# DIGITAL CITIES, HUMAN DESIGN

Living together, reinvented

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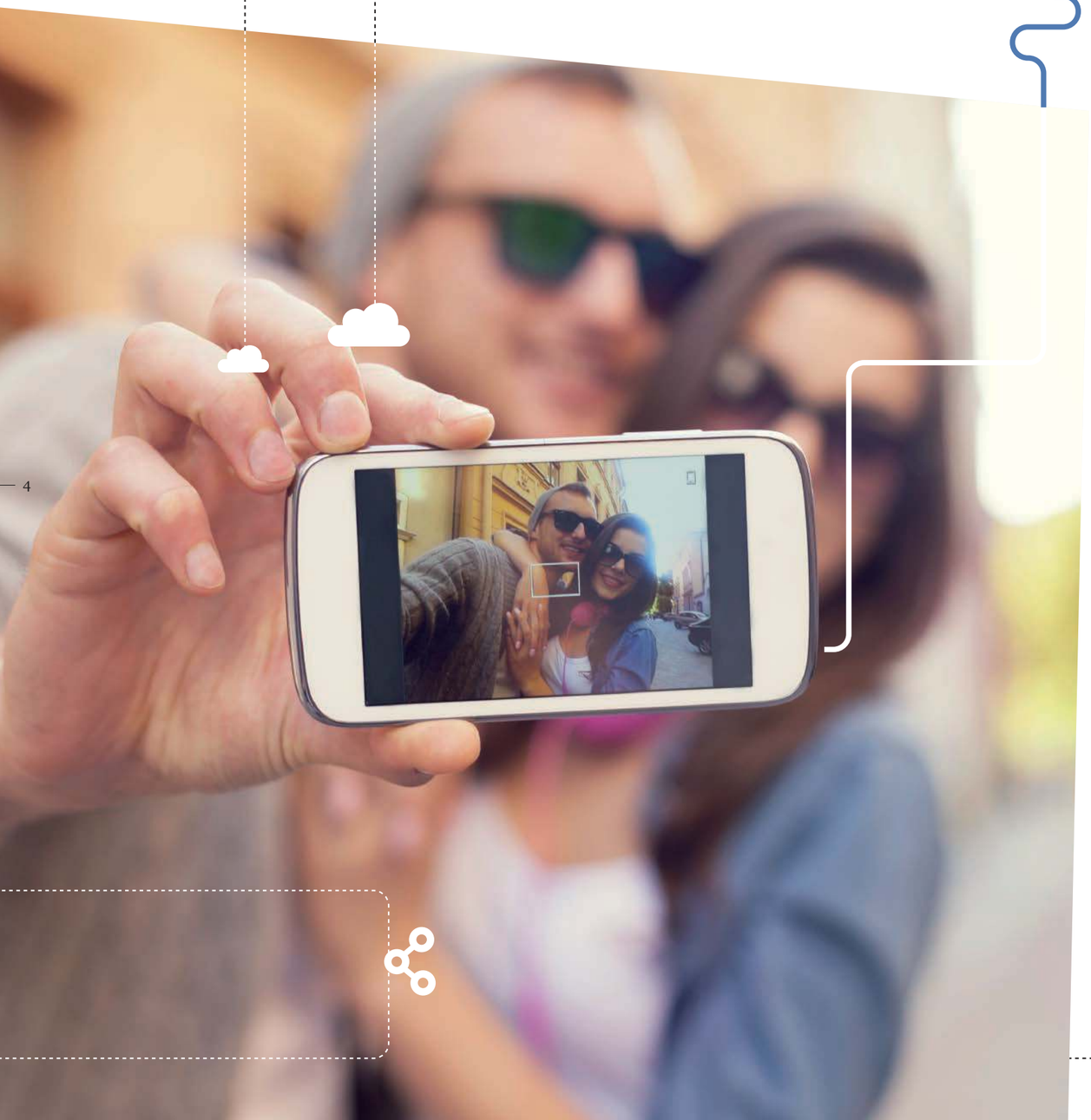


# INTRODUCTION
# BY BOUYGUES CONSTRUCTION

## The Digital World: A Societal Revolution

**With the digital ecosystem, we are transitioning to a new paradigm which is revolutionising our economic models, our lifestyle, and our habits.** New opportunities are opening up for us in different areas such as shared usage, mobility, energy, citizen involvement, and community living.

**We wished to reflect together on the impact of digital technology in our everyday lives and explore its promises and limits on an individual scale and on a community scale.** Today, digital technology is found everywhere, involved in all business activity sectors, and has profoundly modified the way we as citizens and city dwellers perform tasks. In order to better understand this societal revolution, we have gathered a panel of experts with skills in various domains to study the new habits brought about by digital technology on a neighbourhood scale. This think tank was sponsored by Joël de Rosnay, Advisor to the President of Universcience and Executive President of Biotics International, and accompanied by Fondation Internet Nouvelle Génération (FING), a renowned player in the digital technology sector.
The members of the think tank met several times during 2015 to share their visions and to debate on the subject with their different ideas.
This publication aims to share an overview of these exchanges to contribute to **better living together in our neighbourhoods thanks to digital technology!**

> **Today, new technologies enable people to be more involved in their role as citizens. They must be given the opportunity to create and control their own city.**
>
> **Carlo Ratti,**
> architect, director of Senseable City Lab at MIT (Massachusetts Institute of Technology)

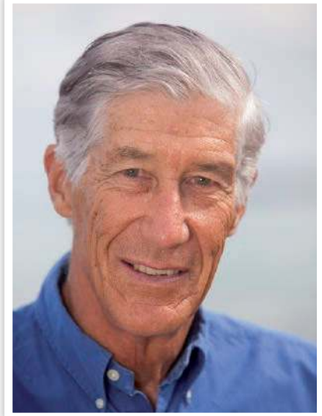


# PREFACE

**The initiative started by Bouygues Construction is original and intelligent. Thanks to the collaborative work of various experts, it was possible to go from theories on the uses of digital technology to the practice of using applications which improve people's quality of life. Evolution in society is tied to digital technology and is continuing to happen at an exponential rate.** Industrial and political leaders need to respond to the changes brought about by this acceleration. Today, it has a considerable influence on our lifestyle, particularly because of the digital culture fostered by the "millennial generation": the young Internet generation.

The impact is already seen in aspects of everyday life, with e-commerce, direct dialogue between a person and connected objects, and e-health through which it is possible to collect information about the body using wearable sensors. New approaches also appeared in the education sector, with MOOCs, as well as new relations between energy and digital technology thanks to interconnected smart grids which favour an optimised distribution of electricity via positive energy buildings. Other components of the revolution created by the digital ecosystem include home automation, where the smartphone is the centrepiece and controls the functionalities in the house, and the self-driving car, which absolutely requires smart roads, and by extension, smart cities. These different examples show how crucial it is for big construction companies designing buildings, neighbourhoods or smart cities to factor in this evolution.

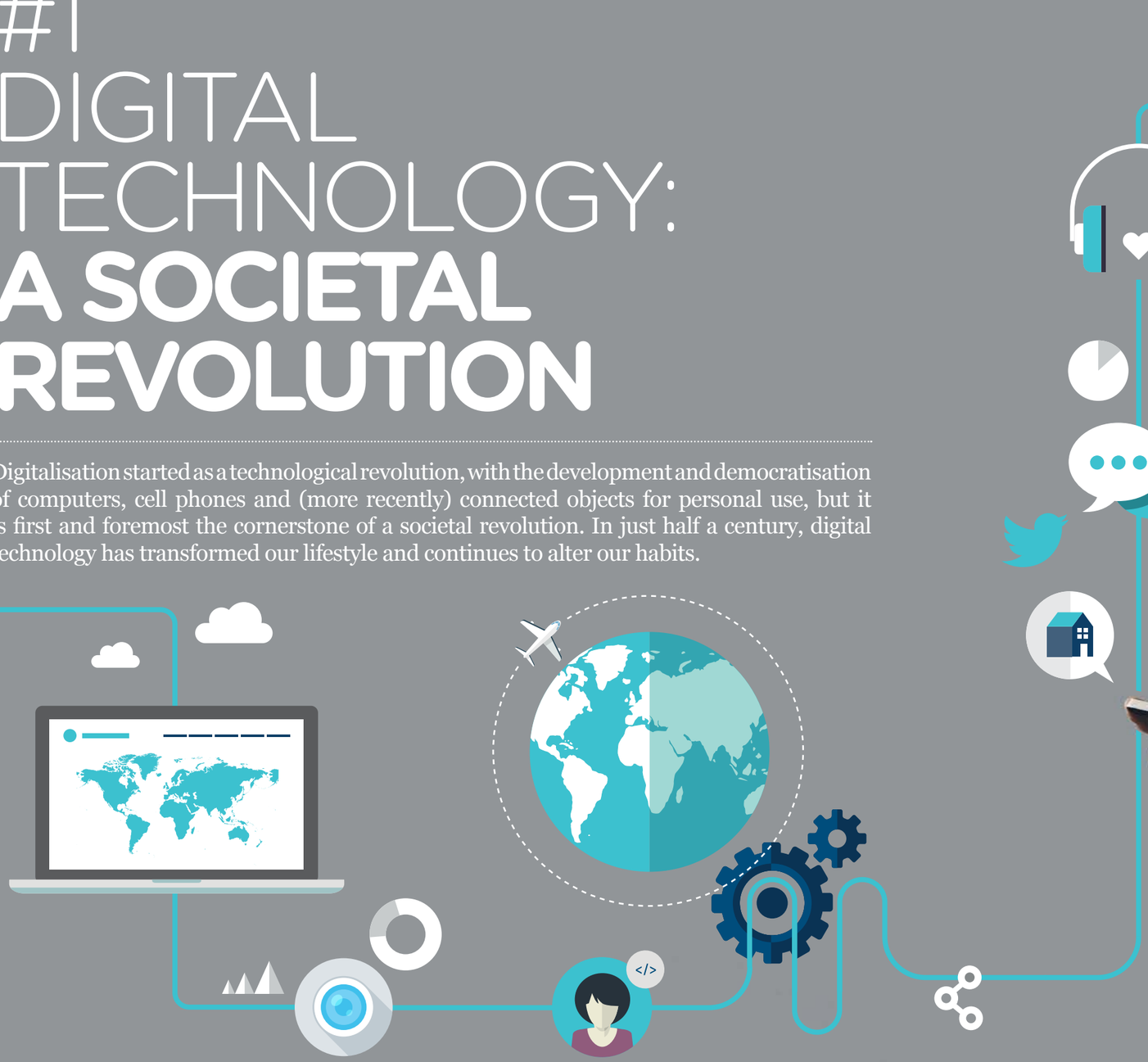
For this reason, Bouygues Construction adopted a systemic approach of working with a group of experts to envision not only the technological progress and fundamental questions related to sustainable development, but also, most importantly, people's needs, so that in this new digital ecosystem we can preserve **the human bonds indispensable to community living.**

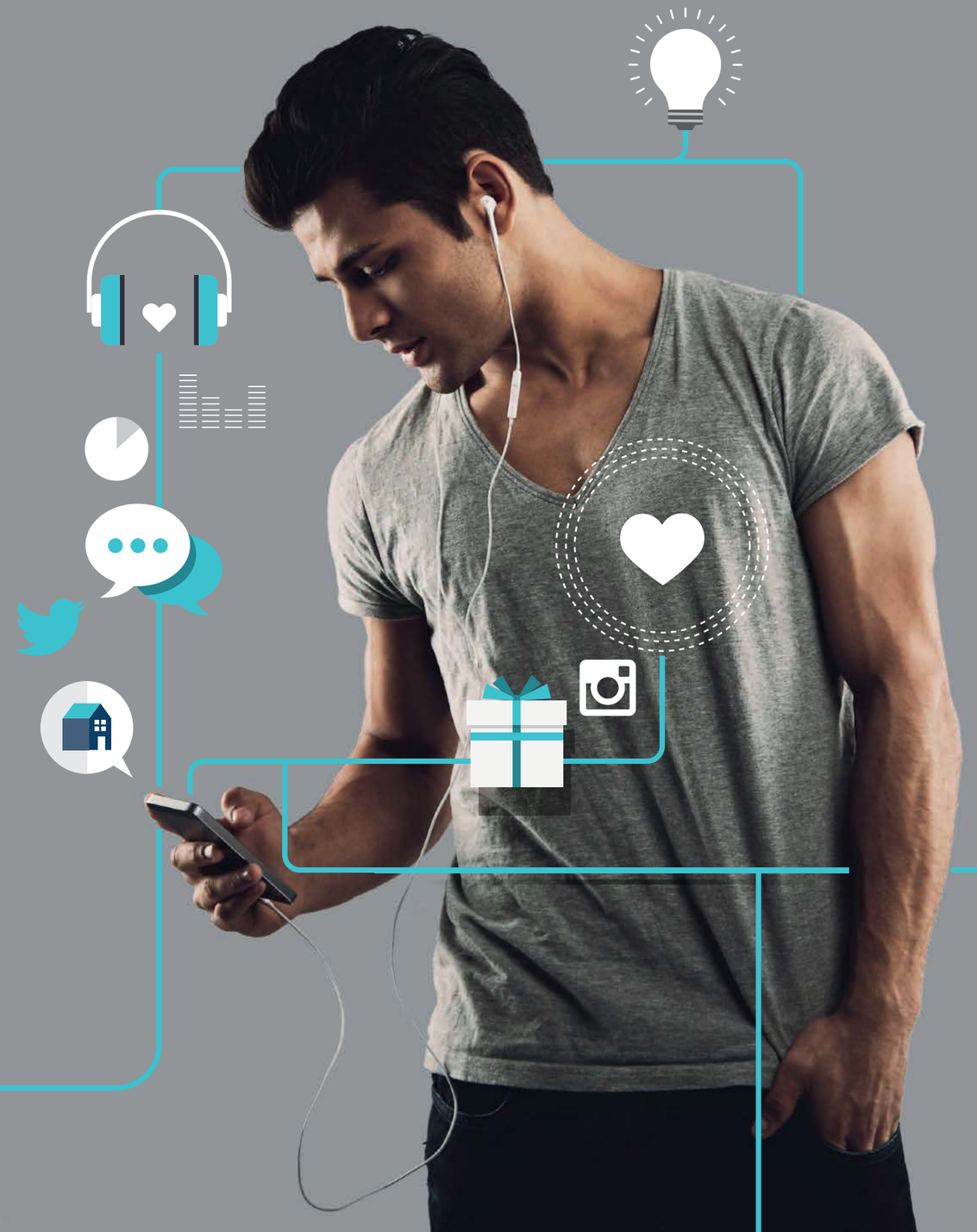


**Joël de Rosnay**
Advisor to the President of Universcience (Palais de la découverte, Cité des Sciences et de l'Industrie), Executive President of Biotics International

# #1 DIGITAL TECHNOLOGY: **A SOCIETAL REVOLUTION**

Digitalisation started as a technological revolution, with the development and democratisation of computers, cell phones and (more recently) connected objects for personal use, but it is first and foremost the cornerstone of a societal revolution. In just half a century, digital technology has transformed our lifestyle and continues to alter our habits.





# #1.1 DIGITAL TECHNOLOGY TRANSFORMS OUR LIFESTYLES AND OUR HABITS

The French word for “digital” is “numérique”, which comes from the Latin “numerus”, meaning related to numbers. In computer science, information is converted and processed in binary language, in the form of series of 1s and 0s.

## A Technological Revolution

### FROM PCs TO CONNECTED OBJECTS

**The digital revolution started with a revolution in the way information is transmitted.** It started in the second half of the 20th century with the rise of IT tools, particularly the invention and democratisation of personal computers, then spread to a great number of sectors thanks to the miniaturisation of components and an increase in the computing power. All of the products which transmit information, including phones, televisions, radios, books, cameras, and printers, are now accessible in digital format.

**Now, everyday objects are jumping on the digital bandwagon:** watches, household appliances, cars, etc. 80 billion objects will be connected to the Internet by 2020.

### FROM TECHNOLOGY TO A DIGITAL CULTURE

This approach of defining the digital age through the rise of information technologies still remains restrictive. A broader definition has emerged because of its extraordinary success: the growth in the digital technology sector has been 4.5 times superior to that of the GDP in France since the 1980s*.

“Digital” first referred to an area of research in mathematics, then to an industry. **Today, it has turned into a culture.** For example, generalised mobile connection is transforming the notions of availability and responsiveness. Milad Doueihi even talks about **“digital humanism”**: digital technology is not just a tool to perform tasks. It modifies the tasks profoundly, which in turn impacts humans as well as the means of production and transmission of information and knowledge.

* Syntec Numérique, BIPE, Insee, 2012.

**9**

**digital tools per household in France in 2015.**

Source: FING

**80**

**billion connected objects by 2020.**

Source: IDATE, “The Internet of Things Market” report

## A Revolution in Habits and Lifestyles

**Digital technology transforms lifestyles and habits.** It changes the way we work, get healthcare, live at home, entertain ourselves, train, consume, and travel, and it accelerates already-existing tasks.

### FROM INDIVIDUAL OFFICES TO CO-WORKING SPACES

**New technologies drastically change the way we work.** For example, they have allowed us to considerably increase the amount of information obtained. In 2012, a study by the Radicati Group showed that the average number of e-mails received per day for work was 72.

**This phenomenon took on such proportions that it is now referred to as “infobesity,”** which has consequences on work organisation. In May 2012, a study by IFOP / Good Technology showed that on average, executives estimate that they spend 4 hours working outside of scheduled work hours.

As a response to these new ways to work, new types of remote work are appearing. In addition to teleworking from home, people can now use the telecentres and co-working spaces that are being developed.

**25%**

**of people telework in Denmark and the Netherlands (10% in France)**

**60%**

**of French people shopped online in 2013**

Source: Eurostat

### E-COMMERCE AND DIGITAL CONSUMPTION

**Digital technology allows consumers to share their goods,** using social networks to create a link between supply and demand. Mobility, housing, tool rental, and other entire sectors are being transfigured by the arrival of new players who are redefining the rules and offering new services. In fact, the leader in room-in-home rentals had offered 800,000 rooms throughout the world by the end of 2014, whereas the leading traditional hotel chains offered thirty times fewer rooms.

**Another consequence of E-commerce is that consumers are more independent and active in the process of satisfying their needs.** This is the era of the Do-It-Yourself (DIY)! In the future, the development of 3D printers for personal use will enable individuals to create various pieces of furniture and objects themselves, using only a computer file. Building on this movement, “fablabs”, short for “fabrication laboratories”, have been created. This initiative by the Massachusetts Institute of Technology provides spaces open to the public where all sorts of tools, such as computer-controlled machine tools, are available to design and create objects.

> “A city that knows how to open up its urban spaces and systems no longer thinks of them as finished works, but as actionable objects, loosely-defined spaces by and for its citizens.”
>
> **Daniel Kaplan,**
> FING

# #1.2 DIGITAL CITY: PROMISES AND LIMITS

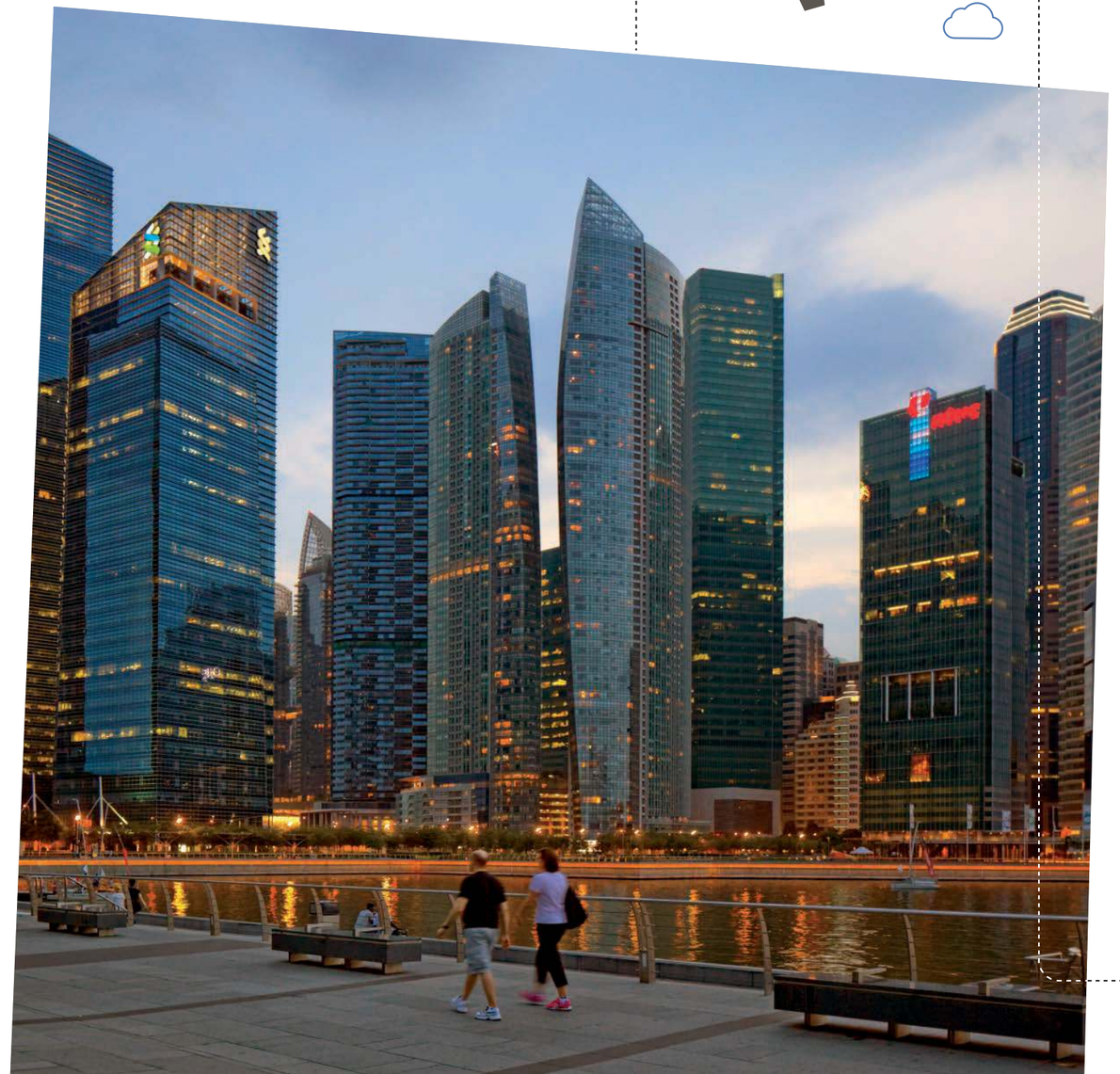
In the year 1700, just 7% of the world's population lived in urban areas. In 2050, this number will be 65%; a majority will be in Asia. This growing population concentration will create gigantic megalopolises which will have to be developed, built, and organised.

## Optimising the city

Through the installation of sensors and the gathering and processing of information, **digital technology can turn into a powerful management and optimisation tool** for major services offered by cities relating to mobility, energy, water, the environment, and safety, for example. The Ministry of Ecology estimates that in the 856,000 km drinking water network in France, an average of 25% of the water is lost due to leaks. Sensors installed on the network would enable the people in charge to quickly identify major problem areas in order to fix them.

**Another possible focus: electricity management.** France has undertaken to replace traditional electricity meters with 35 million smart meters by 2021. With these meters, it will be possible to calculate electricity bills based on actual consumption and to have remote access (no need for the constraint of setting up a meeting) enabling much faster interventions.

**The energy sector could undergo fundamental changes in the next few years** thanks to the development of home batteries. They are able to store natural, renewable and intermittent energy and redistribute it to a house's occupants when they most need it, for example in the mornings, in the evenings, and during the winter for heat.



## Everyday Life Made Easier

**Thanks to smartphone apps, we can consult the timetables for public transport and receive alerts in real time, which allows us to optimise travel.**

At home, aside from providing connectivity, digital technology can also help us control electronic devices such as locks, rolling shutters, lights, sprinklers, ovens, and more, through what is called home automation. Now, the possibilities to control devices remotely are nearly limitless.

This remote control of household equipments also has its uses in the health sector, for patient follow-up and to enable older adults, whose number is predicted to increase sharply over the next few years, to stay at home. Digital technology allows medical personnel to ensure a regular follow-up on patients and facilitates interventions in the case of a fall or accident thanks to sensors or telecommunication devices.

Augmented and virtual reality and 3D glasses also enable access to information supplements, as people can use these technologies to walk around a city, visit a museum, play sports, and more.

## New Forms of Intermediation

**Digital technology is a factor in the recomposition of the value chain,** as it allows new players, namely from the collaborative (share) economy, to enter the market. All business sectors are affected, including hotels (e.g. Airbnb, Booking), restaurants (e.g. la fourchette.com), transportation (e.g. Blablacar, Uber), and construction (e.g. Wikibuilding). These players most often rely on an ergonomic digital platform and come in between long-established businesses and their clients, providing added value to the latter.

**1M**

**rooms were offered for rent in 2015 on Airbnb, surpassing hotel industry leader Intercontinental, which offered 710,000 rooms.**

Source: Barclays report, January 2015

> **"Trust and the human factor remain at the heart of the digital transformation, serving to reinvent proximity for the future and simplify everyone's lives."**
>
> **Carine Homsy,**
> La Poste Group

# Limits to an All-Digital World

**Digital technology has its limits, especially in urban areas,** which makes it unlikely that the linear development predicted by players who see a new Eldorado of urban services will happen.

The issues **of interoperability** between the different operating systems in a city, and between the different connected objects, constitute the first obstacle and will multiply.

**Another difficulty** is that in spite of very promising talk on the potential of digital technology in tomorrow's cities, the "lower" layer of connectivity infrastructure, especially the quality of this layer, is not guaranteed: in many metropolises around the world, mobile connection in metros is still too weak to allow the development of the more demanding digital technology uses.

**The ever-growing strain on cities' public financing is also a hurdle.** The turnkey model of a smart city requires considerable investments which communities can rarely afford. The numbers vary depending on the information source, but it is estimated that Songdo, the smart city archetype, represents roughly 35 billion euros in investments over 10 years. The real challenge for cities and metropolises is to be frugal: to do more with less.



## CITIZENS' FEARS IN THE FACE OF ALL-POWERFUL DIGITAL TECHNOLOGY

**When it comes to the continuing expansion of digital technology, apprehensions and fears about it are an even greater obstacle than technological limits.** Surveillance and eavesdropping scandals revealed these last few years have left a mark on the population. Moreover, the multiplication of information channels creates a constant flow of data coming in and out, making it difficult for individuals to distinguish what is important from what is superfluous, which in turn reinforces their fears.

**In order to mitigate the risks associated with using digital technology,** the implementation of regulations could ensure the protection of personal data and intellectual property. These regulation needs are being identified as problems appear: the legal framework for digital innovation has yet to be built.

**3,3 bn**

**Number of queries processed each day by the Google search engine. The Californian company holds about 65% of the American search engine market, 90% of the French market, and 95% of the European market.**

Source: Senate information report, November 2014

**75%**

**of the RATP network will be equipped with 3G+ and 4G by the end of 2015, and the rest of the network in 2016.**

Source: RATP press kit, 2014

# #2
# FROM SMART CITIES
# **TO SAVVY CITIES**

Digital technology immerses us in a new era which is transforming our economic models, our lifestyles, and our habits. This digital ecosystem contributes to creating cities that are savvy, open, flexible, lively, and service-oriented, with the end goal of improving the quality of life of their citizens.



#2.1

# DIGITAL TECHNOLOGY **TRANSFORMS OUR HABITS**

The rise of new technologies opens up personal and professional opportunities in various areas such as shared usage, mobility, energy, political participation, and social connections. Digital technology fosters multitasking and redefines our relationship with space and time. Moreover, the use of information and communication technologies allows us to better understand the behaviours of city dwellers and propose solutions that meet their needs.

## New Individual and Collective Practices

### MOBILE WORKPLACE

Mobile offices, employees on the move, smartphones, and the multiplication of collaborative and remote work tools represent a significant change: **a workplace can be both everywhere and nowhere.**

Driven by the digital revolution and the sudden sharp increase in mobile tools, businesses have dematerialised. We are witnessing the intermingling of private and professional life.

**35%**

**of businesses in France encourage their employees to telework.**

**51%**

**of Swedes work from home at least once a week.**

Source: Polycom study, 2015

### LEARNING EVERYWHERE, AT ANY AGE

**The digital revolution is having a profound impact on educational institutions as well.** Digital technology provides easier access to training and reinforces peer training. Today, through digital technology and MOOCs, knowledge is accessible everywhere, at all times. University campuses are more and more involved in this movement and are opening their doors to businesses and citizens. Libraries, hotels, cafes, co-working centres and other places are integrating education as a component of their business activity, and encourage learning on the spot, thanks to digital learning.

**160 000**

**people registered to the first MOOC, offered by Stanford in 2011.**

Source: Les échos newspaper, 2014

> **Digital technology makes sense because it enables flexibility and a capacity to adapt to the constraints of today's lifestyles.**
>
> **Dominique Paret,**
> Saint-Étienne Métropole

> **Digital technology has wreaked havoc in universities: students check Facebook in amphitheatre-style classrooms, eat and work just about anywhere, and no longer attend their own classes, though they attend other classes for which they never registered!**
>
> **Florine Marie,**
> EPA Plaine Commune

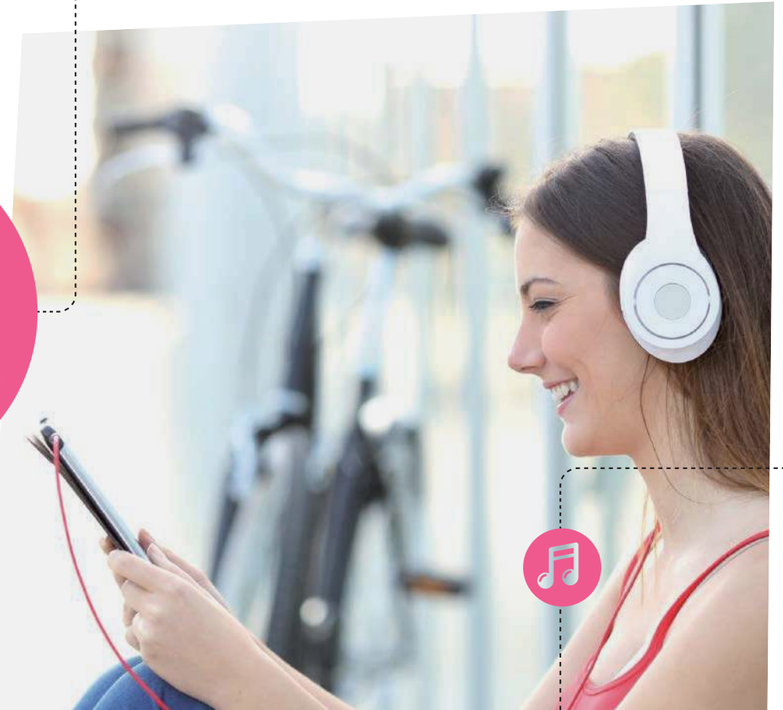
### GETTING INVOLVED IN OUR HEALTHCARE

**The e-health sector shows a two-digit growth rate annually.** We are witnessing the proliferation of health platforms and applications and of connected medical tools, which generate an exponential amount of data. The patients' journey during and after their stay in a medical establishment is once more becoming a priority in the medical world, and there is a strong focus on comfort, social connections, and empathy.

**57%**

**of French people consider that healthcare applications can promote self-monitoring and self-medication.**

Source: Pew Research Center, 2012



> **E-health will transform patient care as well as the work of health professionals who will have access to data based on parameters that had not been measured until now to establish their diagnostic.**
>
> **Erwan Salque,**
> Pharmagest

> **The new transportation infrastructures will never be enough to match the increasing demand for mobility. We must also think to develop intelligent mobility based on behaviour changes.**
>
> **Cédric Verpeaux,**
> Caisse des Dépôts

### MOBILITY OPTIMISATION

**The new mobility technology needs to evolve with the population** (density, living zones, economic centres) and meet the expectations of all players, for trips to go as smoothly as possible. Digital technology makes multimodal transportation easier and serves to develop shared mobility solutions as well as tools for traffic prediction, flow management, and optimisation of urban logistics.

A breakthrough innovation also comes into play: the self-driving car. While the technology is ready, these cars must still overcome the barriers to being brought into circulation and accepted in society in order to be fully implemented.

> **In 2050 at the latest, mobility and cities will have changed significantly as a result of self-driving cars. We will find it quite strange and dangerous for people to drive cars themselves.**
>
> **Boris Beaude,**
> EPFL

#2.2

# NEW SERVICES FOR EASIER, OPTIMISED EVERYDAY LIFE

Digital technology opens up opportunities and leads to the development of applications which make everyday life easier, optimise time and budgets, and in the end, aim to improve quality of life.

## Collaborative Economy

**Shared spaces, objects, or services appear as one of the major solutions** to meet the challenge of better living together, as they enables people to save money, acquire more living space, and better connect with others. This solution also offers new opportunities for services such as shared mobility, service exchange networks, shared guest rooms, and others, which aim to make everyday life easier, bring comfort, provide entertainment, and contribute to improving quality of life.

### INCREASINGLY MULTIPURPOSE SPACES

**Digital technology fosters multipurpose spaces,** as it enables the possibility of performing various types of activities and services in one space. Thus, a banking agency can also be a social security office as well as a flower shop, following the pop-up store model in which different businesses occupy a space at different times, at regular intervals.

**However, one condition must be met first:** eliminating the barriers between the different players in the neighbourhood. This idea is close to that of the interoperability of connected objects, as the aim is to get different players to collaborate who were not previously used to working together.

## Digital Technology and Energy

### SUPPORTING ENERGY PERFORMANCE

**The development of digital equipment in buildings** (sensors, consumption management systems, etc.) was the first step toward smart grids. The purpose of using smart grids is to be able to connect communicating buildings in order to balance energy supply and demand in real time. This will enable communities to optimise their overall energy performance.

**A NUDGE TO REDUCE CONSUMPTION**

**A nudge is a concept in behavioural economics.** It consists of making indirect suggestions to influence the behaviour of a user without imposing formal constraints. Electric power companies such as Opower (U.S.) use this concept to incite their clients to save energy. They use social pressure by sending clients their bill and that of their neighbour, to encourage them to compare and reduce their consumption in order to get a better score.

€ 268.5 bn

**The collaborative economy market represented 12 billion euros in 2014 and is predicted to reach 268.5 billion euros in 2025.**

Source: www.planetoscope.com /PwC study - November 2014

49%

**of third places in France are in Paris, but this phenomenon exists everywhere in France.**



## Digital Technology in Daily Life

**Digital technology transforms our daily lives:** our homes are now connected and can be controlled remotely, outside the signage is becoming dynamic, allowing us to find our way more easily, and shopping is being reinvented as it benefits from endless new digital opportunities.

### CONNECTED HOMES

**People can use a smartphone or tablet to control an ever-increasing number of functionalities in their homes.** They can control everything using a single device, without even needing to be at home. Sensors throughout the house send signals to a mobile application that can change the settings for central heating, the electrical system, surveillance cameras, garage doors, TVs, and washing machines with a single click.

### STREET FURNITURE AS A SUPPORT FOR DIGITAL TECHNOLOGY

**With the arrival of digital technology, new matters have to be considered and many new opportunities arise for the organisation of public spaces.** Urban furniture, for example, represents a great component for connectivity in an area: it is ideal to install the sensors necessary to the operation of a smart city or the antennas for wifi, 4G, etc. required for connected objects. Urban furniture can also be seen as a dynamic signage tool which can guide citizens and provide the option for tourists to plan their own journey through the city.

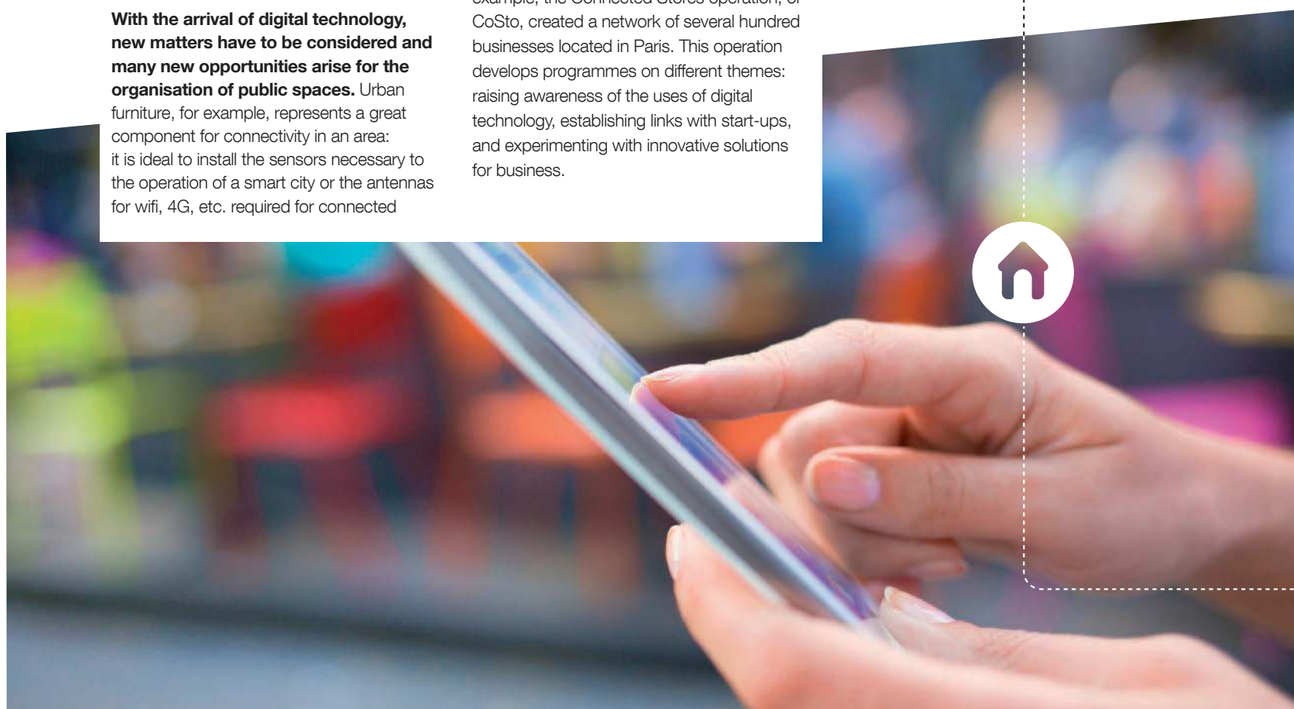
### DIGITAL TECHNOLOGY AND BUSINESSES

**Some local businesses are concerned about the increasing power of e-commerce.** Faced with the challenge of digital technology, they have no choice but to reinvent themselves, which means mastering communication and social networks, regrouping by business sector to offer a pooled supply, performing search engine optimisation, and more.

**However, digital technology can also be a source of new services** and act as a driver for a new local economy involving these neighbourhood businesses. For example, the Connected Stores operation, or CoSto, created a network of several hundred businesses located in Paris. This operation develops programmes on different themes: raising awareness of the uses of digital technology, establishing links with start-ups, and experimenting with innovative solutions for business.

**THE "CONCEPT-BUS SHELTER" BY JC DECAUX**

**The Concept-Bus Shelter is an array of multi-service innovations offering a free WiFi connection,** a mobile phone charging station, and information to explore the local area. This service-oriented system also enables users to view local classified ads, find their way around the city, and find out about things to do in the neighbourhood.



# #2.3 PUTTING CITIZENS AT THE HEART OF SPATIAL AND SOCIAL ORGANISATION

Digital technology contributes to redefining the relationships between citizens, their peers, and decision-makers. Everyone can further interact with the neighbours and communities who use the same services. Moreover, the amplified communication between public authorities and citizens helps build more pleasant and practical neighbourhoods and cities.

## Governance: More Involved City Populations

**Today, we are witnessing an evolution in the traditional representative democracy model.** Citizens have more means to stay informed and get mobilised in day-to-day life. Social networks make it possible to gather hundreds of people in the street in a few hours. New technologies allow the emergence of new initiatives for improving the living environment in neighbourhoods. Urban project design is being challenged, as vertical governance is no longer the optimal model.

Writer and journalist Francis Pisani compares what he calls **"Datapolis",** a city based on data and technology, to **"Patricipolis",** a city that formally and informally involves its citizens in designing it. Digital technology can be a tool for co-building cities, through its function of amplifying and fluidifying social interactions. In Medellin, Colombia, the community put in place a platform (MiMedellin.org) for citizens to express themselves regarding the focus of city projects and to suggest ideas. Inversely, in Rio, citizens created a platform which uses technology to pressure local elected officials. In a single day, an elected official may receive hundreds of calls or thousands of e-mails about the same demand (see "Meu Rio", p. 38).

> **"Turning citizens into full-fledged collaborators in the city-building process represents an opportunity for public players and urban service providers to improve the quality as well as the utility of physical or digital urban spaces."**
>
> **Thierry Marcou,**
> FING

> **"Structuring and combining "top-down" dynamics (capable of developing platforms, ensuring a connectedness and coherence, etc.) and "bottom-up" dynamics (citizen locality projects, active communities, entrepreneurship dynamics, etc.)."**
>
> **Véronique Routin,**
> FING

### LEVERS FOR COMMUNITIES AND THE ROLE OF MAYORS

- Envisioning the city on the long term
- Taking into account the personality of each city: its history, environment, culture, etc.
- Designing the city with the citizens to stimulate a sense of ownership, involvement, and civic duty
- Developing a systemic, comprehensive approach to go beyond the monofunctional verticalisation of services
- Being accountable and explaining the decisions made
- Thinking about "uses" rather than "technology"

Source: Carlos Moreno, Scientific Advisor to the President of Cofely Ineo & CEO

## Better Living Also Means Living Together

**In order to live better in a city, that city needs lively streets and interactions between its citizens.** The neighbourhood scale is particularly adapted to this concept, since it is a mix of private and public spaces; therefore the inhabitants have a stronger interest in the quality of life there. The notion of trust is key, since it pushes people to be open and suggest collaborative projects that lead to better living together, whereas distrust leads to people staying isolated at home, counting only on public intervention.

**Digital technology provides additional tools to put people in touch.** The smartphone is one of the most used accessories throughout the day, with which people can use sites and applications to stay informed wherever they go about events, community life, neighbourhood matters, neighbours willing to trade services, and businesses where to meet up. Social connections have always existed in neighbourhoods, and have been amplified by digital technology. The mix of technology and human relations can be found in the streets, on social networks, in the stairs, in forums, and in mutual help applications: people get involved in associations after having found out about them and their activities online or offer IT courses to neighbours via a newsletter or a neighbourhood social network, for example.

> **"Neighbourship is complex and influenced by trust or distrust: you may not feel inclined to play tennis with your neighbour, but he is the only one who can water your plants when you are away!"**
>
> **Charles Berdugo,**
> ma-residence.fr

> **"What brings a neighbourhood to life is not the technology implemented, but the fabric woven by overlapping organised and unorganised components, and useless and very useful components."**
>
> **Jean-Louis Frechin,**
> NoDesign

### MA-RÉSIDENCE.FR

is the number one local social network site in France, which connects people living in the same building, neighbourhood, or city so they can help one another, share services (trade, care for the elderly, courses, etc.), talk to each other, and participate in events.

ma-residence.fr
Vous allez aimer vos voisins

# #3 DIGITAL TECHNOLOGY: **CITY LIVING MADE EASY**

Initiatives to make life easier flourish everywhere in the world.
Civil society, private entities and decision-makers are suggesting solutions to optimise everyday life and make it easier and more entertaining.

#3.1

# Getting Around

Intermodality is a key concept for city development, building on an increase in public transport and soft mobility (walking, biking, etc.) Citizens are looking to plan their trips in ways that efficiently combine different means of transport. Applications and interactive terminals allow them to find information, and new players in the sector are offering shared rides by private persons to complement private and public transport networks.

## Choices and Information

### MOOVIT

This public transport app covers a large number of cities worldwide and informs users of the multimodal transit options and combinations to make it to the final destination. Users help each other by enriching the live content: they can inform when events cause delays.

### URBANFLOW HELSINKI

The Finnish capital is being equipped with touchscreens for its citizens and tourists.

The content at each terminal is adapted to the neighbourhood where it is found. These terminals provide information on shops and noteworthy sites in the area, as well as timetables for public transport and data such as the average ecological footprint in the neighbourhood.

### WAZE

This app is a favourite among motorists and relies on information provided by its users: anyone can inform others about a traffic slowdown, speed checks, or the price of gas at different stations. The GPS function is improved thanks to a collaborative map.



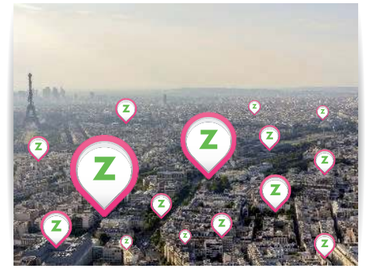
## Sharing

### GETAROUND

The San Francisco-based online platform enables car owners to lend their vehicle to other private users, receiving an hourly or daily fee for the service. The platform provides insurance and assistance to all users.

### ZENPARK

This app allows subscribers to find parking for their vehicles in different cities in France, pay a flat fee or a rate per minute, find out in real time the number of spots available, and follow instructions to get there. The parking spots do not belong to Zenpark, but rather to partners such as hotels, lessors, businesses, who can thus optimise the use of their parking lots.



### BLABLACAR

The leading ridesharing service in France allows its members to contact each other and ride together from one city to another, sharing transport costs. The online payment function and the mutual review process for drivers and passengers have made carpooling safe and commonplace.

#3.2

# Health

The number of digital technology uses in the health sector is multiplying. We seek to modernise operating theatres, facilitate medication, and shorten hospitalisation periods to relieve the burden on healthcare centres without harming the patients. Patients are monitored remotely and assisted during recovery, as digital technology allows health professionals to collect data on the patients' medical condition.

## Prevention

### SENSIUM WIRELESS MONITORING, UK

This wireless connected patch was developed for hospitals in order to monitor patients from their homes. The patient wears it directly on his or her skin. Vital signs such as heart-rate, respiration, and temperature are measured every two minutes and sent to the hospital by internet, allowing patient monitoring after clinical or chirurgical interventions.

### DO-PILL

This connected pill organiser alerts the user when it is time to take medications, and shows which box contains the right pills. It is specifically recommended for people suffering from short-term memory loss.

## Improved Well-Being During Hospitalisation

### MY HOSPI FRIENDS

This app allows patients to meet other people in the same healthcare centre. It complements the entertainment offered by the centre in order to improve the well-being of the patients, who can talk to each other, create ties and take a break from discussing their pathological condition, which is too often the prevailing theme during patient recovery.


### BEPATIENT

This platform creates a personalised heath management solution adapted to outpatient surgery. It facilitates the continuity of personalised post-operative care outside of the hospital as well as the awareness and prevention phase. This type of tool allows hospitals to reduce the number of patients occupying a room for several days, as part of the follow-up can be done remotely.

BEPATIENT

## Technological Solutions

### 3D PRINTING

Today, the rise of 3D printing, particularly of the new materials that can be used, allows us to create copies of a patient's organs in order to identify anomalies more easily when scanners are not enough. In the United States, thanks to this technology, a new-born baby with a heart condition was diagnosed and treated.

### ROBOTIC SURGICAL DEVICES NAMED DA VINCI AND ROSA, BY INTUITIVE SURGICAL

These medical robots are controlled by a surgeon and can make small, precise movements. This enables minimally invasive surgeries which are more bearable for the patient, and opens up a new world of possibilities, especially in neurosurgery.

#3.3

# Work and Training

The line between personal and professional life is increasingly blurred: more and more, a single space can be used for training, socialisation, and work. The omnipresence of the internet enables people to perform tasks remotely, and to combine different tasks. Today, people also give and seek feedback based on experiences. We receive advice from other people who are not necessarily experts. Citizens' role has a renewed significance, as they are ushered into facilities that have been designed to welcome them and have them interact with new concepts or solutions.

## Working anywhere

### ZOKU, NETHERLANDS

This new kind of hotel offers hybrid rooms to its travelling professionals. In them, guests can sleep, work, exercise, cook, invite friends, and more. The lobby is designed in a cozy and playful way to encourage people to meet and network. Meeting rooms and coworking areas complete the offer.

### HUBUD, INDONESIA

This coworking space in the midst of the Balinese nature brings local and visiting entrepreneurs together. Apart from the usual services a coworking space offers, Hubud developed a package for people who wish to relocate in Bali: this service provides help with airport pickup, finding a home, and getting to know the community.


## Solutions to Challenges

### MAKESENSE HOLD-UPS

Makesense brings people together via an online community in order to help develop social enterprises. Hold-ups are events which bring volunteers together to think about the problems encountered by these startups and entrepreneurs in order to find solutions via collective reflections.


### TUBÀ, LYON

This place offers innovative project leaders the chance to test their products on the public. It is a space for dialogue and networking, which fosters improvement and local collaboration. Tubà provides project leaders with office space as well as advice on their development methods.

TUBĀ
TUBE
À EXPÉRIMENTATIONS
URBAINES

## Training

### COURSERA

Online courses by professors at prestigious universities, free, with no selection process! The videos and exercises enable everyone to learn about a variety of fields, from physics to philosophy. An official certificate (assessment and payment required) is also offered. Thousands of people of all ages, from around the globe, attend MOOCs (Massive Online Open Classes).


### IDEASTORE, LONDON

It's not just a library. It is also a training and career advising centre, a place for meetings (business or leisure), and a café. An app allows users to consult the catalogues and the calendar of events.

#3.4

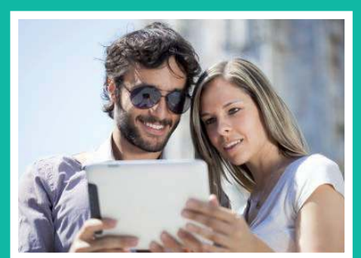
# Goods, Services, Entertainment

Citizens are more and more involved in the way they consume, as digital technology provides the means to be informed and have access to new types of goods and services. They make informed choices on food consumption, stay in private homes when they travel, develop their manual skills, and meet their neighbours. There is an increasingly strong connection between consumption and interactions with others.

## Discovery, culture

### CIGALES NETWORK

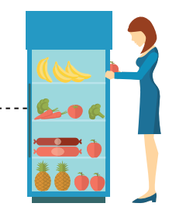
This network gives public and private tourist sites the possibility to get together and offer visitors a unique interface for free internet access points. Access to internet is made easy: instead of entering a different password at each hotspot, “Cigales” users only need a single tool, wherever they go in the area. This system already exists in the Drôme region.



## Knowing Before you Buy

### THINK DIRTY, USA

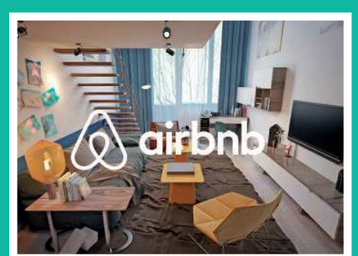
Users of this app can scan beauty products to learn about ingredients used in their production process and the degree of toxicity of these ingredients. It enables them to make educated choices and avoid less healthy products if they wish.

### AIRBNB

This is the most well-known example of collaborative economy! Individuals rent their apartments to tourists looking for housing.

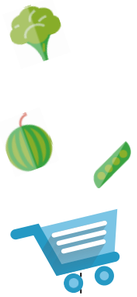
The rental process happens via an online platform where travellers can see comments and pictures that help guide their search. This platform enables people to visit cities in a friendlier setting (since they have contact with locals) and the rates are advantageous. Its success challenges the traditional tourist housing scheme.




## Local, organic, wholesome food


### LA LOUVE

The first collaborative supermarket in France. Members can buy local, organic products and commit to participating in the supermarket's operation. They own shares in the cooperative and participate actively in its governance.

### *LA RUCHE QUI DIT OUI*

(Lit. "The beehive that says yes"). The network of "beehives", or "ruches", in French, enables everyone to order fruits, vegetables and fresh produce from regional producers. The platform provides information and can be used for ordering. Every week, baskets are delivered directly at people's houses or in a store.


## Learn by Doing

### FABLAB

This space is open to the public and enables people to develop their capacity to imagine an object and create it. There is a real exchange of skills between users.
The object can be made using the tools at users' disposal. This type of space already exists in a number of cities, including Paris, Caen, and Bordeaux, and some even have 3D printers.


### ZILOK

Professionals and individuals use this platform to offer a number of objects for rent. Among these objects are handiwork tools, household items, sports and technology equipment, medical devices, and more.


## Local services

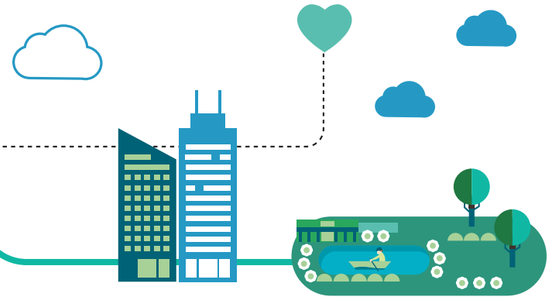

### *LULU DANS MA RUE*

(Lit. Lulu in my street). This site enables individuals to offer or request paid services in their neighbourhood. Everyone can be "Lulu" the helper, and the payment and contact with others take place on the site.
The services offered include handiwork, childcare, shopping, moving help, and more.

### PACKCITY, BY NEOPOST

In France, this network of automated self-service lockers enables individuals and businesses to pick up or drop off parcels. This service is also offered in different countries, for example through the postal service in Chile, and enables users to send and receive parcels outside of post office or other pickup location hours.

#3.5



# Improving the City

Digital technology brings new tools for citizens, who can inform themselves on projects affecting their neighbourhood and communicate with the people carrying out these urban projects, in the private and public sector. With digital technology, it is possible to reach out to a larger number of stakeholders, and this is revolutionising citizen involvement practices. Participatory projects flourish, initiated by civil society or suggested by public authorities and private developers.

## Mutual Help Through Information

### OPENSTREETMAP

This online map with fully patent-free content is accessible without restraints to all users, and anyone can edit it: it is collaborative and dynamic. Themed maps can be created to inform others or enrich their search.
Bike lanes can be found for a number of cities, as well as indications that facilitate the provision of humanitarian aid in the case of a natural disaster.


### PLATAFORMA URBANA, CHILI

This site has multiple collaborators and gives information on ongoing urban projects and initiatives by local associations. Journalists, urban planners, bloggers, and architects post information. The content includes, for example, impact analyses for real estate projects, information on historical sites, urban development plans, and events in public spaces organised by various players.

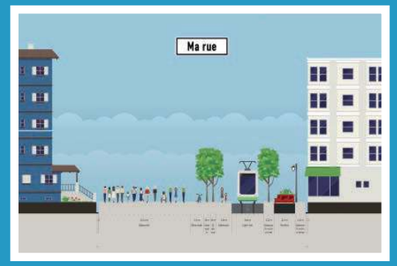
## Modifying Public Spaces

### SAN FRANCISCO BETTER STREETS

The city of San Francisco proposes an online website with a collaborative map to survey citizens' opinions and inform them on city policies and the possibilities for modifications of public spaces.
The city also addresses private land use planning and construction agencies, as well as businesses.


### STREETMIX PLATFORM

This colourful design tool allows people to create their own streets by imagining the space allotted for different means of transport. Users can share their suggestions and view other people's. Everyone can learn about the constraints linked to the space allotted for different uses in a street and understand the different possible combinations.




#3.5

# Participating in decision-making

## PARTICIPATORY BUDGET FOR THE CITY OF PARIS

Since 2014, the city of Paris offers its citizens the possibility to suggest projects for their city and their neighbourhoods, and to vote to undertake the most relevant ones. 5% of the city's investment budget (representing 35 million euros per year) was put at their disposal until 2020. This system operates via an online platform and a citizen committee, and is used by other cities in the world, in Brazil, China, Spain, Sweden, Argentina, etc.

## CARTICIPE

Strasbourg, Saint-Etienne, Saint-Jean-de-Luz, Montpellier, Marseille, and other cities are implementing this online tool which allows citizens to express their opinions on the city and public facilities. They can suggest road improvements or other actions related to public spaces, and vote for other propositions. The most popular suggestions are taken into account when making urban planning decisions.


## MEU RIO

This online platform was created by citizens in Brazil and allows them to suggest modifications for their city, to mobilise, to commit to participating in campaigns, and to receive advice from professionals when they lobby the public services. Several hundred thousand people already participated in campaigns which resulted in laws being modified, public facilities built, safety measures put in place, and other actions taken which improved their city.

# Participatory Art

## CROWN FOUNTAIN BY JAUME PLENSA

Artist Jaume Plensa created a 15-metre-high fountain in Chicago. It is composed of a big screen with a hole pierced in it, which shows pictures of the faces of people who live in Chicago, and water comes out of their mouth through the hole. The fountain met with a high level of approval from the public, as citizens are at the centre of this public work of art.



## BIG EAR, IN SEOUL

The city installed a sculpture that is used for both artistic creativity (sound experience) and collecting suggestions from citizens. Passers-by can express their complaints or suggestions through a giant ear which broadcasts their message to the city hall in real time. The most relevant messages are forwarded to the city's community liaison services, and the rest are "recycled" in a public room where an indistinct whisper can be heard at all times.

# INTRODUCTION TO THE MEMBERS OF THE THINK TANK

**Hugues Aubin**
ICT adviser at Rennes and Rennes Métropole, co-founder of LabFab Rennes

**This self-taught learner of social sciences turned to the world wide web at the beginning** of his career and developed a good number of experiments combining land use and digital technology for the city of Rennes and Rennes Métropole (web 2.0, geo-contextual information, open data, 3D models of lands, participatory urban planning, urban mediation, transmedia storytelling). Since the end of 2014, he has been in charge of developing the potential of digital manufacturing by establishing contacts between the different players in the area involved in the large Rennes Métropole fablab, called LabFab.

**Boris Beaude**
Doctor of geography, researcher at the Chôros laboratory of *École Polytechnique Fédérale de Lausanne*

**Boris taught for eight years at the Paris Institute of Political Studies (SciencesPo).** His works focus on the spatial dimension of telecommunications, and more broadly, on the spatial context in which social interactions happen. He is interested in finding out the ways in which individuals control spaces, with particular attention to the internet as a unique space in which people coexist. He is the author of the following works: “internet, changer l’espace, changer la société” (2012, FYP) and “Les fins d’internet” (2014, FYP).

**Charles Berdugo**
President and CEO of ma-residence.fr

**Charles has occupied positions in major French companies where he had extensive responsibilities, before going on to successfully create his own consulting firm, Sysicom S.A.,** which he sold 11 years later to the American company Marchfirst. As he is convinced that better living together must involve an exponential increase in dialogue on a local level, in 2007 Charles Berdugo created a website for dialogue and mutual help between neighbours, “ma-residence.fr,” in order to facilitate communication between neighbours. He published “Le Nouveau Vivre Ensemble” (published by Descartes) in 2009 after a number of conversations with sociologists and experts in community dynamics. He also gives lectures in entrepreneurship courses at HEC and ESSEC.



**Jean-Louis Frechin**
Designer and architect at DPLG, founder of the NoDesign agency

**In 2001, after having experimented in IT research, multimedia editing, and global design, Jean-Louis created a strategic design agency dedicated to digital technology:** NoDesign. This agency is the recipient of many awards and specialises in creation, innovation, and industrial, urban and cultural strategies. As a renowned pioneer in “new design”, it advises companies and institutions on emerging questions through unique approaches: innovation through design, non-technological innovations, and innovation strategies. Jean-Louis Frechin has given lectures internationally and participated in many publications and exhibits. He is a professor and researcher, and is currently head adviser in the prospective and innovation department at ENSCI/les Ateliers, Paris.

**Carine Homsy**
Innovation director at La Dides, the innovations department of the digital technology branch of La Poste Group

**Carine is in charge of the Smart City and her role consists of identifying and developing new digital technology opportunities for the different branches of La Poste. Previously, she was in charge of research.** Before she joined La Poste Group, she spent 10 years working for a startup company in the services industry focusing on the IT market, new technologies, and the internet. She holds a Master’s degree (M2) in marketing, a Master’s degree (maîtrise) in Communications, and a Bachelor’s degree (licence) in art history.

**Daniel Kaplan**
Co-founder and general delegate of the Fondation Internet Nouvelle Génération (FING)

**In 1986, Daniel founded JKLM, one of the first digital communications agencies in the world. He managed the agency until the early 1990s, then became a consultant.** At that time, he participated in founding the Proposition committee. Since the 1990s, Daniel Kaplan has been extremely involved the development of the internet in France and in the world. On an international level, he was the member coordinator of the Internet Society and contributed to the creation of Icann. He was a member of the Chamber of Experts in the eEurope programme. In France, in 2010, he received the Prix des technologies numériques, a digital technology award. In 2013, he was nominated as a member of the Conseil National du Numérique (lit. National Council on Digital Technologies). In 2015, he launched the Transitions programme with the FING to create concrete ties between the digital and ecological transitions.

**Thierry Marcou**
Programme director, FING

**FING was created in 2000 by a team of entrepreneurs and experts, and is the benchmark think tank on digital evolutions.** Today, it has over 300 members: large companies, startups, research labs, universities, regional governments, administrations, associations, and natural persons. Thierry started his professional activities as an adviser in different entities of the French financial organisation Caisse des Dépôts et Consignations before directing the company Conjuguer for 10 years during which he designed, developed, and presented the first regional collaborative networks: A big cities network (Réseau des Grandes Villes, or Oredic), and a medium-size cities network (Réseau des Villes Moyennes, or RVM).

**Florine Marie**
Adviser,
Plaine de France EPA

**After completing a "Scube" (SciencesPo – UPMC) Bachelor's degree (licence) in math/physics and social sciences, Florine spent a year in Sapporo, Japan.** When she returned, Florine was passionate about digital and urban strategies, which were the focus of her studies at SciencesPo where she earned her Master of Urban and Regional Policies and Strategies (STU). In 2013, she joined the Plaine de France Établissement Public d'Aménagement, where she has been working on the project Quartier Universitaire International du Grand Paris (Lit. International University Neighbourhood of the Greater Paris) and on the renovation of deteriorated business parks. As the president of the interdisciplinary mediation association "Idées d'Après," she is particularly interested in the new forms of scientific mediation.

**Frédéric Oru**
Deputy general delegate of NUMA

**NUMA is an organisation whose ambition is to accelerate and spread entrepreneurial spirit in France and in growing ecosystems.** NUMA combines a wide variety of complementary activities: coworking, startup accelerator programmes, community structuration, and open innovation and digital technology evolution programmes for businesses. Frédéric travels the world in search of local partners who share the values of NUMA. In 2015, he opened the first NUMA offices outside of France, in Moscow, Bangalore, and Casablanca. Before joining NUMA, Frédéric Oru worked for thirteen years in the IT and training sector and developed strategic and international projects for major companies. He is an engineer with a diploma from École Polytechnique, and holds a Doctorate in Mathematics from École Normale Supérieure.

**Dominique Paret**
Director of Higher Education,
Research and Innovation
for Saint-Étienne Métropole

**Dominique started his career in the banking sector and trading rooms, and went on to become a consultant and manager in the telecommunications sector before joining the local authorities as a project manager focused on digital technology and innovation.** He is a specialist in open innovation and creative industries, has been Director of Higher Education, Research, Innovation, and Entrepreneurship in the agglomeration of Saint-Etienne Métropole since 2010, and as such, he is the head of major development programmes such as the "Manufacture" creative neighbourhood, the engineering and health campus, and the Lyon-St-Etienne metropolitan project entitled "creative industries".

**Joël de Rosnay**
Advisor to the President of Universcience
(Palais de la découverte, Cité des
Sciences et de l'Industrie), Executive
President of Biotics International

**Between 1975 and 1984, Joël was the director of research applications at Institut Pasteur.** This former researcher and professor at the Massachusetts Institute of Technology (MIT) in biology and IT became the science attaché to the French Embassy in the United States, then scientific director at the *Société européenne pour le développement des entreprises* (a venture capital firm).



**Véronique Routin**
Director of development, FING

**Véronique just finished a project on collaborative consumption called ShaREvolution.** Before joining FING, she worked for ten years in the ICT sector in the United States and in France. She led many internet projects for startups (launch of Amazon in France in 2000) and key accounts (Laser). Véronique Routin holds a Master's Degree in International Economics (Paris 1), a Master of Business Administration (UC Berkeley), and a Master in Innovation by Design (ENSCI 2014).

**Erwan Salque**
Operations director for E-health,
Pharmagest

**Today, Erwan is the Director of Operations for E-health at Pharmagest Interactive,** the leader in pharmacy computerisation, with 43% of market shares. Its activity is centred on three areas of focus: data hosting, device design and applications, and information tracking and processing systems. The strategy of the Group is to use these new skills to provide services indispensable to pharmacists within the framework of the implementation of the French HPST Act.

**Justyna Swat**
Architect and strategic designer

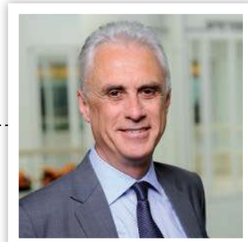
**This architect and strategic designer is involved in multiple initiatives in the areas of new economies,** digital and decentralised manufacturing, smart cities, and urban innovation. She is the co-founder of the POC21 project, of the WikiHouse Foundation and WikiHouse France, and a connector-member of OuiShare, the think and do-tank collaborative economy community. She has been a lecturer at ENSCI-Les Ateliers since 2013. Her work focuses on developing sustainable systems which have a positive impact on cities, citizens, and the environment.

**Cédric Verpeaux**
Manager of the "Territoires Intelligents"
(Lit. "Smart Regions") division at the
Caisse des Dépôts

**After working for a startup at the beginning of his career in 1998, Cédric joined the Regional Digital Development department at the French financial organisation Caisse des Dépôts in 2002.** At that time, as the head of the "Modernisation of Public Services" division, he was responsible for developing and deploying digital services for users. At the start of 2010, he became the head of the newly created "Digital and Sustainable City" division. One of the goals of this division was to combine the strategy and actions of Caisse des Dépôts regarding urban development related to digital technologies. Since 2012, the Caisse des Dépôts' actions have been refocused on investment, and the "Smart Regions" division targets the following areas: sustainable mobility, teleworking and third places, energy and the environment, open data, the challenges posed by the "smart city" concept in small cities, and more.

# POINT OF VIEW

## Habits at the heart of reflections on urban lifestyles



**Cyril Ferrand**
Deputy CEO, Bouygues Energies & Services; Co-pilot of the think tank

**Digital technology transforms our lifestyles and our habits, and opens up new opportunities for cities.** The digital ecosystem enables an optimisation of the city in terms of energy, mobility, safety, urban logistics, and more, and it also makes everyday life easier through new services, local social networks, and nearly instantaneous access to information.

**The collective and collaborative reflection that happened in this think tank, "digital cities, human design: living together, reinvented"** with a panel of experts in a number of fields allowed us to analyse the new habits induced by digital technology on a neighbourhood scale and on a city scale.
Through this think tank, we wanted to think of digital technology as something other than a list of technological innovations: it is a cultural revolution which profoundly impacts our lifestyles, and therefore, the way in which we must design cities. Designing smart cities is about constantly seeking to improve quality of life, and placing people at the centre of urban projects.

**Reinventing the way we live together through our sustainable neighbourhood projects is an essential component of our LinkCity initiative** which combines social ties, environmental performance, and connected services in order to benefit the quality of life of citizens. From smart buildings to connected regions to smart cities, **Bouygues Construction positions itself as a global operator for urban and regional projects in order to create cities that are more energy-efficient, more service-oriented, and more lively.**

**WITH LINKCITY, CREATE TIES WITHIN YOUR NEIGHBOURHOOD**

**As a global operator of urban projects, our aim is to help communities plan or renovate their neighbourhoods for sustainability through a systemic approach which combines various players and functions to create more lively, social, environmentally-friendly, connected, performing, and intermodal neighbourhoods.**

linkcity

## Reinventing our neighbourhoods

**A MORE LIVELY, SOCIAL, AND INTENSE NEIGHBOURHOOD**

**A MORE EFFICIENT, RENEWABLE, AND ENVIRONMENTALLY FRIENDLY NEIGHBOURHOOD**

**A MORE CONNECTED, SMART, AND INTERMODAL NEIGHBOURHOOD**

# ACKNOWLEDGEMENTS

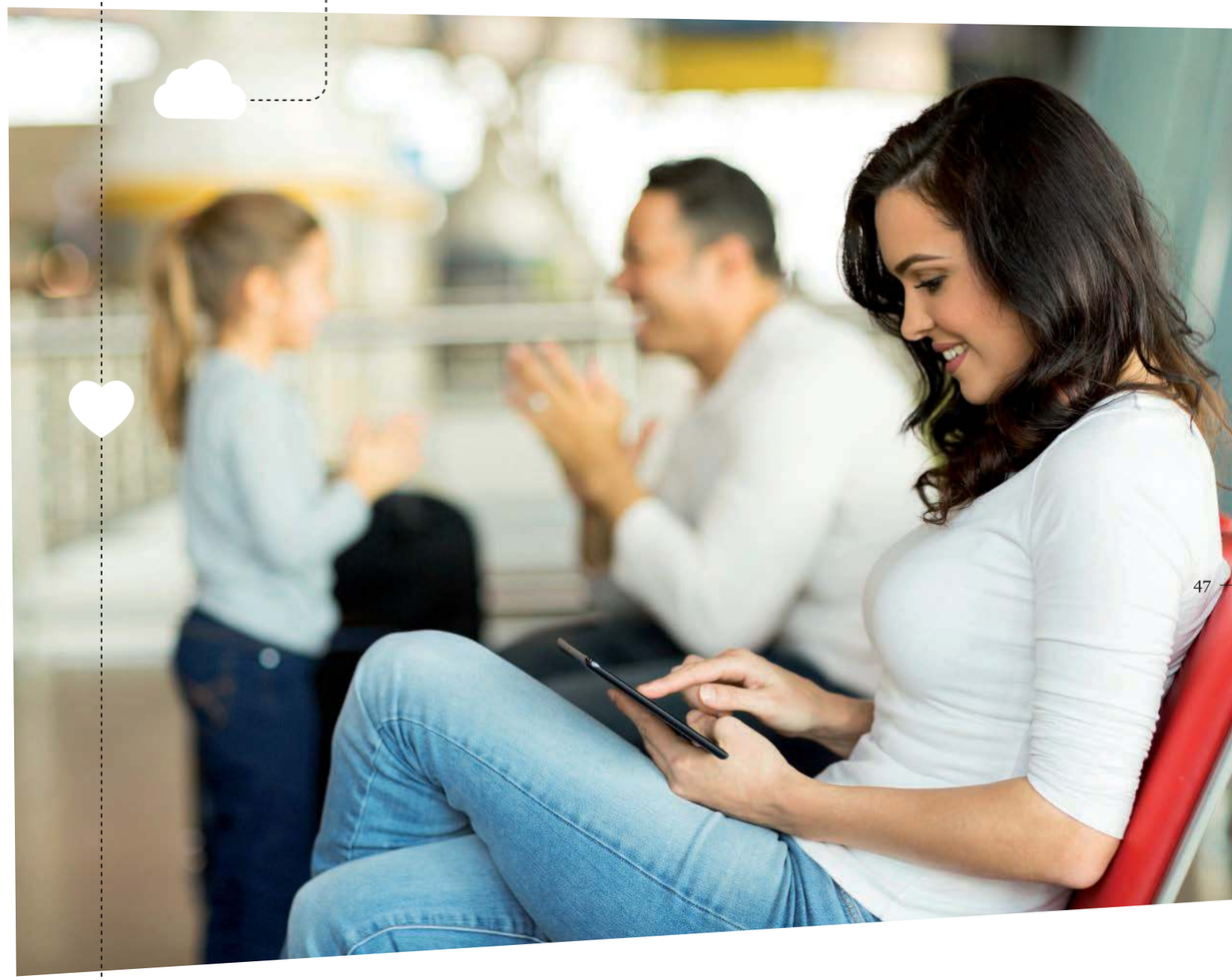
Bouygues Construction would like to extend warm thanks to **Joël de Rosnay** for having sponsored the think tank and brought all of his expertise to enrich the reflections and dialogues relating to this societal revolution driven by digital technology.

We express our heartfelt thanks to **FING** (Fondation Internet Nouvelle Génération), particularly **Daniel Kaplan, Thierry Marcou,** and **Véronique Routin** for their assistance all throughout this project, and for their expertise in anticipating digital transformations.

As well as the think tank experts, Bouygues Construction wishes to thank the **employees** who contributed to the project and to the reflections that took place in the think tank:

Virginie Alonzi / Sandrine Beaufils / Jean-Charles Bertrand /// Cyril Ferrand / Matthieu Gauvin / Christine Grèzes ////////////// Idir Igoudjil / Emeric Kassimaly / Pascal Leroux ////////////////// Laurent Michelin / Karine Monmarché / Julien Schmid. /////







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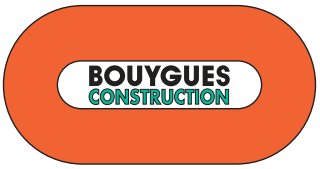


Shaping a **Better Life**

**Bouygues Construction**

1, avenue Eugène Freyssinet - Guyancourt
78061 - Saint-Quentin-en-Yvelines - France
Tél : 00 33 1 30 60 33 00

**www.bouygues-construction.com**
**www.blog.bouygues-construction.com**
**@bouygues_c**