision of more coworking spaces or telecentres. Understanding the commitment of employees to these new working methods and their impact on work itself is a key question that gives rise to many different points of view. Here, we focus on the spatial impact of these new practices and their impact on quantitative needs in terms of office surface areas. After a cycle marked by very high growth in office premises in the Paris Region, these new uses could presage a slowdown in the construction of new office spaces.

The work space is playing a new role, i.e. that of a hub connected to its community, business and the rest of the world. However, its location criteria remain unchanged for the time being. Currently,


MUTINERIE

the geography of the development of third places and coworking spaces mirrors that of the conventional office property sector, featuring polarization in the heart of the agglomeration on sites that are very accessible and provide attractive urban amenities. The main change has been in the approach to the office property sector, which is no longer seen as an asset-based market but as a service-based space that must be agile and flexible. Beyond the impacts on the organization of the real estate industry, the major challenge will be to adapt the fringe office buildings that still do not meet these new requirements. The reserve of such buildings is large, because half of the office buildings were built before the year 2000, none of which has been properly renovated. ■

www

THE BOOMING DEVELOPMENT OF THIRD PLACES IN PARIS REGION
Carine Camors, Alexandre Blein, December 2017
http://bit.ly/idfboomingdev

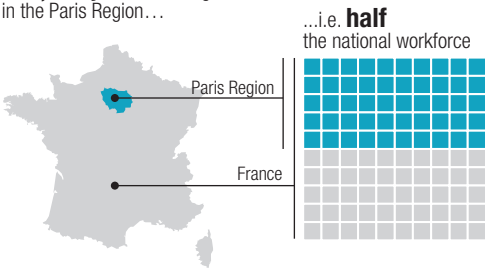
THE PARIS REGION OFFICE MARKET IN A NEW PRODUCTION CYCLE
Renaud Roger, February 2018
http://bit.ly/idfofficemarket

WHO ARE THE PLAYERS IN THE DIGITAL ECONOMY?

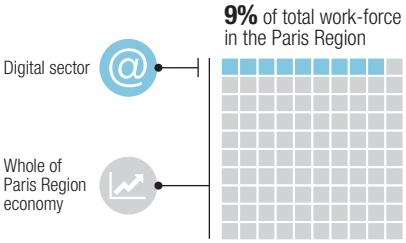
SIZE OF THE DIGITAL SECTOR

▸ IN FRANCE

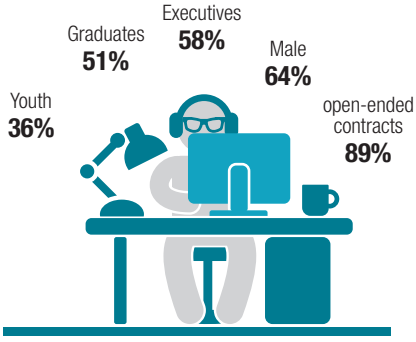
513,000 jobs in the digital sector in the Paris Region…



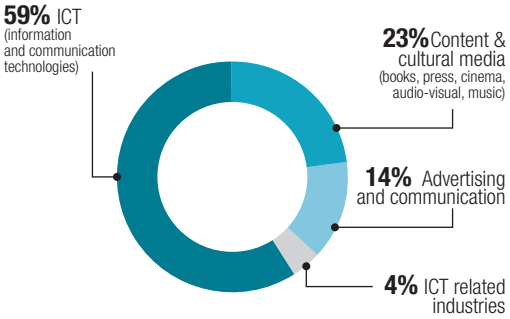
▸ IN THE PARIS REGION ECONOMY



PROFILE OF WORKFORCE



SCOPE OF DIGITAL ECONOMY



EMPLOYMENT PROFILES VARY BY TYPE OF **TERRITORIAL ENTITY**

37% of workforce

- Advertising, communication, cultural content (cinema, media, publishing)
- Start-ups, self-employed workers

44%

- Media, telecommunication, programming and IT consultancy
- Large digital service companies

19%

- ICT, tech industries
- Large tech companies

DIFFERENT TYPES OF **WORKPLACES**

Large facilities
Employing more than 100 people mainly in ICT-related activities.

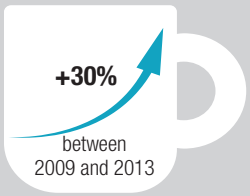
Co-working spaces
Shared workspace for a community of users: self-employed workers, micro-entrepreneurs and start-ups working collaboratively.

Business support centres
Hosting structure, assistance with company start-up and development: incubators, seedbeds, business centres, accelerator, etc.

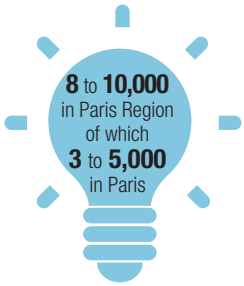
FabLabs
Digital production workshops, hackerspace, makerspace, prototyping, 3D printing, etc.

Home, public space
(café, library, park, etc.)
Standard workspaces for self-employed workers, micro-entrepreneurs, often with slender means.

60,000
SELF-EMPLOYED



START-UPS

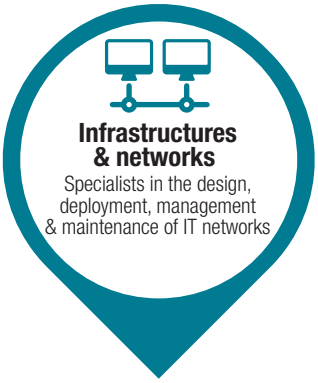


NEW DIGITAL **OCCUPATIONS**

SECTORS THAT ARE HIRING

Content production & management
Specialists in search for & production-management of web content

Programming & development
Specialists in technical design and the programming of web services



Infrastructures & networks
Specialists in the design, deployment, management & maintenance of IT networks

Sources: IAU îdF ; Insee RP 2012 ; http://metiers.internet.gouv.fr


HARMAN
Speed : 56 km/h
Time to Destination : 1h 49min
Distance to Destination : 132 km
Temp at Destination : 4°C
HARMAN
Pharell Williams, Happy
Media Center
Phone
Navigation
Settings
Driver Assist
Apps
SmartConnect
TRW

HOW DIGITAL TECHNOLOGY IS DISRUPTING **MOBILITY**

Day-to-day multimodal mobility has been made possible by combining public transport with car-pooling, car-sharing, cycling, walking and even "urban gliding" such as overboard, etc. At the heart of this mobility revolution in the Paris Region are real-time access to information and digital platforms. The challenge now is to unify public and private data and make them work for even smarter regional mobility.

****

Frédérique Prédali, transport urbanist, IAU îdF

In addition to creating information applications, digital technology has boosted mobility services. However, for most private players, the market is far from being consolidated and remains immature regarding certain services. The establishment of a data governance system generated by all mobility applications would make it possible to organise more attractive and balanced mobility services across the whole region.

A NEW MOBILITY TOOL: THE SMARTPHONE

The smartphone is the new mobility tool. Whether you are walking, driving (GPS, car-pooling), looking for a bus route or the time of the next train or a self-service bike-sharing, the smartphone is your multimodal online/virtual accessible transport information station. As we move around, we are using our telephone more and more to obtain information, find our way and choose a route (today, 64% of French people check the state of traffic and transport before travelling, compared with 44% in 2014[1], a proportion which is even higher in the Paris Region where more people own smartphones). As the development of the smartphone increases, it is becoming an ever more efficient tool for information, assistance, booking and making payments.

To begin with, multimodal route search applications open up endless possibilities by indicating the offers available and journey times. This information revolution has changed the image of transport modes, gradually reducing the opposition between private car users and public transport users. Indeed, digital technology compensates for the lack of information on mobility possibilities, but also instantaneously matches supply and demand. This disrupts all the «traditional» mobility sectors, including vehicle rental companies, taxis, vehicle manufacturers and, to a lesser extent, public transport providers... The taxi sector is the clearest case because its means of communication between customers/drivers renders obsolete the difference between a vehicle that has been pre-booked (private hire vehicle[2] or taxi) and one that has not (a roaming taxi).

Uber positions itself as a radical innovation by enabling drivers and their customers to get in touch with each other almost immediately, while providing unprecedented quality and ease of service, including payments, like BlablaCar. For all these public or private mobility applications, the Holy Grail is to become indispensable on a daily basis (i.e. to become a typical «toothbrush application»).

By helping people to organise their trips, the smartphone gives each mode of transport its

rightful place. It also helps reduce the use of the private car by making alternative transport offerings accessible.

A HUGE EXPANSION IN SERVICES

At the same time as the smartphone resulted in positive developments, digital-related innovations also generated the development of «physical» mobility services. Based on long-standing concepts[3], car-sharing and car-pooling emerged against the background of skyrocketing oil prices and a growing awareness of the need to give priority to the protection of the environment. The Vélib bicycle-sharing and Autolib car-sharing schemes took off thanks to their public procurement contracts, which raised their profiles. They have since been riding the collaborative wave and the success of Blablacar. When, in 2009, the law established the equivalent of "remise" (private pick-up service), registrations of private hire vehicles began as early as in 2010, but these services really took off only in mid-2013, one year after the appearance of the UberX application. Like car-sharing among private individuals, private hire vehicles owe their success to a competitive advantage gained from cost savings on platforms. These services being still too recent and underused on a regional scale, they cannot be accurately evaluated today. However, targeted surveys of their users[4] show some changes of behaviour and the users' ability to call into question certain habitual modal choices according to the trips to be taken. But the main reason why people think twice about using car services (private hire vehicles, car-sharing, car-clubs etc.) is their cost, unlike car-owners who are keen to use their cars.

A MASSIVE SUPPLY OF PRIVATE HIRE VEHICLES

Since the law governing private hire vehicles was passed in 2009, the number of such vehicles has increased, particularly since 2013, thanks to the development of applications for smartphones. The fleet of private hire vehicles now probably exceeds the number of Paris taxis (20,000). The number of registrations with the Ministry of Transport exceeded 11,000 on 01/01/2017. As each operator may have several drivers and vehicles, the number reached 44,000 cars in April 2017, according to the Sud Taxi trade-union. In 2014, the Thévenoud report* estimated that if the Paris market were open to competition the number of taxis and private hire vehicles would reach 70,000. Given that some suppliers have been taking liberties with the law, this figure has probably already been reached. Unlike most other mobility services, private hire vehicles have achieved a critical mass. By comparison, even self-service car even Autolib car club (+/- 4,000 cars used for 11% of the time) are scarcely used. Unlike taxis, they are used more for private reasons, notably leisure (47%), rather than for professional motives. Over one third of the trips occur at night.** ■**

***Thévenoud Thomas, « Un taxi pour l'avenir, des emplois pour la France », April 2014.**
****6t-bureau de recherche, 2015, « Usages, usagers et impacts des services de transport avec chauffeur », enquête auprès des usagers de l'application Uber.**

THE ISSUE OF THE TERRITORIAL COVERAGE OF SERVICES

Apart from collaborative practices that network a whole area and concern all social groups, the services developed by operators are concentrated in densely populated areas where companies hope to break even[5]. For example, the ObSoCo observatory has noted that the frequency of use of chauffeured private hire vehicles varies from one to 10 depending on whether an inhabitant lives in Paris or in a rural municipality, given that four Parisians out of 10 had already used a chauffeured private hire vehicle in the past year[6]. The inhabitants of suburban and rural areas feel even more abandoned than before the emergence of these new offerings. The public authorities have been trying to address these imbalances by encouraging car-pooling practices and supporting innovation.
As they benefit from an ample supply of services, connected Parisians are potentially hypermobile and agile, even when they are non-motorised. But only a small section of the population enjoys such mobility. Having this range of modal options amounts to reserving scarce, and therefore precious, urban space and large expenditures of public money. Although spatial and air quality constraints may justify such expenditures in Paris,

the issue facing the Paris Region decision-makers today is that of extending this model to the entire region, given their concern for this policy's impacts on budgets and roads, which are already very strained by a whole range of services and usages. The potential for disseminating these practices to most of the population is currently raising many hopes on the part of operators and public-sector players but remains questionable. At the heart of the stakeholders' concerns are questions about the economic model, the price users agree to pay for it and its impact on local government budgets.

EVER MORE DEMANDING TRAVELLERS

Digital technology has also made customers change: they are more connected, better informed and more demanding, which means they want to manage their time and comfort as well as possible... And yet there is a need for people to call into question their modal choices and habits and become multimodal, thus alleviating the transport system and making services sustainable. It is difficult to really discern citizens' aspirations because they vary so much depending on the citizens' positions in the life cycle, the places they go to, their income levels, etc. The only way to induce a change of consumption habits would be to invite people to test innovative services, reconsider their modal choices and advise/direct them to other solutions they very often do not know about or do not know how to use. This is called 'mobility counselling'.

The smartphone boom combined with economic difficulties mean that all industrialised countries are experiencing a «peak car use» period. Citizens are relying more and more on economical sharing solutions. In terms of day-to-day mobility, this trend is reflected in a modal shift (to more walking, cycling and use of public transport) and the separation of car usage from car ownership via car-pooling and car-sharing. These trends are expected to continue and the market for new forms of mobility should continue to grow (at a high pace, according to some people). However, today it is not so obvious that the use of cars will continue to decline at the same pace, even in densely populated areas. Mobility needs seem to be met better

A 10-year mobility revolution in the Paris Region

2016
- Law to support a digital Republic ●
- Launch of CityScoot electric scooter rental scheme

2015
- CityMapper app for Paris and its region
- Electric vehicle rental in railway stations (Wattmobile)

2014
- Public Mobility Authority (MAPTAM Act) ●
- Residential car club
- Carsharing (Zipcar, Koolicar
- Uberpool app

2013
- Huge growth in private hire vehicle and non-professional drivers (UberPOP, Heetch)
- Apps for car parking and rental near airports (TravelCar, Tripndrive, Carnomise)

CityMapper app

2012
- Beginning of UberX in Paris and the Paris Region

2011
- Launch of Autolib
- Car clubs spreads across the Paris Region (Buzzcar, Auto2, etc.)
- UberTaxi (Paris)

2010
- Start of passenger car with private hire vehicles
- 2nd generation carsharing business (WayzUp, Karos, OuiHop, etc.)

First Uber and Waze apps

2009
- Creation of legal status of passenger car with driver business ●
- Launch of ViaNavigo and RATP apps
- Zilok (car renting peer to peer)
- OuiCar (SNCF)

Launch of 3G iPhone and the Apple Store app

2008
- Officialisation of motorcycle taxis ●

Touchscreen revolution: Apple launches the iPhone

2007
Car club operators
- Mobizen (Transdev group)
- Okigo (Vinci/SNCF)

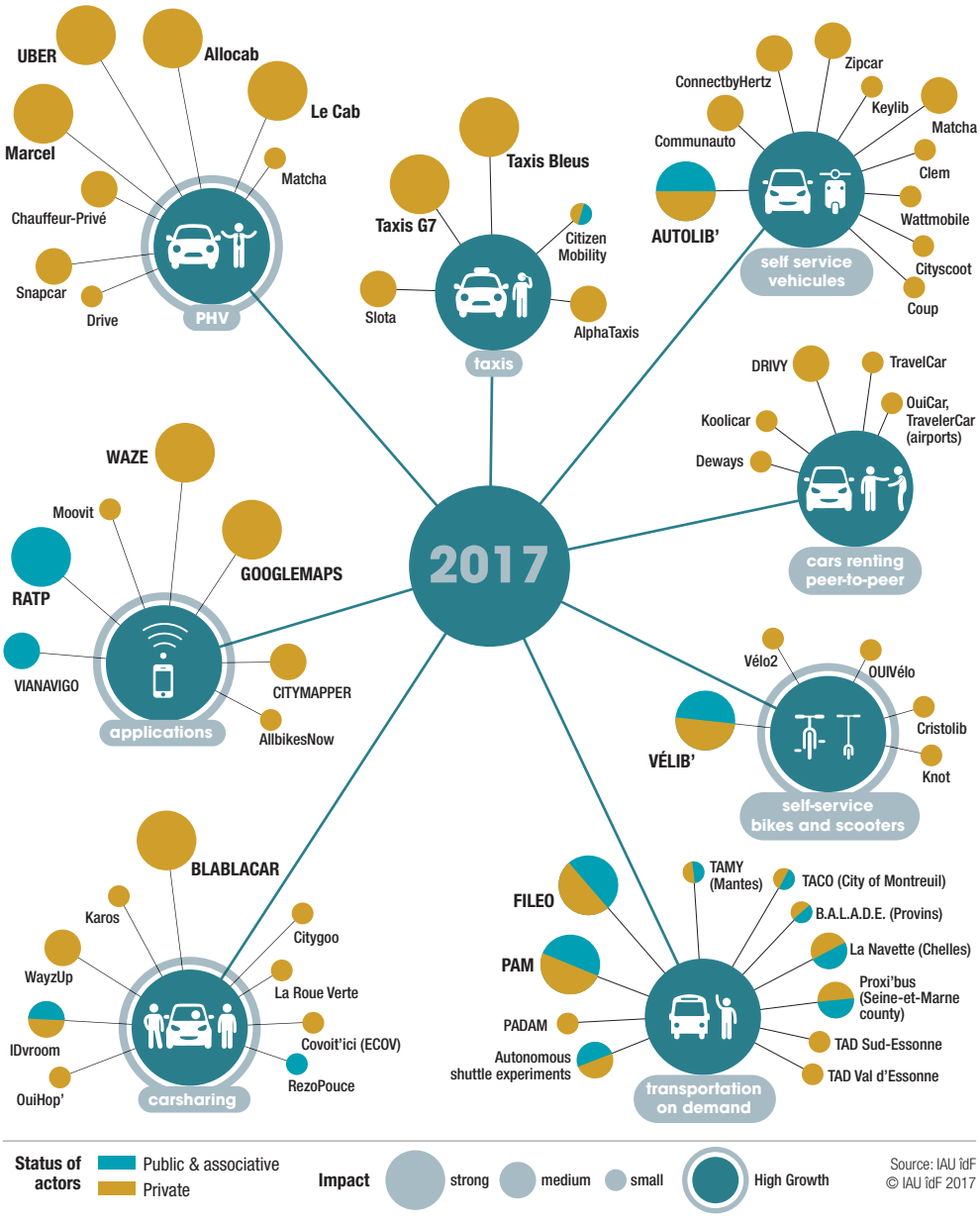
Creation of OpenStreetMap & Twitter

2006
- 1st generation carsharing sites (covoiturage.fr became BlaBlaCar)

Source: IAU îdF © IAU îdF

● Law enactment

MOBILITY
IN PARIS REGION



Source: IAU îdF

CLEM AND MATCHA MULTIMODAL OFFERINGS

Although each operator has developed a specific type of offering, some have been able to really gauge the scale of the challenges of urban mobility. These have drawn up service packages that complement their core business, i.e. car club. Thus, Clem, which operates in Marne-la-Vallée and Saclay near Paris, provides two-wheelers for rental and information on public transport facilities, as well as its car-pooling offering; while, since 2016, the Europcar group's Matcha in the Paris Region has been offering clients the possibility of booking a private hire vehicle or a car without a chauffeur over longer periods. ■

by private hire vehicle services (easily accessible in one click) than by self-service vehicles, the success of the Paris bike-sharing Vélib service being an exception due to the availability of many accessible and affordable bikes. The massive fleets of private hire vehicles have probably hindered the take-off of the Autolib' car club and contributed to stifling the expansion of car sharing. But, so long as the fate of private hire vehicles and Uber is not decided, this situation is far from being static.

TOWARDS SMARTER REGIONAL MOBILITY

Digital technology has made it necessary to deeply change our system of day-to-day mobility. A market for new forms of mobility has been emerging which is not uniform: a very diverse range of offerings is available which has met with varying degrees of success with the public. Some offerings have already attained a sufficient critical mass (Vélib', VTC, Autolib') and are no longer at the experimental stage, whereas others are still struggling to exist (car sharing, carpooling).
On the demand side, there is undeniably a positive market dynamic, which has enabled various operators and start-ups to raise funds. But all these physical services have operating deficits, a "necessary evil" in the day-to-day passenger transport sector. And yet, the usefulness of these services is unquestionable because our road and rail transport systems are under pressure. They are also essential for providing good service quality pending the completion of large-scale projects, such as the "Grand Paris Express", which have become government priorities[7]. Moreover, these shared services are opportunities to test the business models of self-driving vehicles. For local public-sector players, the expectations are varied, and the challenges interconnected: attractiveness, urban marketing, financing (private rather than public), social and mobility challenges (linked with an inadequate public transport offering) and energy/environmental issues, etc.
It is deemed that it would take far too long before public money could be spent on these challenges. Only experimental initiatives make it possible to test the concepts and draw up the most suitable economic models. One of the first steps towards a "smarter" region in terms of mobility would be to take the opportunity to process the numerous data sent by the applications and the ticketing to better understand demand and adapt the public transport offering by adding the required services and, if necessary, by regulating private services. The implementation of this first stage raises the issue of the quality of data exchanged between public and private players and its governance[8]. The other major challenge is the linkage between mobility and parking policies, which requires specific governance. Parking policies that encourage the moderate use of private vehicles would help the new mobility market to develop. Finally, although the application provides most of the advice on mobility, it seems that calling into question people's mobility practices seems necessary to decongest roads and make for a healthier quality of life and living environment. ■

1. Social and consumer observatory (ObSoCo), 2016.
2. Passenger car with driver.
3. Here, car renting and hitching respectively.
4. A series of Ademe surveys on "mobility expertise", from 2013.
5. See *Note Rapide* n° 699 on car clubs and car renting in Ile-de-France.
6. Observatory of emerging mobilities Chronos/SNCF, Ademe, 2016 (survey of a sample of 4,000 people representing the population of France).
7. See the "innovation support" schemes of the Region and the Ademe.
8. Statements by French Minister of Transport Élisabeth Borne at the VivaTech show, June 2017.

PIXABAY - *LA JOCONDE*, DE LÉONARD DE VINCI, (1503-1516)

DIGITAL TOURISM: AN OPPORTUNITY FOR LOCAL AUTHORITIES

The tourist industry has been as much disrupted by digital technology as any other. A digital capability makes for better knowledge of visitors. It makes it possible to go and look for them in their places of origin, to support them during their stays and keep their loyalty on their return home. Tourist destinations face growing international competition at a time of rising demand for personalised travel offerings. As the stakes are very high for local territorial authorities, they should consider digital technology as part and parcel of their tourist attraction strategy.

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Marion Tillet, geographer-urban planner and **Sylvain Beaubois,** sociologist-urban planner, IAU îdF

The Internet has enabled travellers to be less reliant on travel agencies and classic guide-books when planning their holidays.

TRAVEL EXPERIENCE TRANSFORMED BY DIGITAL TECHNOLOGY

Photos, videos and travel blogs shared on social networks give people ideas about where to go. When comparing potential destinations, aspiring travellers consult not only official websites and websites of tour operators, but platforms such as TripAdvisor that combine travel evaluation with travel booking. In this process, peer-to-peer ratings influence choice in addition to the available budget and time constraints. Once decisions are made, the aspiring travellers go online to pay for their plane or train tickets, accommodation bookings and activities (good plans), and so on.

On arrival, particularly if travelling from afar, travellers are almost obsessive about their free Wi-Fi to be able to access online services. Wi-Fi is increasingly available in airports and stations but is still lacking in public spaces. Connected travellers (via Google Maps) can find their way around independently and add new activities to their travel programme, thanks to location-linked recommendations or to local exchanges in situ. Travel experiences can then be shared through social networks, vlogs and/or blogs accompanied by hashtags.

Once back home, it is now the travellers' turn to become recommenders, giving their opinions to others based on their own experience, thereby motivating or dissuading other potential visitors. Using digital technologies enables travellers to become their own tour operators. And their choices can be influenced by strong promotional pressure. Highly contextualised and individually tailored proposals made to appear as rare or unusual opportunities are their main added value.

DIGITALLY SUPPORTED TOURISM: AN OPPORTUNITY TO BE TAKEN BY LOCAL AUTHORITIES AND THEIR STAKEHOLDERS

Local government authorities and their agencies are responsible for the image and aura generated by their territorial entities. Investments are made to induce a desire to find out more about a destination by identifying it, explaining it and "selling" it wrapped in an attractive narrative conveyed in promotional films (via YouTube), websites, mobile applications and even tutorials. Many destinations have enhanced their attractiveness in this way, including London (visitlondon.com), Dubai (visitdubai.com), Berlin (visitberlin.de) and New York (newyorkcity.fr targeting visitors from France). These destinations all compete with the so-called "Ile-de-France" Region, which is promoted internationally and branded as the Paris Region. Instagram, YouTube, Expedia, Airbnb, etc., are "must-use" communication channels in direct contact with travellers. Websites selling tickets and other services can collect data to identify visitors, better understand their needs and wants and personalise their offerings by suggesting sites, places and activities either pre-journey or in real time while travelling. The emergence of such platforms is a response to demand for forward planning, choice of accommodation, means of mobility and access to extended ranges of activities and services, from concierge services to left-luggage, etc. Digital platforms have also favoured the emergence of "experiential" tourism, which seeks authenticity and a better match to traveller aspirations. Innovations have re-invented the visiting experience thanks to guided tours, augmented reality, 3D, cultural mediation through "chatbots", automated real time translation, etc. Digital tools help local authorities to capitalise on the "after travel" experience. Visitors who have enjoyed their stay become ambassadors and potential candidates for repeat visits. Links with visitors must be kept alive thanks to personalised and gratifying offers that induce them to return to discover places they have yet to explore and are well suited to their tastes.

DIGITAL TOOLS HELP LOCAL AUTHORITIES TO CAPITALISE ON THE "AFTER TRAVEL" EXPERIENCE

NEED FOR AN AMBITIOUS DIGITAL STRATEGY

Today, digital technologies are a vital component of local authority tourist attraction strategies, ensuring that visitors' expectations are met and enhancing the perceived value of local areas and the availability of quality offerings. A local authority digital tourist strategy needs to do the following:

- provide suitable amenities including free Wi-Fi in public places, high quality urban spaces and the protection and highlighting of heritage sites, etc.;
- improve the digital experience of on-line visitors by introducing proactive promotional approaches, adopting protocols of interactivity that meet international standards, and which are responsive, user-friendly and allow easy access to content in suitable formats, etc.;
- manage the skills available internally to ensure the ability to put digital technologies to good use, develop and maintain tools for promoting offerings that suit the targeted customers, gather and analyse data collected from visitors in order to build increasingly attractive and customised offers, while managing the e-reputation of the territories concerned, etc.;
- adopt a policy of support for innovation in the tourist sector based on a strategic vision of changes in the demand for the territory concerned in order to position itself as of now for the tourism of tomorrow. ■

PHOTO PEOPLECREATIONS/FREEPIK - *LA LIBERTÉ GUIDANT LE PEUPLE*, D'EUGÈNE DELACROIX (1830)

WHEN **CIVIC TECHS** FACILITATE DEMOCRACY

Initiatives such as *MaVoix*, *Démocratie ouverte*, *Parlement et Citoyens*, *Voxe.org* are emerging in France as new digital tools of participation in political life. The so-called "Civic Techs" contribute to greater engagement by citizens, more participation in democratic life and the promotion of transparency by governments. As companions or instigators of radical change, Civic Techs herald a new era of governance.

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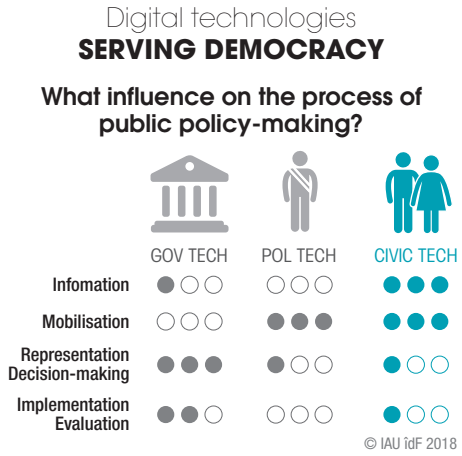
Cécile Diguet, urbanist and **Tanguy Le Goff,** sociologist, IAU îdF

Civic Techs play many roles, from supporting candidacies of citizens chosen by lot to stand in the 2017 parliamentary elections in France, to lending support to movements of protest or challenge of the established order and encouraging awareness-raising of various causes. Civic Techs and their role raise questions about what they are, the way they operate and the limits of their effectiveness.

CIVIC TECHS HELPING TO RENEW ACTION IN THE PUBLIC ARENA

Reliance on digital technologies in politics is not new. As early as the election of Barack Obama in 2008, they were key to his election campaign based on the strategy of "community organising,"[1] and are now very much part of public policy-making. After "Gov Techs" serving government institutions and "Pol Techs" serving political parties



(where digital technology plays a more conventional role), Civic Techs are involved in public policy-making at four different levels:

- as sources of information on legislation, parliamentary activity, current controversies and political programmes. Civic Tech "Le Drenche" presents the pros and cons of political policy-making initiatives in order to help readers make up their minds."Voxe.org" compares political programmes."Nosdéputés.fr" and "Nossénateurs.org" monitor the activities of parliamentary representatives;
- by promoting rapid and massive mobilisation for a given cause, notably by on-line petitions (change.org, avaaz.org) or by the organisation of the prerequisites for militant action. "Nation Builder" defines itself as a "system working through communities" to serve NGOs, associations and political parties. This tool enables accurate profiling of members, collecting of gifts, mobilising of people in the field and instant communication by means of an integrated website;
- by developing numerous tools dedicated to representation and participation in decision-making. Of note here are "DemocracyOS", experimentally used in Argentina, an open source platform (non-paying and independent) seeking to promote broad participation in political decision-making. "LaPrimaire.org" put forward a candidate chosen from an open citizen primary in the 2017 French presidential elections, based on a jointly constructed programme. "MaVoix" offers a service of random selection of volunteer citizens, who are then trained in how to devise proposals for legislation to be presented to electors for approval or not during a five-year mandate;
- inventing tools for the implementation and evaluation of decision-making processes. Civic Techs mine the availability of open data and the feedback from citizens in order to contribute to the analysis of the impact of public policy-making. "Etalab" is a Civic Tech dedicated to circulating information about government decisions or state organisations. "Open Data Soft" supports local authorities in the deployment of their strategies of data openness and enhanced availability of information.

HUMAN MEDIATION AND TRADITIONAL TOOLS ARE STILL NECESSARY

Even so, considering the "digital divide", it is inconceivable that Open Techs alone can transform French political practice. However, Civic Techs can effectively incentivise citizens more generally to invest in many fields of public policy-making and its assessment but this does not resolve the problem raised by Daniel Gaxie in 1975 of the shortcomings of democracy due to people's insufficient grasp of the issues[2]. People who are internet-disabled are still excluded, exactly as others are excluded from traditional modes of participation in public policy-making. Much supporting effort is needed to mobilise citizens, in particular those who are digitally disadvantaged. Significantly, the budget allocated to "participatory exercises" in Paris (for the second time early in 2017), twins access to an internet interface with a big presence of mediators to inform and help people to better understand the projects they are participating in. This signals that digital tools have a role somewhat limited to the support of a pre-existing conventional participatory approach. Digital tools have yet to overcome the barriers to mobilising the people most estranged from standard politics, the "invisibles" of society. Actual ability to "open up" democracy is still fairly limited.

The risks of knowledge being inaccessible and of unfamiliarity with how to process it are real. How is produce this knowledge which is available thanks to digital technologies? Who screens the information? Information could be channelled and decision-making oriented by the makers of software or applications, even if the "entrepreneurs of digital democracy" (Stéphanie Wojcik) claim they have a certain ability to spread knowledge and power more equally ("horizontalization"). The open source dimension of software is also a divisive issue for those in the Civic Tech field. Some militate for free non-paying availability of applications in the name of "digital common property", fostering a virtuous circle, an open source software program being constantly improved openly and collectively. But others, the developers (or the software publishing houses they work for), are more in favour of recognition of property ownership and control. There is also the risk of ascribing exaggerated value to digital tools, because of people's fascination with technology and a belief in technology's power to offset citizens' lack of involvement in civic action. The experience of those working in the Civic Tech field confirms that, to be really effective, human and technical mediations are interdependent.

Questions are also raised about the ability of these democratically innovative approaches to attain the legitimacy granted by existing universal suffrage election systems to the "anointed" representatives of "the people". The problem of a system of representative democracy is how to take into consideration the existence of these new tools "for monitoring and influencing the decisions taken by governments in another way than by simply conferring a political mandate on the representative". Undeniably, Civic Techs are beginning to play a bigger role in the digital environment, just as they are now part of the toolbox of political parties during election campaigns. But it is still too early to assess their impact on the actual participation of citizens in political life. No doubt "Civic Techs", being means of exercising control over those in the public arena, they contribute, alongside other techniques, to enhance "democratic vigilance[3]". By bringing citizens and elected officials into closer contact, Civic Techs ensure that user-friendly IT resources are brought into play so that the "citizen's voice" is heard, and views expressed on choices affecting them. Through their ability to better monitor and influence public policy-making, "Civic Techs" are part of the process of building a revitalised model of democracy. ■

THE CASE OF MAKE.ORG

The Paris Region is committed to the Civic Techs. Thus, it recently teamed up with the campaign organized by the make.org platform to work out what action to take in the campaign against violence towards women. This campaign is taking place in three stages: first, an extensive consultation exercise on the social networks; second, formulating solutions; and third, implementing an action plan in close collaboration with the relevant associations. The platform has set itself the target of 500,000 sign-ups to its dedicated Facebook page, which was scheduled to come on stream at the end of November 2017. Thanks to these methods, along with its ability to link up with an extensive public, the make.org platform, like other Civic Techs, has the declared intention to invent new forms of citizen participation in public life because politics is not enough, as its slogan says. ■

1. "During the 1930s, a factor of notable significance in the presidency of Franklin Roosevelt was the innovative use of radio; the election of John F. Kennedy in 1960 made extensive use of television and marketing techniques; the election of Barrack Obama in 2008 appears to have marked the entry of information and communication technologies, including more particularly the social media, into the world of political communication."
F. Heinderyckx, *Obama 2008: digital turning point, Hermès,* La Revue, 1/2011 (No. 59), p. 135-136.
2. Developed by Daniel Gaxie, the concept of "cens caché" (a play on "sens caché" or hidden meaning and "cens" as the census that puts people on the electoral roll) focuses on the ways in which citizens in a democratic system tend to self-exclude themselves from politics by reason of their feelings of social and cultural illegitimacy and of political incompetence arising from their low level of educational attainment. D. Gaxie, *Le cens caché. Inégalités culturelles et ségrégations politiques* (Cultural inequality and political segregation) Éditions du Seuil, Paris, 1978.
3. Ibid., id., note no. 2.

CHRISTOPHE JACQUET/MAIRIE DE PARIS

CAN DIGITAL TECHNOLOGY ACCELERATE **URBAN DIVERSITY**?

Electricity made it possible to construct high-rise buildings with lifts or elevators. The expansion of the rail and road networks relied on coal and oil. The contribution of today's digital technologies to the urban environment seems to favour hybridisation, by dematerialising many activities and connecting them more easily in time and space. The emergence of hybrid places and of transitional urban planning testifies to a new relationship with the urban environment, multiplying uses and spatial and temporal configurations.

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Cécile Diguet, urbanist, IAU îdF

Urban zoning in the past favoured single function spaces in response to then known specific needs (for peace and quiet or economic efficiency). But the rigidity of such planning soon made it obsolete. As early as at the end of the 1950s, the Megastructure concept arose, promoted by Yona Friedman and his mobile architecture, followed by Archizoom and Archigram, proposing nomadism, architectural mobility and open spaces. The 1970s saw

more research into flexible architecture adapting to the social changes of the time. However, it was through sustainable development that functional diversity came back to the fore at the turn of the century. It brought into being an animated, diverse city with greater interaction between citizens, shorter distances, shared spaces and optimal use made of the urban land. Digital technologies then speeded up the trend towards the hybridity that is the hallmark of today's city-living. By dematerialising so many activities, it favours flexibility of places, mixed use and openness. But how can these changes be sustained in the existing urban fabric and in new-build neighbourhoods?

CHANGE OF USAGE: HYBRIDISATION AND TRANSFORMATION

Changes in and diversity of uses, if not spontaneous, imply either architectural transformation or transitional urban development projects. All of this is subject to more or less favourable town-planning regulations.

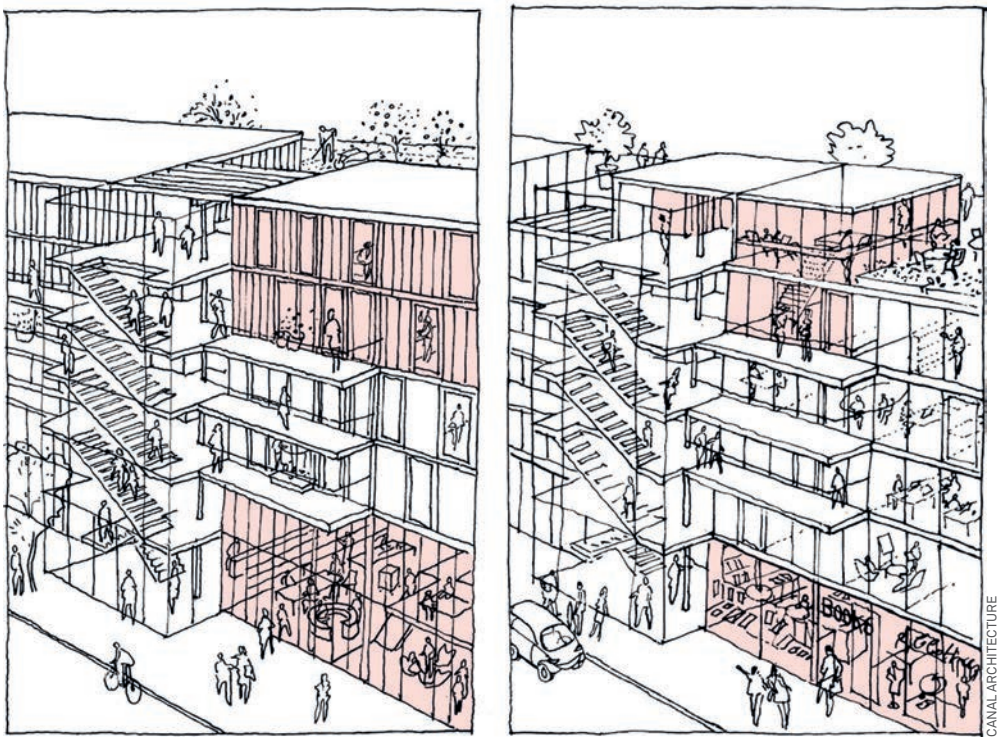
From the end of the 1960s, deindustrialisation led to transformative projects and the need to recreate the city over itself. This approach is still with us today, as the industrial heritage of the past is turned into cultural spaces (the brickworks in Vitry-sur-Seine). Alternatively, offices and former workshops are transformed into housing (Macdonald warehouses in Paris). Former bunkers are turned into data centres (*Les Alluets-le-Roi, Yvelines* county). A number of recent planning procedures support the dynamics of conversions to new uses, particularly in favour of new housing. Article 93 of the French Act of parliament voted in 2016 grants local authorities and public intermunicipal cooperative institutions (EPCIs) remission of property taxes on buildings (TFPB). Conversions of office space into main homes also benefit from this. The same benefit was voted by the Paris City Council in February 2017, for conversions of at least 250,000 sq.m. of obsolete office space into residential accommodation by 2020. A provision in the so-called "Macron Law" (*Loi pour la croissance, l'activité et l'égalité des chances économiques*) of 6 August 2015 allows local authorities to authorise temporary conversions of business premises into accommodation for up to 15 years. But conversions of property to other uses than residential could also be envisaged, leaving ultimate usages open. The New Generation Internet Foundation (FING)[1] seeks to include non-specific zoning into local land-use planning documents known as *Plans Locaux d'Urbanisme* (PLU), to foster all forms of change in use provided that there is no environmental damage and an adequate response to local needs. PLU land-use planning regulations are especially important for promoting, but also regulating, the de-specialised use of space. This option could promote the emergence, leveraged by digital technology, of new multi-functional and hybrid places , such as facilities for the delivery of public services, temporary or shared business locations in third places, public places for digital services, Fablabs, etc.

Initiatives for transitional urban developments supported by the Paris Region also illustrate the trend to growing and recent[2] hybridisation of usages, which have multiplied to some 65 since 2012 in the Paris Region. Often space is given over to hybrid uses pending the finalisation of more definite urban and architectural plans. The former Alstom offices at Saint-Denis have become 6B, a space for artistic and cultural creation, hosting a very large number of graphic and performing artists, artisans, an art gallery, a silk-screen printing workshop and meeting rooms.

SWITCH TO REVERSIBLE CONSTRUCTION A CHANGE IN APPROACH?

Anticipating the need for diversity made possible by digital technologies implies innovative approaches to new-build activities. Reversibility must be designed in to save on more embodied energy, to build more sustainable buildings and adapt to the faster changes accelerated by the digital system. Architect Patrick Rubin (Canal Architecture) has developed the model of a building whose structure makes new uses possible with only minor fit-out modifications, known as

KEY BENEFITS OF REVERSIBLE CONSTRUCTION



Left, in main façade, workshops, offices and/or retail space at ground and first floor levels. Right, on roof-top, houses and/or offices benefiting from planted terraces. Combination systems allow changes in use of the building or parts of it to suit occupier needs.
Illustration taken from *Construire réversible* (Reversible Construction) published by Canal – http://bit.ly/construireReversible.

the Conjugo system. This architect, who practised the diversion of architectural features, came up with the idea of a building without a specific end use. Another idea is a two-stage building permit, proposed by Didier Bertrand[3], in support of reversible construction, while enabling local authorities to adopt a strategic vision of their local building programmes. The first building permit is limited to the volume (outer fabric), and the second one is delivered on completion, specifying the use of the building. The result is faster response to the changing economic cycle and social needs. There are obstacles, however, such as property taxes differentiated by the use to which buildings are put, the need to commit to the long term when building social housing, and the financialization of real estate, which favour short termism.

What applies to a building applies to wider urban projects. Thinking up programmes that are open and flexible is key, as in the *Île de Nantes* project. Structured around a strong core framework of publicly accessible spaces and new approaches to the renovation of heritage assets, this project can be developed step by step, inventively, on different spatial and temporal scales for uses and composition that adapt to changing needs and economic cycles.

A WHOLE CHAIN TO BE RE-ARTICULATED

Digital technologies have boosted the demand for mobile lifestyles and more versatile use of space. The available operational and technical tools are now cutting edge, but negotiation is still required. Reversibility, upgrading, hybridisation, transitional uses are key issues involving local area development, which must adapt to specific needs and new visions to be shared. ■

1. *Report Softplace - Une exploration des écosystèmes de lieux hybrids* – Exploration of the ecosystems of hybrid spaces
2. See *Note rapide* #10, *Temporay urbanism: planning differently, October 2017*, IAU îdF.
3. Mission Director for Métropole du Grand Paris.

Société du Grand Paris Project: a planned agricultural data centre whose technical facilities would be concealed under urban greenhouses to recover the heat produced.
IMAGE: LINA GHOTMEH ARCHITECTURE

DIGITAL TECHNOLOGY AND THE **ENVIRONMENT**: STRIKING THE RIGHT BALANCE

Although digital technologies provide innovative responses to environmental challenges, they continue to place huge pressure on resources and on the environment. The challenge is how to reduce the negative impact of digital technologies and increase their positive effects on the environment.

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Nicolas Laruelle, urbanist, IAU îdF

In the 1980s, the initial promise of digital technology was widely held to reside in its environmental benefit: it was claimed that it would reduce consumption of raw materials, particularly in the move to a paperless environment, while economising energy by avoiding unnecessary travel. But instead, travelling has continued to increase as better long-distance communications simply increased the need for meeting in person. Until very recently, paper consumption rose, as the ease with which documents could be exchanged and handled boosted the number of paper printouts. Digital technology, which was thought to be certain to resolve environmental issues, became a potential environmental problem in its own right.

THE EMERGENCE OF "GREEN IT"

Since the turn of the 21st century, the pressures of digital technology on the environment and other resources have led gradually to greater awareness of the issues on the part of various players with a variety of concerns, from IT managers in large corporate groups, keen to improve their environmental reporting or simply to reduce their energy bills, to non-governmental organisations, worried about the consequences of the extraction of rare materials and the exporting of waste electronic equipment to developing countries, not to mention local people subjected to radiation from telecommunications masts or to the noise of data centres... Awareness became more structured in the first decade of the years 2000, notably on the initiative of public and private networks such as the CNRS Eco Info grouping or the GreenIT.fr galaxy (see box), who applied to IT products and services the more comprehensive approach suggested in 2002 by standard ISO 14062 on the eco-design of products and services. To assess the environmental impact of a given service (such as ordering train tickets or optimising heating systems), this approach takes into consideration not only all the equipment mobilised (data centres, fixed or mobile terminals, sensors, etc.), but also the entire life cycle of each of these items of equipment involved in design, manufacturing, distribution, service life, decommissioning etc. Finally, it takes into consideration the potential environmental impacts of climate change due to greenhouse gas emissions, the depletion of fossil fuel resources and over-consumption of water. This more comprehensive approach has enabled the development of shared diagnostics of the main negative effects of digital technology on the environment and the identification of the major "green Information Technologies" levers available to green digital products and services.

First lever: ensure a longer service life for IT devices, particularly terminals such as computers and mobile phones, because most greenhouse gases are emitted, and water consumed, at the time of the initial production or at the end-of-life disposal of equipment, i.e. not while the devices are operational. This is a major indicator of the need for retrofit or reconditioning of products to extend their service life in preference to recycling. For example, The IT department of Pôle Emploi, the French Employment Agency, based in *Montreuil* (*Seine-Saint-Denis*), reconditions 70% of its computers using labour supplied by voluntary organisations and job-seekers in the "solidarity economy." The ReCommerce company in *Gentilly* (*Val-de-Marne*) is a dominant player in the European mobile phone reconditioning market.

Second lever: revamp the design of software and on-line services to combat "overweight" digital technologies whose unnecessarily complex features are a factor of excessive energy consumption and built-in obsolescence. The average number of bytes required to carry a webpage has tripled in the last 10 years and the size of the RAM memory required to run a world-famous word processor has increased one hundredfold in the last 20 years. Thus, the SoLocal group

THE GREENIT.FR "GALAXY"

The GreenIT.fr "galaxy" is made up of several organisations involved in alleviating the harmful effects of digital technologies on the environment and society. Among its very active members are: Frédéric Bordage, former IT developer and journalist, the founder and organiser since 2004 of the GreenIT.fr website, who has popularised this notion in France; the 'responsible digital design' Collective, which promotes reflection on the eco-design of digital services and which, in 2017, drafted a "White Paper" on this subject; the Green IT Club, which every year publishes its "Benchmark of Responsible Digital Technology" comparing the performances of players such as RTE (the French national grid), SNCF (French railways) or La Poste (the French postal service); and the association "Halte à l'obsolescence programmée" (Stop built-in obsolescence). These organisations, which include both public and private sector players – large groups and start-ups – provide forums for exchanges of views, help prioritise the challenges and propose methods, tools and indicators. They keep a close watch on the extent to which "greenwashing" contributes to failings in the IT community, and are involved in collective action at various levels by proposing legislation, running awareness-raising campaigns, etc. ■

(Pages Jaunes, Mappy, etc.), based in *Boulogne-Billancourt* (*Hauts-de-Seine*), has pioneered the eco-design of online services for the immediate benefit of its customers, who appreciate the speed at which its web pages are displayed.
Third and last lever: remember the little things you do on a daily basis. Although media coverage has frequently over-played the importance of each individual energy-saving gesture ("Turn off your computer at night to save the planet"), the cumulative effects of such actions are potentially significant, including the use of cloud computing limited to the strictly necessary, efforts not to watch TV on internet and to reduce reliance on paper printouts.

FROM "GREEN IT" TO "GREEN BY IT"

The greening of digital technologies has gone hand-in-hand with a new will to mobilise technologies that support the environment, sometimes known as "green by IT". It involves rationalising the management of major urban services, such as energy, by the introduction not only of smart grids but of smart networks for the delivery of services such as water, food and waste disposal. Equally important is the way buildings are occupied, involving the sharing of offices, meeting rooms and parking areas. Assistance can be made available in the fields of risk management, the prevention of nuisance and pollution, along with the new technology that will enhance the mobility of both persons and goods.
In a large metropolitan area such as the Paris Region, where the regional scale has turned out to be one of the most relevant in almost all aspects of environment protection, the adoption of digitally enabled solutions is often of critical importance to generating more synergies between territorial areas where interdependency is clearly obvious. For example, online platforms can be built, such as "La Ruche Qui Dit Oui", which put farmers in the rural outskirts of Paris in touch with consumers in the heart of the agglomeration to organise bulk deliveries that reduce the number of trips to be made. Another example is complex forecasting systems, such as the one conceived in the Imprex European project at the Irstea Centre in *Antony* (*Hauts-de-Seine*), which enhances coordination between local areas, both upstream and downstream, for the purpose of preventing and managing the risks of flooding.
In all areas relating to the environment, digital technologies help, first and foremost, to enhance knowledge by using interconnected sensors, enabling remote detection by drone or satellite and collaborative mapping, as well as the management of data on a more massive scale than before. Next, they increase the analytical, forecasting and simulation capabilities that contribute to sound decision-making: thus, the French Bull Sequana supercomputer currently being built at *Clayes-sous-Bois* (*Yvelines*) will, in 2020, become the most powerful and energy-efficient supercomputer of its kind in the world, enabling Météo-France to improve its simulations of future climate trends. Finally, digital technologies are new vectors of information and awareness-raising through the social networks, serious games and open data etc., while also mutualising resources through platforms for car-pooling, vehicle-sharing, etc. One of the major challenges facing the practise of "Green by IT", as well as other aspects of the digital city, is how to ensure the interoperability of the technologies mobilised so as to bring about greater coherence and reduce redundancy. With this in mind, in 2016, the Arvalis research institute joined forces with other agricultural stakeholders to create a digital farm in Boigneville (Essonne). This experimental farm has made possible the joint testing of currently available digital technologies in real situations, the aims being more economical use of resources and reduced pressure on the environment, while also supporting farmers in a more reasoned approach to the transition to digital technologies.
The widespread adoption of digital technologies to serve environmental protection must be well thought through. Given the real risk of encouraging the unnecessary proliferation of sensors and data, cool-headed assessment of new technologies is required with the right critical distance from the issues, in order to assess their true overall benefits for the environment and society. ■

Issy Grid,
1st operational example in the
Seine Ouest district
of Issy-les-Moulineaux.
PHOTO : DRIEA/GOBRY

SMART-GRID: THE LOCAL LEVEL IS THE KEY TO SUCCESS

The smart-grids revolution affects extra high-voltage networks as much as neighborhood or building networks. This is typical of the changes of model in the management of urban services made possible by digital technology. In the Paris Region, the first local developments foreshadow the solutions that could be more generally applied to the existing urban fabric.

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Nicolas Laruelle, urbanist and **Daniel Thépin,** economist,
with the support of **Erwan Cordeau,** environmentalist, IAU îdF

Although digital technology has helped to unbalance electricity consumption (new uses, vehicle electrification, widespread introduction of data centers), it has also transformed grids, which have become smarter, but without freeing themselves from major structural constraints.

Thus, despite undeniable progress, the possibilities for electricity storage remain limited overall. It is therefore necessary to ensure at all times a balance between electricity generated and electricity consumed, at the risk of producing excessive variations in voltage and frequency with adverse effects on infrastructures and devices. The growing integration of very fluctuating renewable sources of energy (wind, photovoltaic, etc.) combined with the development of very variable modes of consumption make such permanent balancing more and more difficult.

> TO BE EFFECTIVE, THE PERMANENT BALANCING BETWEEN PRODUCTION AND CONSUMPTION MUST BE ACHIEVED LOCALLY

Second constraint: the transmission and distribution of electricity cause significant "grid losses", i.e. 2% of electrical energy transmitted by the high/very high-voltage grid and 6% of electrical energy transmitted by the low/medium-voltage grid dissipated as heat – the "Joule effect". Given that renewable energy generation sources are more and more decentralized (Enedis, the distribution affiliate of the EDF electricity company, has a network of over 350,000 generation sites), the "re-centralization" of generation at national or even regional level offers little benefit. True, it will still be necessary "to follow the load curve", i.e. to compensate for possible local load imbalances by using more centralized generation sources. However, to be efficient, permanent balancing between generation and consumption must be done locally. This is what is at stake in neighborhood smart grids.

SMARTNESS CAN NOW BE EVERYWHERE

Today, multiple digital innovations allow electrical grids to be made "smarter" at all levels, from continents to local buildings: smart meters measure consumption in real time; algorithms and supercomputers allow production and consumption peaks to be anticipated; and close decentralized partnerships are formed with the producers and consumers who accept to contribute to grid balancing. For example, if there is a cold snap, extra generation sources are immediately mobilized, while at the same time some individuals and companies automatically renounce part of their non-essential consumption against remuneration, as though they themselves were electricity producers. All these solutions exist and have already been technically validated and gradually implemented in the transmission and distribution grids. Little by little, they are being introduced into buildings. Henceforth, experimental solutions at neighborhood level must be validated to take full advantage of the efficiency gains to be obtained from smart grids.

LOCAL SMART-GRIDS: AN APPROACH THAT REMAINS EXPERIMENTAL

At local level, smart-grids are being implemented within a very rich ecosystem, bringing together large national corporations, start-ups, research laboratories, etc. In cooperation with public and private sector planners, these players naturally use the preferred environment of eco-neighborhoods to develop local smart-grids and turn them into laboratories and/or demonstrators for their latest innovations: IssyGrid in Issy-les-Moulineaux (a southwestern suburb of Paris) is the first operational example; other projects are emerging, such as CoRDEES in Paris, and others in the suburbs of Paris such as Descartes Grid in Champs-sur-Marne, LiveGrid in Palaiseau or Smart Hoche in Nanterre.

Although promising, these initial developments, to a large extent, are still at an experimental stage and focus on new neighborhoods. Before they can be spread to older existing areas, numerous issues remain to be addressed. Operators do not yet have complete control over the processes. The massive scale, complexity and inadequate interoperability of these processes limits the size of current operations. At the other end of the chain, potential users are sometimes reticent and even opposed to any change in the contractual consumer/supplier relationship, which may, for example, give the supplier the right to moderate consumers' use of an equipment. Another brake is the difficulty of collecting accurate data on consumption within a household, as some consumers consider that such data concern their private life. From an economic point of view, the sector remains a niche market whose profitability prospects are uncertain and hardly favorable to massive investments.

Thus, the take-off of local smart-grids remains subject to the emergence of a stabilized and inclusive model that can be easily replicated by all those involved in the value chain, notably the planners and local elected officials. This is the condition on which smart grids will truly realize their full potential. ■

P. LECROART/IAU îDF

DIGITAL DATA AT THE SERVICE OF **SECURITY**

Security being an important dimension of the attractiveness and quality of life of the Paris Region, local stakeholders are mobilised to face security-related challenges. To optimise their action in this area, they produce and use databases on acts of delinquency and disturbances of public peace in their respective local areas.

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Camille Gosselin, urban planner, **Virginie Malochet,** sociologist and **Émilien Pellon,** IAU îdF

In the era of Smart Cities, the management of local security remains subject to digital tools. Alongside the ruling departments of the state, local players are also involved in this issue. Local government authorities, social housing landlords and transport operators are setting up databases to better identify difficulties and map out the course of action, convinced that the new technologies mechanically enhance performance levels.

LOCAL PLAYERS AND PRODUCERS OF DATA

To collect and process data, local players may develop their own system internally or call on specialist service providers. There is a market for companies that design and market dedicated software. However, a closer look at actual practices reveals enormous disparities of provision. Databases are as diverse as the local realities, the methods of collection and the players who use them.

The facts recorded are enormously varied depending on the fields of intervention. Some are classified under the categories used by the state police departments.

The declared intention is to adopt "a common language" with the law enforcement authorities, as specified to us by the Security Manager of a public housing authority. The databases also record minor acts of delinquency/disorder that are below the threshold of criminal offences, known to locals as "incivilities." Most of these acts are disturbances of the peace: setting garbage cans on fire, wrecking vehicles, noise disturbance, uncleanliness, occupation by vagrants of building entrances, verbal threats and disputes, etc. The tools used are also very diverse. The databases are also fed data from the population provided in a collaborative way, which promotes participatory democracy. However, most of the data is provided only by professionals. In general, these are community offices (urban mediators, municipal police officers, building security staff and caretakers, bus drivers and ticket collectors, etc.), who are in regular contact with the public and who must report this information. To do this, they follow a variety of protocols and use tools of a greater or lesser sophistication. Some fill in forms by hand, others use computerised platforms, which enable statistical processing and mapping.

Data characteristics depend on the procedures for data recording and management. Other factors are the way technology is deployed in the field, and the willingness or otherwise of those involved to provide information with sufficient detail. Such data have their limitations and certainly do not provide a perfectly objective and transparent measure of levels of insecurity. First and foremost, they reflect the activity and views of field professionals.

DATABASES ARE AS DIVERSE AS THE LOCAL REALITIES, THE METHODS OF COLLECTION AND THE PLAYERS WHO USE THEM.

STEERING-DECISION SUPPORT TOOLS AND COMMUNICATION

Various tools are available as instruments of diagnostics and assistance in decision-making. Local players use them internally for steering projects, team management and allocation of appropriate resources to closely meet identified needs. For example, the Paris joint landlord building surveillance group (GPIS) oversees the night-time security of 500 social housing complexes. To optimise deployment of staff to all locations, the GPIS relies on a digital system quantifying occupancy of common areas and providing daily updates of residences by five levels of criticality[1], which in turn determine how frequently they are visited, from a weekly round, to reinforced daily inspections. Another example is the use of digital data streams by local players to position themselves and communicate with the population and their partners. At Mantes-la-Jolie, for example, the municipality has acquired a data processing software program which provides a mapping service updated daily by urban mediators, and more occasionally by social housing landlords, transport operators, the local and national police. Thanks to this tool, all players can feed information back, share it and engage in interventions according to their prerogatives. This is a practical way of keeping the partnership alive. How widely such systems are adopted nevertheless depends on their benefits to those using them, and on whether data collection leads to effective action on the ground. This raises the question of the ability to operate, prioritise and process the information compiled, the challenge being to provide solutions to the problems

reported. Another question arises from the fact that digital tools impact the performance of their duties by local service providers, insofar as they generate a great deal of reporting work and follow-up analysis. But do they affect the way services themselves are delivered on the ground? In any case, the question must be raised as to whether the spread of IT tools ultimately favours managerial logic for dealing with spatial issues and responding to problematical situations. Such a logic is essential but should certainly not be the only line of action for local security policies, at the risk of neglecting prior risk prevention.

ANNOUNCED DEVELOPMENT OF PREDICTIVE MODELLING

In the local security field, digital data have opened up new prospects, not only for the diagnosis of existing situations, but also in anticipation of new risks. Using sometimes opaque algorithms, predictive policing claims to be able to predict the times and places of future breaches of the law, particularly in the United States. True, predictive software programs have not yet been developed in France, but the National Gendarmerie is working on projects of this type. It is likely that they will be progressively disseminated, which may raise some ethical and practical issues. ■

FOR FURTHER INFORMATION

"WHO BENEFITS FROM THE CRIME? THE CRIME PREDICTION MARKET IN THE UNITED STATES", LA VIE DES IDÉES
Bilel Benbouzid, 13 September 2016
www.laviedesidees.fr/A-qui-profite-le-crime

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champpenal.revues.org/9050

1. Prioritised by degree of importance.

The OuiShare Fest international festival of collaborative economy. Paris, July 2017.
PHOTO: STEFANO BORGHI
WWW.STEFANOBORGHI.COM


JEAN-MICHEL SICOT/DIVERGENCE

THE ROAD TO A SMART PARIS REGION

Fouad Awada,
Director General, IAU îdF
Paris Region Urban Planning & Development Agency

A multitude of public and private initiatives are transforming territorial entities in the Paris Region. Even so, the ability of local government authorities in this region to take their own "smart" destinies in hand varies considerably. The Region's role should be that of an orchestral conductor who ensures the harmonious deployment of these changes and the collective emergence of a smart region.

The Paris (Île-de-France) Region is fortunate in that it hosts one digital job in two in France. It boasts 150,000 enterprises and more than 500,000 jobs and has become the driver of digital technology in our country. Behind the headline figures, there are many further initiatives and expectations driven by the corporate sector, employees or anonymous people who, each in their own way, are contributing to the digital transformation of our region and of France.

This massive digital expansion is part of a global movement that is collectively giving birth to new modes of production, work, consumption and mobility. The dynamics of this movement are driving the development of platforms such as Amazon and Uber, the most accomplished forms of the two-sided economy, which may one day be superseded by blockchains. This trend has produced the most far-reaching forms of logistical optimisation, increasing tenfold the storage and handling capabilities per square metre. It has brought into being the factories of the future, 3D printing, nomadic working, third places, teleworking and *flex offices*. It has given birth to innumerable kinds of applications that help us with our day-to-day activities via our smartphones. It will probably soon make driverless cars a reality.

REGIONAL SUPPORT IS REQUIRED TO ENSURE THE OVERALL CONSISTENCY OF MUNICIPAL AND INTERMUNICIPAL INITIATIVES, WHILE DEVELOPING DIGITAL SERVICES AT REGIONAL LEVEL

Spawned by massive research and experimental efforts, many developments are now being adopted across society more generally in the form of new services and behaviours without institutional intermediaries, replaced by the so-called "citizen-focused" or horizontal dissemination of innovations.
Other innovations have been taken up by economic players, who have developed them into marketable products and services.

COMMITTED LOCAL GOVERNMENT AUTHORITIES

Local authorities, for their part, are discovering the many possibilities opened up by these innovations for implementing their development policies. The Smart City as a concept builds on these opportunities: the improved services to residents and users are based on all the possibilities opened up by digital technology.

ACTION IS EXPECTED FROM THE PUBLIC AUTHORITIES REGARDING THE PUBLIC AVAILABILITY OF DATA, STARTING WITH OFFICIAL DATA

The Smart City concept may potentially be of interest to local authorities at all levels, from the municipalities to the regions, as well as to intermunicipal authorities and counties (départements). The Paris Region has taken up the issue by focusing, until now, mainly on mobility due to its jurisdiction over regional transport and the importance of daily journeys to residents of the Paris region and to the economy, another major area of responsibility of the Region. Hence Ile-de-France Mobilités, the regional transport authority, is working on a comprehensive offering of access to all modes of transport, as it is true that one of the major benefits of digital progress is that it favours the generalisation of intermodal mobility.

REGIONAL SUPPORT FOR LOCAL AUTHORITIES

The ability of municipalities to gain control over their digital destiny varies considerably depending on their capacity to invest and their attractiveness to promoters of new initiatives. Central districts are the best served, being densely populated by the beneficiaries and devotees of forward-looking projects. The suburbs that are poorly served and have a low fiscal capacity are penalised, and the peri-urban and rural areas even more so. There is a real risk of seeing the precursors in the heart of the metropolis surging ahead, while the local authorities and stakeholders who are less prepared for change are left behind. De facto, the concept of the digital divide can be measured in the field. It correlates with the inhabitants' disposable income, levels of digital equipment in households and their access to broadband. Another measure is the variable financial capacity of municipalities.
These existing and potential inequalities justify the adoption of inclusive approaches, particularly at the regional level, especially when the region is an indivisible territorial unit, as is the case of the Paris Region. A regional approach is required not only to coordinate or set rules and standards, but also to support the efforts made by municipalities and to foster greater connectivity, drive a broader exchange of good practices and improve access to data at all levels, thereby reducing the social and intergenerational digital divide. The regional approach helps to train people in new job skills, to

ensure the best conditions for adopting innovations and welcoming innovators, and to oversee the convergence between digital technologies and the imperative need for energy efficiency management.
The Region would thus have a dual role to play: it should support the overall consistency of initiatives at the municipal and intermunicipal levels, while, at the same time, developing digital services on a regional scale, beginning with mobility (transport operations, ticketing, optimisation of physical traffic and data streams, information to travellers, etc.), supply chains (notably in relation to e-commerce) and new modes of production and working (collaborative working, teleworking, *flex offices*, the factories of the future, etc.).

FREEING UP DATA STREAMS AND MANAGING DIGITAL-ECOLOGICAL CONVERGENCE

Strategically, the Region should also address two major areas of concern: issues of data availability and the convergence between digital technology and ecological imperatives. Much is at stake when it comes to data access, production, analysis and dissemination, because these issues are at the very heart of all the topics relating to smart territorial entities. In the case of most services introduced by a smart territorial entity initiative, well-managed data availability is an intrinsic part of the digital solution (for example, movement detection for more efficient lighting management), notably in the field of the Internet of Things (IoT). Data generated for a particular use can serve multiple other uses, so it is important that all the other services that can exploit such data should be able to benefit from them. The action now expected of public authorities is that they should facilitate the availability of data, starting with public data.
Under recent legislation, a specific role is entrusted to the Regions, i.e. to initiate and run a spatial data infrastructure (SDI) that ensures the greatest access by all to publicly available data. But such data can be considerably enriched – compared with its current status, which is often static – by continual inputs of big data supplied by territorial entities. Such data enrichment needs to be further supported by ramping up big data expertise and processing capabilities. The Paris Region Urban Planning and Development Agency (IAU), which is playing a major role in the establishment of a Spatial Data Infrastructure with the Paris Region, is actively working on achieving this goal.

DIGITAL TECHNOLOGY CAN HELP THE ENVIRONMENT BY MORE EFFICIENT MATCHING OF ENERGY CONSUMPTION TO REAL NEEDS

Much is also at stake in the digital and environmental transition. Technology can help the environment by more efficiently matching energy consumption to precisely assessed real needs. This involves their detection followed by the provision of energy in its most economical and economic form. Increasingly, this will be decentralised, so that energy is produced as close as possible to its point of use and limited to the time needed. Practical examples are digitally controlled and environmentally responsive heating systems, digitally oriented searches for car parking, waste energy recovery systems from data centres, powering of home facilities from energy stored in car batteries charged off-peak, etc.

Nevertheless, until the advent of such energy-saving technologies forecast in the mass market around 2025-2030, digital technologies would appear to drive rising demand for energy. Data centres planned in the Paris Region will require as much power to run as for heating and lighting a city of a million people. Technology boosts the production and point-of-use delivery of products in greater numbers and variety. Technology has invented new services demanding unprecedentedly higher levels of energy for their delivery.
Faced with this rising and technology-induced demand for energy in the short term, how can technology be harnessed to ensure energy sobriety in the longer term? Strategies are required in the short term coupled with designed-in long-term energy efficiencies through intensification following design optimisation.
Action on the ground by local government bodies is of key importance in this field. It requires ever more focus on IT-enabled techniques of controlled energy supply closer to the point-of-use, which in turn underlines the importance of strategic oversight and the need for consistency.
Here, the Region will actively play the coordinating role expected of it by local communities. ■

IAU ÎLE-DE-FRANCE PARIS REGION URBAN AND ENVIRONMENTAL AGENCY

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THE **DIGITAL** REVOLUTION IN THE **PARIS REGION**

The digital revolution is hitting our towns, cities and way of life by means of big data, e-tourism, smart grids, e-commerce, smart housing, digital town and country planning, e-health, coworking, etc. It is changing the way we work, inhabit, travel, care for our health, and design and experience the urban environment. It also provides new economic opportunities and is a factor of the attractiveness of metropolitan areas.

However, for many of us – including planners, elected officials, citizens – it is difficult to realise all the consequences of these multiple transformations for our day-to-day lives and on the areas in which we live.

In this issue of *Les Cahiers*, the IAU calls upon its experts to answer these questions. It shows various facets of a Paris Region which is spontaneously changing through digitalisation. Thanks to concerted action by private initiatives and public policies, this Region could turn into a smart region, for the benefit of all its inhabitants.

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