TRANSITIONING
CITIES

#9

TRANSITIONING
CITIES

CONTENT

EDITORIAL

For an Adaptable, **Reversible and Inclusive City**

While space has often been organised to save time, rarely has time been organised to save space.

Luc Gwiazdzinski

Geographer. Professor at Toulouse School of Architecture (ENSA-Toulouse). Luc's research focuses in particular on the temporality of cities, rhythms, mobility, hybridisation. He has led numerous research programmes and conferences and has published fifteen books on these topics, including: *La nuit dernière frontière de la ville, L'Aube; La ville 24h/24, l'Aube; Chronotopies, Elya; Saturations, Elya; L'hybridation des mondes, Elya; Pour une politique des rythmes, EPFL.*

Time, an essential aspect of our lives, is a somewhat overlooked entry key in the development and management of the city. While space has often been organised to save time, rarely has time been organised to save space. More generally, the chronotopic approach combining space and time remained marginal for a long time.

But times are changing. The constraints placed on contemporary cities, transforming lifestyles, the need to control the mobility of goods and people and urban sprawl, the need for independence, proximity and sharing forcibly expressed by citizens during the health crisis, overall expectations in terms of sustainable development and transition, require a change in perspective and practices for the observation, development and management of urban worlds.

The response to these challenges necessitates the deployment of a chronotopic and rhythmic approach to the city, which includes the notion of time at all levels, from the apartment through the neighbourhood down to the city, in the short, medium and long term. It also requires transitioning from an approach based on zoning and spatial specialisation (housing, work, shopping, leisure) - the negative effects of which have been identified - to an approach based on diversity of uses and functions, versatility and hybridisation of space and time.

This shift in approach is self-evident; it is a necessity and an opportunity to develop scenarios together for the city of tomorrow, an adaptable and inclusive city that meets the needs of residents and visitors, with a limited impact on the environments. It is self-evident because the city is not a fixed entity but a living system which is constantly evolving over different scales and at different paces, and urban beings do not have the same expectations and needs over the course of a day, week or life. It is a necessity because we must address economic, social, cultural and environmental challenges.

How to limit urban sprawl? How to reduce travel and the economic, social and environmental costs of urbanisation? How to meet the needs of the people throughout the life cycle? How to maintain diversity in terms of activities, populations and local services while continuing to construct monofunctional and monochronic buildings and neighbourhoods in the suburbs, used for a few hours every day, a few days a week or a few weeks in the year? How to meet the changing needs of residents over the course of a day, week, year and life? How to find space in cities seen as over-stretched?
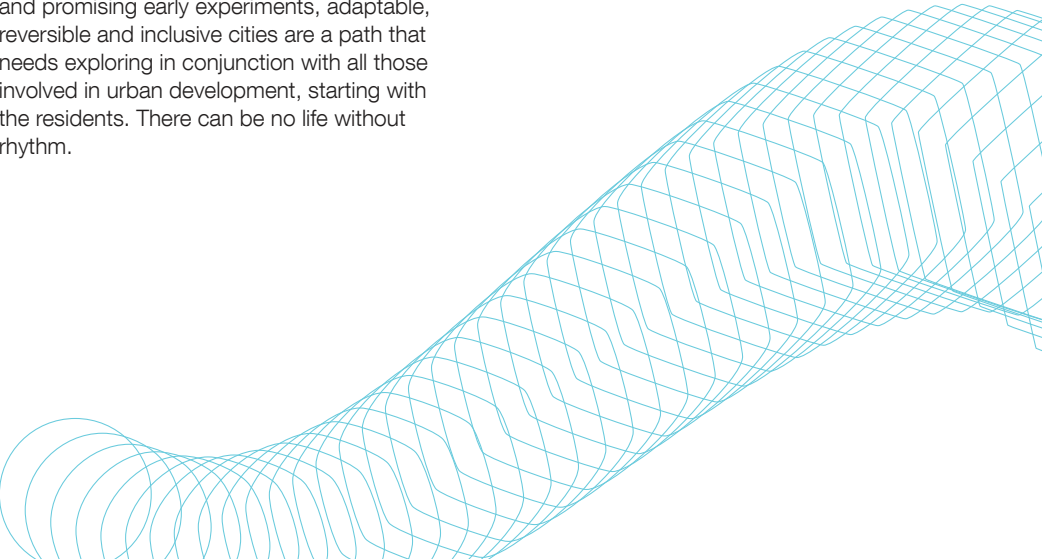
Part of the answer lies in intensifying the simultaneous and alternating use of buildings by increasing the number of functions in the same space (urban diversity, cohabitation, hybridisation) and over time by rotating activities during the day, week or year. It requires all those involved in urban development to focus on the modularity and versatility of public spaces, premises, buildings and neighbourhoods for multiple uses and users. This solution invites us to define new rules in terms of temporary occupation and chronotopic uses, as well as a form of "collective intelligence" where Smart City tools can be implemented. On a different scale, the chronotopic approach also helps integrate the possibility of future use by other populations and for other purposes, a form of usage reversibility bringing about faster changes when released.

Adaptability, versatility, modularity of public spaces, apartments, buildings, neighbourhoods in the course of a few hours, days, weeks, seasons and more, are avenues to be pursued with a view to improving the urban situation, promoting compact cities with shorter distances, maintaining urban intensity and urban life. The time prism is also a fantastic opportunity for the joint development of our cities with the residents. This approach is of interest to everyone as it refers to the human notion, sensitive aspects and matters of everyday life. It responds to the demands of citizens in terms of proximity, engagement and concrete action. It does not fall within the competence of a single player but concerns them all - public and private - on various levels. It requires partnership and transdisciplinarity and appears as a formidable source of innovation.

This is not a pipe dream. As is often the case, users are one step ahead of institutions. Adaptable, reversible, temporary cities already exist in our urban centres through artistic, playful, creative, political or commercial appropriations in public spaces, squares or roundabouts, online rental platforms, or on another scale with the temporary occupation of derelict sites. New forms of cohabitation are created there between multiple and temporary activities and uses, and constructions that are both more fragile and more sustainable. For existing buildings as well as ongoing and future constructions, we should demand the introduction of a "high temporal quality" standard, obliging architects, urban planners and operators to integrate these principles of versatility, diversity and intensity of uses, in space and time, into their designs, conversions or constructions.

In light of the limitations of today's cities, and beyond declarations of intent on transition and promising early experiments, adaptable, reversible and inclusive cities are a path that needs exploring in conjunction with all those involved in urban development, starting with the residents. There can be no life without rhythm.

Transitioning Cities:
One Space, Several Uses and Several Lives

> Rebuilding the city on top of the city means incorporating the principles of circular urban planning into the heart of the urban development process: i.e. initiating and ramping up the transition to carbon neutrality.

Virginie Alonzi
Head of Strategic Foresight Bouygues Construction

Over the past century, the world's population has increased from 2 billion to nearly 8 billion and could reach 10 billion by 2050.

During this period, the world's population should become increasingly urbanised; the urbanisation rate could approach 70% in 2050. At the moment, cities occupy less than 2% of the world's land mass, but produce 80% of the world's gross domestic product, and generate more than 70% of CO_2 emissions. Human activities therefore cause rapidly accelerating global warming on an unprecedented scale: the global rise in temperatures is responsible for environmental degradation, increasingly frequent natural disasters, extreme weather conditions, food and water insecurity, economic disruption and conflict. Nowadays, ecological transition and responsibility towards climate change are core concerns for many stakeholders; it is a strategic priority for Bouygues Construction, who position themselves, through their various businesses, as a major player in this transition to a low-carbon economy.

In addition to these various factors, the Covid-19 global health crisis alters our relationship with time, space and the essence of things. The useful value of spaces (housing units, offices, outdoor areas, etc.) is enhanced. By searching for a quality living environment, people aspire to proximity, in a city/life where distances are shorter.

Now more than ever, a spatial-temporal approach to our lives and our territories really makes sense. As mentioned by Luc Gwiazdzinski, the response to these challenges requires the deployment of a chronotopic approach to the city, combining space and time on various levels.

Limiting urban sprawl, reducing our environmental footprint, preserving natural resources and meeting new societal expectations are challenges we have integrated into our open-ended and multi-stakeholder forward-looking approach, alongside other city agents and users (urban planners, architects, local authorities, businesses, institutions, developers, researchers, start-ups, operators, design offices, academics, etc.), so that together we can come up with new models and devise an advantageous future for a desirable city. How do we make better use of our built-up areas to maximise their useful value while limiting their environmental impact? Intensify uses: which limits and social acceptability? How to design infrastructures/buildings and urban spaces with no predefined function, capable of adapting to changes in use over time? Which new models should be devised to create economic, human and societal value while promoting positive externalities?

Bringing together these stakeholders from a variety of backgrounds to focus on common issues, as part of participatory workshops or webinars, brought to light inspiring initiatives and courses of action; we share the result of this open-ended and multidisciplinary approach in this new **"Transitioning Cities"** trend book with a view to supporting change.

In the short term, to tackle these challenges, part of the answer lies in a better use of existing spaces. For decades, the city was designed with specialisation in mind, with monofunctional buildings (housing units, offices, leisure, shops, etc.), which contributed to urban sprawl and the central role of cars in urban and territorial planning. Buildings - public or private - are currently underutilised: the use rate of offices ranges from 30% to 45%, while that of schools is 20% on average. In addition, 8% of housing units are vacant in France! These figures demonstrate the potential for a better occupation of underutilised or neglected spaces in the city, for blending uses to address the challenge of "Zero Net Land Take" (ZNLT).

Increasing the intensity of use by ensuring the coexistence of various activities in one place, or by alternating uses and user profiles in the course of a day helps address environmental issues while providing new economic models for buildings or infrastructures.

A building with a high use rate is more profitable, becoming a profit centre rather than a cost centre. Furthermore, de-specialising neighbourhoods by mixing urban functions reflects a strong societal desire, by taking full advantage of different uses near one's home and bringing life to the neighbourhood in order to recreate social ties.

In the medium term, possible building transformations must be envisaged from the design stage. Designing a building in symbiosis with its environment and local ecosystem means creating spaces fit for several lives and several uses over time, as well as enabling functional upgrades, in new and existing constructions, to combat the obsolescence and underutilisation of buildings!

This is why it is urgent to come up with new urban models, designed to be upgradable, with a high quality of use to facilitate future transformations in accordance with the territorial needs of the moment!

Focusing on the scalability and reversibility of infrastructures, intensifying uses of existing structures, converting neglected places, rebuilding the city on top of the city, means incorporating the principles of circular urban planning into the heart of the urban development process, i.e. initiating and ramping up the transition to carbon neutrality. Efficiency, resilience and inclusiveness are central to this approach which should result in a flexible and scalable city, capable of constantly adapting to changing needs, a shared city to increase the useful value of buildings and improve our living environment, and an autonomous, self-sufficient city to limit our environmental impact and preserve natural resources.

Conserving resources, reducing our carbon footprint, contributing to the local economy and territorial attractiveness, promoting well-being and social ties, reducing waste or limiting soil sealing are the reasons why Bouygues Construction, as a responsible and committed stakeholder, is fully engaged in this long-term process to (re)build the city on top of the city, by breathing new life into living spaces. For a vibrant, desirable city!

New Urban Challenges
to Overcome
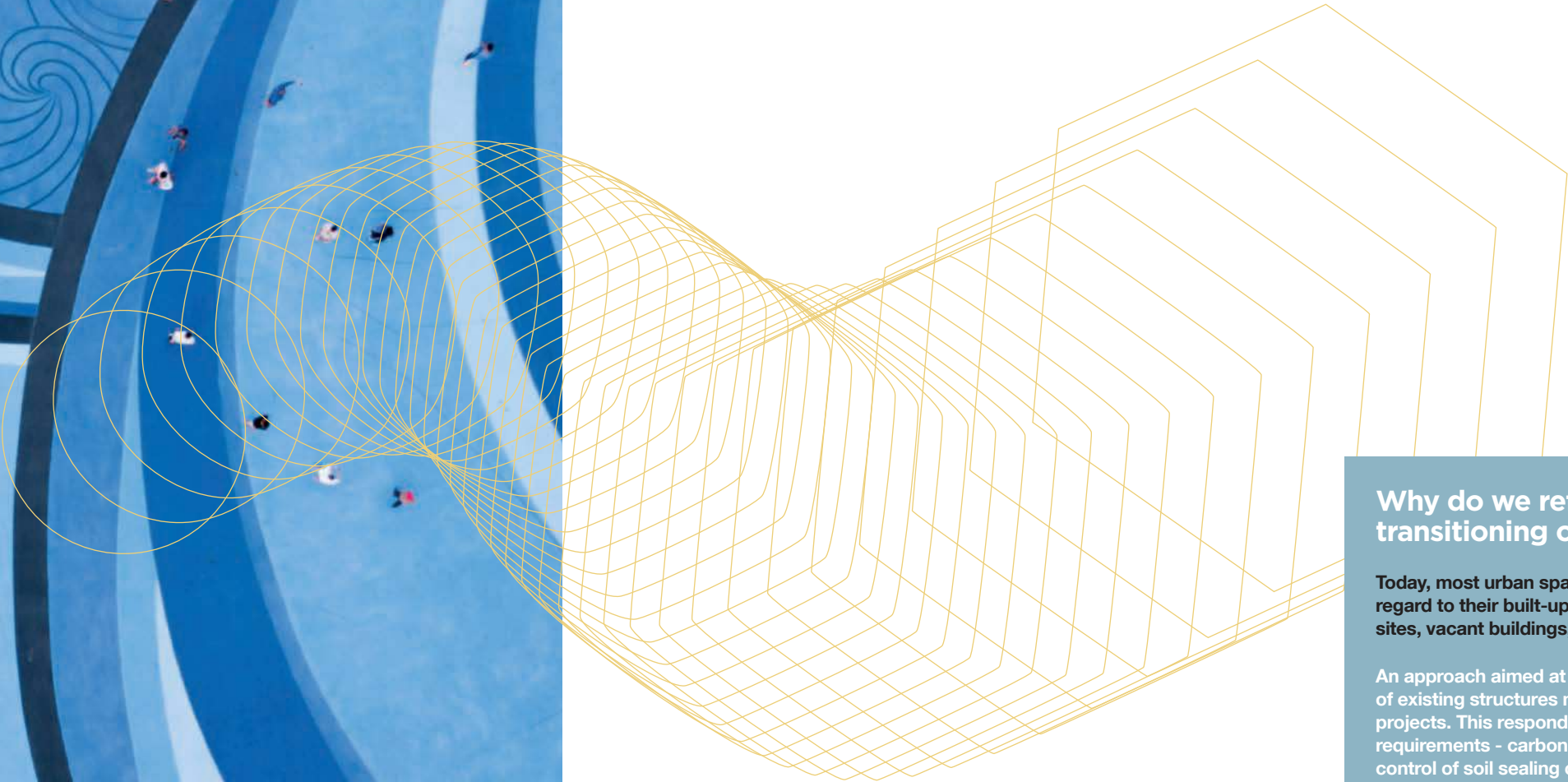
Why do we refer to transitioning cities?

Today, most urban spaces are underutilised with regard to their built-up space potential: derelict sites, vacant buildings, spaces used only part time.

An approach aimed at improving the use of existing structures may help curb construction projects. This responds to environmental requirements - carbon footprint reduction, control of soil sealing caused by urban sprawl, adaptation to the depletion of natural resources – while also ensuring adaptation to new uses and needs of populations. Improving the use of built-up areas in the short, medium and long term involves the adoption of new economic models, consistent with the guiding principles of sustainable development.

Many Underutilised Urban Spaces

Against a background of a scarcity of spaces available in the city, and the emergence of environmental issues - fight against climate change and soil sealing, limited natural resources - many urban spaces remain paradoxically underutilised.

The most emblematic examples of this underutilisation are abandoned spaces, as with brownfields or, more generally, spaces left vacant: offices or commercial premises remain vacant, due to a demand that fluctuates with economic conditions and changing working methods, as do many housing units. Failure to use these housing units is a genuine challenge, as supply in this sector is insufficient to meet seemingly abundant demand.

This underutilisation also concerns buildings used below full capacity (schools closed during school holidays, cultural or sports facilities closed or unoccupied after a certain time of day, offices, etc.). This underutilisation is reflected in the use rate, i.e. the portion of time during which the place is used by users.

Vacant urban spaces[1]

11 million
vacant housing units in Europe in 2015

3 million
square metres of offices are vacant out of 55 million square metres in total in the Ile-de-France region in 2017[2]

55%
of towns with a population of less than 10,000 have a commercial vacancy rate of over

10%

3 million
brownfield sites across Europe[3]

3 to 5 years' vacancy
for land and buildings undergoing work, from the date of purchase to the moment work actually starts – and costs of up to

€80,000
per year to maintain these vacant spaces

Underutilisation of buildings and facilities

Use rate of offices range from
30 to 45%

Typical use rate of schools
20%

Typical use rate of school playgrounds
7%

Unused parking spaces in Paris
150,000

There are several reasons for this underutilisation

● **Urban spaces are inherited from the past:** often designed for a specific purpose corresponding with a single use, their transformation has not been anticipated from the beginning.

● **The reuse of these spaces is bound by the following requirements:**

Legal: the legislation governing the design of buildings differs depending on whether said buildings are used as housing units, offices or public access buildings (PAB). As a result, compliance with these rules may hamper the reuse of spaces for other purposes.

Tax-related: taxation schemes are different for offices, shops, PAB and housing units.

Architectural: the distribution of spaces, access to natural light and, more generally, the use of space dictate the shape of buildings depending on their function.

Technical: the design of load-bearing structures and the layout of utilities (water, electricity, ventilation) hinder the modification of an existing place.

● **Stakeholders with various lines of reasoning and very different ways of doing things** can undermine cooperation and complicate the shared comprehension of a long-term common interest. It is therefore necessary to bring these various stakeholders, with sometimes diverging logics, to work together.

- Community
- Associations and Local Initiatives
- Promotion and Development
- Project Coordination and Supervision
- Construction
- Investment and Asset Management
- Running, Operation and Maintenance
- Users

The underutilisation of buildings is all the more problematic as lack of space and its corollaries - housing costs, distances travelled every day, lack of parking spaces, sensation of overcrowding and oppressive density - are regarded by urban users as factors particularly detrimental to their quality of life.

Lastly, this reflection can be extended to our use of public spaces, a significant part of which is dedicated to mobility: is their potential fully achieved to serve the general interest of all users?

In 2014, the number of parking spaces in the EU is estimated to be

440 million
Approximately

2 spaces
for every passenger[4]

[1] Data available on the website of the Banque des territoires
[2] According to IEIF, 2017
[3] European Commission, Remediated sites and brownfields, 2015
[4] QPark, EU Car Parking Market, 09/2014

Urban Sprawl Faced with the Zero Net Land Take Objective

Although numerous spaces remain underutilised in cities, there has been a steady progress of urban sprawl. Expanding city outskirts lead to increased soil sealing. The overall proportion of artificial surface areas has increased by 70% since 1981, when the French population has only grown by 19%: this imbalance shows that urban sprawl is disproportionate in relation to population growth.

Various factors contribute to the acceleration of urban sprawl: improved transportation networks and mobility or appeal of urban regions. These causes include in particular the role of cars, a real paradigm based on which an urban model involving very long distances has developed, as well as the users' strong desire for individual housing units. Individual homes however use up to 15 times more space than apartment buildings. Thus, soil sealing is for the most part linked to the housing sector.

Between 1990 and 2000,

275 HA
of soil were lost per day to soil sealing in the EU[1]

between 2000 and 2006, the average increase in artificial areas in the EU was 3% with figures exceeding

14%
in Cyprus, Ireland and Spain

Between 2000 and 2018, the largest share of arable land consumption (25%), i.e.

6 222KM^2
happened because of growth in economic sites and infrastructure

This soil sealing causes significant environmental damage:

● **Biodiversity:** according to IPBES, soil sealing is a threat to nearly **1 million** plant and animal species.

● **Carbon:** soil sealing increases CO_2 emissions: every year it causes the emission of the equivalent of **4.35 gigatonnes[2]** of CO_2.

● **Environmental degradation:** soil sealing exacerbates flooding and erosion phenomena.

● **Food resilience:** urban sprawl reduces agricultural production areas, pushes farmland further from the cities, thereby affecting the ability to feed the population through local supply chains.

357 KM^2
of farmland lost to soil sealing in France from 2012 to 2016[3]

In addition to these environmental costs associated with urban sprawl, financial costs are incurred by local authorities in charge of roads and transportation: the negative externalities of urban sprawl facilitated by the use of cars have been estimated at €50.5 billion for France by the Dresden University of Technology.

Limiting urban sprawl and soil sealing has therefore become a priority for public and private stakeholders: this consensus is being transposed into the legislation. The European Commission created a roadmap aimed at suppressing any net increase in the surface area of artificialised land by 2050: this is known as the "Zero Net Land Take" objective (ZNLT). The ZNLT objective is embodied in the Limit, Mitigate or Compensate (LMC) sequence:

● **Avoiding** whenever possible the sealing of new agricultural and natural land.

● **Reducing** the use of this land in new development projects.

● **Compensating** the loss of land used nonetheless, through the ecological restoration of other land currently artificialized.

Despite avoidance and reduction targets, it appears that stopping the territorial planning process altogether with a view to preserving soil is out of the question for the moment. The term "net" underlines this distinction and encourages us to consider the notion of ecological compensation – the purpose of compensatory measures is to restore a normal ecological status, not far from an artificialized site.

Consequently, improving the use of vacant or underutilised spaces in the city is fully consistent with the approach dictated by the "Zero Net Land Take" objective: this innovation helps focus on avoidance and reduction objectives.

[1] EEA, Overview of best practices for limiting soil sealing or mitigating its effects in EU-27, 2006
[2] Sylvain Grisot, *Manifeste pour un urbanisme circulaire*
[3] Corine Land Rover cited by Sylvain Grisot, op. cit. p.44

Environmental Impact of Cities and Construction

It is now recognised that global thresholds in terms of loss of biodiversity and depletion of non-renewable natural resources have been exceeded.

Carbon footprint and climate change

Dominique Bourg, philosopher and professor at the University of Lausanne, paints the portrait of Earth where habitability has deteriorated significantly:

"

There is not a single place on Earth where the effects of climate change cannot be observed first hand: melting glaciers; rising sea levels; violence of cyclones and typhoons (…); collapses in the Alps; emerging craters in Siberia due to melting permafrost; heat waves from the Arctic to the Antarctic; heavier rainfall than usual, causing spectacular and devastating floods; sharper rise in average temperatures (…), etc. [1]

"

Dominique Bourg
Philosopher and professor at the University of Lausanne

Rising sea levels potentially affecting human activities and habitations force the territories to reorganise themselves: sea levels could rise by

110 cm
by 2100 if the emissions continue to rise sharply[2].

By combining greenhouse gas emissions (GHG) relating to building construction and renovation activities with those relating to their use, the industry is responsible for 1/3 of national emissions.

Degradation of the environment and natural resources

Depletion of raw materials required by industry. Recovering

1 tonne of copper,
currently requires digging

125 tonnes
of rock – compared with 50 tonnes in 1920[3]

Disappearance of pollinating insects impacting agriculture.

25%
of bees have disappeared in Europe between 1985 and 2005. And in the absence of pollinating insects,

35%
of the world cereal production could disappear[4]

To respond to these challenges, it is becoming necessary to completely rethink our practices in terms of construction, with a view to ecological transition, to reduce the use of these resources and limit the massive carbon impact of the construction industry.

In 2014, some 210 million tonnes of minerals were extracted in the UK, of which
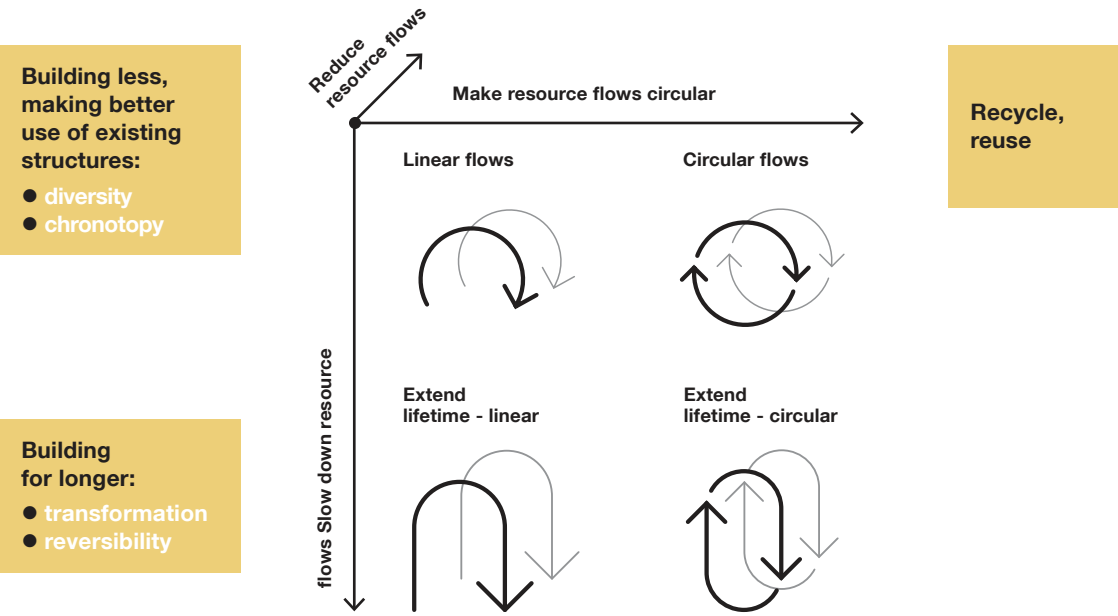
83,8%
were construction materials[5].

---

[1] BOURG Dominique, *De l'économie circulaire à l'économie permacirculaire* in Annales des Mines - Responsabilité et environnement, 2018/1 No. 89, pages 30 to 33
[2] GIEC, Press release, 25/09/2019
[3] Muryel Jacque, *Matières premières : ces pénuries en série qui nous menacent*, Les Echos, 30/06/2015
[4] IPBES, "Summary for policymakers of the thematic assessment on pollinators, pollination and food production", 2016
[5] Ministry of Housing, Communities and Local Government, Mineral extraction in Great Britain 2014, March 2016

To respond to these challenges, building transformations must be envisaged from the design phase and, more importantly, the use of existing built-up areas must improve with a view to curbing construction projects. To check whether new construction is necessary, an in-depth assessment must be carried out. It consists of assessing the need to build, based on the supply of buildings and facilities within the territory, their availability and the corresponding demand for property. This initial verification helps make better use of existing property assets, thus saving the resources necessary for new constructions. This approach is consistent with territorial ecology.

Circular economy and transitioning cities

The principles of the circular economy are largely based on the need to make better use of urban spaces.

Here are three major levers identified to advance an economic sector towards a circular process:

Building less, making better use of existing structures:
● diversity
● chronotopy

Reduce resource flows

Make resource flows circular

Recycle, reuse

Linear flows   Circular flows

Slow down resource flows

Building for longer:
● transformation
● reversibility

Extend lifetime - linear   Extend lifetime - circular

Slowing down resource flows

This lever consists of extending the lifetime of what we produce. In the case of built-up areas, this corresponds with **transformation** and **reversibility** approaches.

Reducing resource flows

This lever consists of minimising the use of resources per product use. In the case of built-up areas, this corresponds with **diversity** and **chronotopy** approaches.

Making resource flows circular

This lever consists of reusing outflows to feed inflows. In the case of built-up areas, this approach means regarding a building or infrastructure at the end of its life as a potential source of resources, reusable components or recyclable materials.

Uses and Needs Are changing

The uses of built-up areas are changing. Our living environments have generally been designed to correspond with the ways of life of their time: this explains in part the current underutilisation of existing buildings, designed based on models adapted to past uses. When these uses change, it becomes necessary to adapt spaces, which can be complex when the construction is very specific.

By way of illustration, changes in working practices can render certain office layouts obsolete; the lifestyle also influences the way of living and therefore housing units. Similarly, our consumption habits bring about major urban changes: convenience stores in city centres have declined in favour of large supermarkets on the outskirts, which are themselves challenged by drive-through and home delivery services.

Changes in households

While there is an increasing number of households in France, they are smaller than before, consisting of **2.2 people on average in 2015, compared with 2.4 in 1999[1].** These transformations result in new housing needs. There are a number of reasons for this change in households:

● **Population growth in France:** 19% increase since the 1980s.

● **Ageing population:** it is primarily the elderly who live alone – this is the case for at least 26% of men and 62% of women aged 80 and over.

● **Changes in family lifestyles:** increase in the number of single-parent families, stepfamilies, young people moving out of the family home later.

Mismatches between urban spaces and practices

As part of the first lockdown in the Spring of 2020, it emerged that housing was no longer exclusively dedicated to the private domain: it also became a space, used by a large part of the population, to educate children who could not go to school, as well as the only place where telework could be carried out. It was also used for sport and all activities normally performed outdoors. The size or configuration of some housing units may have been obstacles to the implementation of these new practices.

In this respect, the lockdown exacerbated well-known housing inequalities. The *Camille Noûs* collective recounts:

> A lot of people develop tactics by taking possession of the space available at certain times of the day: the living room during the day, the kitchen when it is big enough, the balcony, the child's bedroom with the family computer where the father, who works at night, sets up his office during the day while his child is at school, etc. These arrangements, based on alternation between presence and absence of household members, are put to the test when one or more household members suddenly find themselves confined to the home[2].

Similarly, the health crisis has shed light on changes in working practices: offices must reinvent themselves accordingly. Presence in the workplace during the first lockdown plummeted by 56% in France and did not immediately return to normal, thus highlighting the relevance of teleworking[3].

Last but not least, some public spaces seem poorly suited to social distancing requirements and resulting new uses. For example, it appears that preventive measures are more difficult to comply with in some types of public transport: 25% of public transport users in the Île-de-France region interviewed by the "Plus de trains" association said they preferred to use their bicycle at the end of lockdown rather than get back on metros and RER trains[4]. Consequently, the development of public spaces should adapt to this increase in the number of cyclists.

Underlying trends

While the health crisis cast light upon these new uses, these are underlying trends which will become more prominent over the coming years. Emerging trends include in particular a growing demand for proximity: reducing distances travelled - for example being within one kilometre of the infrastructures necessary for well-being - would help improve the users' quality of life. This concept notably resulted in a global campaign launched by the C40 Cities network in July 2020.

"The 15-minute city" according to Carlos Moreno:

The objective of this concept is to give city dwellers what they are lacking: time.

> Feeling good and being with loved ones, first of all, for matters relating to personal well-being. But also social well-being, which consists of being comfortable around our neighbours, work colleagues. Account must also be taken of the notion of well-being within our environment, paying attention to inclusion, social cleavage and ecology. The closer to each other these social functions functions are, the more incremented these three well-being indicators become. With our family, as we have more time to spend with them, with our neighbours by being available, with our colleagues as we are less tired, with the planet as we are more CO2 efficient, etc. That's how the 15-minute city concept was born[5].

[1] INSEE, 2019
[2] C. Noûs, *La covid-19, la guerre et les quartiers populaires,* la Nouvelle Revue du Travail no. 16, 2020
[3] Sébastien Dumoulin, *Confinement: Google publie des données de géolocalisation dans 131 pays,* Les Echos, 03/04/2020
[4] Olivier Razemon, *Comment l'espace public des villes pourrait être réaménagé pour faciliter la distanciation sociale,* Le Monde, 14/04/2020
[5] Carlos Moreno's quotes taken from the article: Marjolaine Koch, *La ville du quart d'heure, ou le village réinventé,* Lettreducadre, 17/02/2020

Shared places to develop social connections

Over the past decades, there has been a growing interest in "shared" places: inhabiting common areas together - "third-places", participatory habitats, shared gardens, common areas of buildings taken over by neighbourhood communities – could help build stronger social connections and encourage diversity initiatives.

The social benefit of these places is apparent in a number of areas:

● **Bringing various stakeholders together around the production of shared representations**

The specific nature of the "third-place", a new type of space that has emerged over the past decade, is due to the configuration of the social interactions therein. The third-place is characterised by its "neutrality", as it does not exclusively relate to the personal, private life in the home (first place), nor does it strictly relate to the professional sphere of the workplace (second place); it is a meeting point for heterogeneous participants. However, the existence of a third place must give rise to a representation. This shared imaginary construct is developed and designed collectively, by participants who share common values.

● **Ensuring new stakeholders discover and adopt best practices**

A distinction is usually made between underground - emerging, experimental practice - and upperground - development of practices by recognised organisations. This division is however qualified by Patrick Cohendet, Professor and Co-Director of the Mosaic Creativity and Innovation hub at HEC Montreal, who points out that the transition of ideas and lifestyles from one social stratum to another is facilitated by a third medium: the "middleground"[1]. This term refers to networks and communities who set up projects inspired by underground practices and ideas, thereby decoding them and making them accessible to major upperground organisations and institutions. Spaces shared and taken over collectively can facilitate interactions between these different levels of organisation.

● **Sharing places to contribute to social innovation**

Lastly, sharing certain places makes them genuine social innovation incubators in a world faced with the need to change. For example, third-places are used to invent and test new practices to overcome uncertainty and future challenges, from our present, while remaining in a safe space. This is how third-places become pioneering microcosms.

Therefore, making better use of existing built-up areas would help adapt to the users' new needs and improve their quality of life, while also enhancing social innovation.

[1] P.Cohendet., D. Grandadam, L. Simon, "The Anatomy of the Creative City", Industry and Innovation, 2010

New Business Models are Emerging

Intensifying the uses of built-up areas also results in inventing new economic models. This is a unique opportunity to come up with an economic model where the three drivers of sustainable development – economic, social, environmental – are no longer opposed but complementary.

This is all the more challenging as property-related costs are substantial expenses for individuals, businesses, local authorities and the State: optimising the uses of existing buildings would therefore help limit unnecessary spending, perhaps even find additional sources of income.

On average, real estate is
the 2nd largest
cost item for businesses

Hybrid Positive-Economy Building (BHEP) concept

Bouygues Construction solution

New economic models can help create a financial, human and societal value. The Hybrid Positive-Economy Building (BHEP) approach developed by the Bouygues Group and supported by ELAN, recognises that the potential of buildings, in the broader sense, are untapped. As a result, the concept identifies six value creation drivers for a hybrid positive-economy building, in the medium to long term:

● **sharing underutilised spaces**

● **optimising uses thanks to the connected building**

● **productivity gains through improved well-being**

● **promoting local and related physical flows to aim for self-sufficiency in terms of water, energy and heat**

● **trading materials with a view to reuse and recycling, by regarding the building as a materials storehouse**

● **promoting positive externalities, e.g. by creating jobs, reducing the urban heat island effect or improving biodiversity**

This approach was awarded the "Solar Impulse Efficient Solution" certification in 2019, as a concept creating opportunities for virtuous economic growth.

"
The BHEP is intended to be a profit-generating property asset, with spaces that can be shared, produce flows automatically, generate multi-user services and are compatible with shared electromobility. Its objective is to move towards maximum energy efficiency in terms of total carbon cost through bioclimatic design, increased intensity of use, the use of reusable and, where possible, bio-based materials, as well as adaptability and reconfiguration.
"

Fabrice Bonnifet
Sustainable Development and QSE Director, Bouygues Group, Chairman of C3D

Another way of exploring urban studies and real estate: the productivity of the built environment

To approach real estate from a different angle and through the prism of uses, the notion of "productivity of built-up areas" can be used. This notion is defined as the ratio of the quantity of use produced to the quantity of resources mobilised for its construction (natural, land or capital resources). This ratio is presented below.

$$\text{Productivity of the built-up space} = \frac{\boxed{\text{Quantity of use produced}} \quad \bullet \text{ Number of hours of use (work, classes, etc.)}}{\boxed{\text{Quantity of resources mobilised}} \quad \bullet \text{ Raw materials, energy, water, land, etc.}}$$

This notion encourages us to work towards a better productivity of built-up spaces in two different ways:

● **by increasing their use:** intensifying the use of the place, opening it to wider user categories through sharing, reversibility;

● **by reducing the amount of resources used:** use of existing structures, raising awareness, sobriety in the volumes of material used, longer life span.

3 questions for

Xavier Gauvin
Bouygues Construction and CEA Minatec Ideas Lab

Where did this idea of productivity of built-up spaces come from?

The agronomy sector uses the term "agricultural productivity": we measure what we produce - for example the amount of wheat - divided by the resource mobilised - i.e. the surface area of the field. Similarly, the industrial sector defines productivity as the ratio of production added value to the production factors implemented to achieve this added value. This makes it possible to measure the productivity of assets, capital, labour, etc. Why not adapt this concept to buildings?

So how can we define added value and the production factor?

Added value is how the built-up space is used, for example the number of training hours provided to students, the number of care procedures carried out or patients treated and, more generally, the time spent in this space. The production factor is made up of the resources used to build the built-up space: land, various materials incorporated in the structure, bit also energy, water and the construction and operation phase.

How can we measure the productivity of a building?

It all depends on the function of the building and measurement choices: for a school, for example, we could measure the number of pupils or the number of teaching hours, divided by the weight of materials used for construction. For offices, we could measure the number of working hours divided by the weight of the building's materials. Then we could compare the productivity of an office building with that of another by saying: "This building produces 200 working hours per tonne of material used in the structure!", based on which its environmental performance can be inferred and compared with the value produced: its use!

Different Time Scales

Working towards a better use of built-up areas encourages us to consider different time scales: taking the short, medium and long terms into account allows urban transition initiatives to become genuine drivers of territorial resilience.

What is territorial resilience?
Resilience is the ability for a territory (and all its components: residents, institutions, infrastructures, businesses, flows, networks) to keep operating independently of major shocks to which it may be subjected, by reducing chronic, everyday stress, a latent phenomenon that affects its operational capability.

Short term

Long term

Adapt
to changing needs

Be prepared
for the uses of an uncertain future
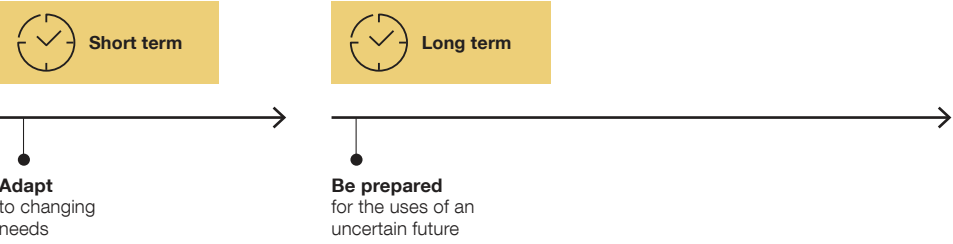
● **In the short term,** during immediate crisis management, blending the uses of an urban space makes it possible to adapt under duress and when faced with an exceptional situation.

● **In the medium and long term,** anticipating possible changes in needs, spaces and how they are used paves the way for the adaptation to sometimes unpredictable future events, relating to climate change, socio-economic shocks, geopolitical conflicts, health risks, etc.

An exceptional crisis which sheds new light on these considerations: COVID-19, lockdown and physical distancing

● **Physical distancing has underscored the need to make better use of existing structures:** lack of space in some housing units seems to painfully contrast with other housing units emptied of their occupants, as well as offices adjacent to these units which were hardly used during the lockdown period.

● **The environmental imperative is emphasised by the pandemic:** environmental degradation contributes to health crises and should result in further disasters of various kinds, just as serious and increasingly frequent.

● **Furthermore, this crisis has cast light on new practices,** for example blending uses of our homes: children's education, telework, sport, leisure, etc., and new needs (introducing production and supply logistics functions in the city), prompting us more than ever to reinvent how we use our cities, our neighbourhoods, our buildings, our homes, etc.

● **Lastly, this crisis reminds us of the existence of unpredictable events and the need to adapt thereto.** It encourages us to prepare our living spaces to facilitate future adaptation to an uncertain world.

Sylvain Grisot
Urban planner, Founder of the dixit.net agency Adjunct lecturer at IGARUN, University of Nantes
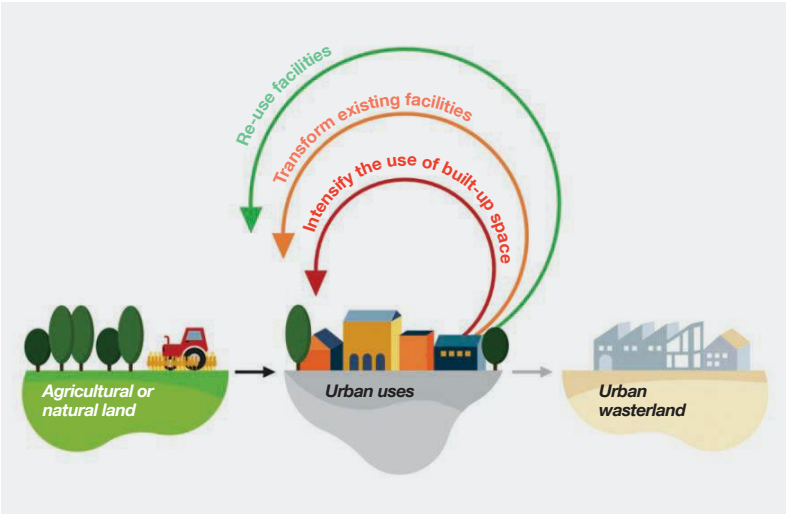

In your latest book[1] you paint a fairly gloomy picture of the prevailing urban development model. Where does the city currently stand?

My approach is based on the study of urban sprawl and soil sealing, and results in a comprehensive observation: the basic failure of the urban development process. We now know how to build new constructions on neutral, essentially agricultural land, and we have effectively industrialised this process. Our current construction methods are extremely intensive in terms of soil, energy and materials. Urban sprawl is linked to automobile development as a whole: while it is made possible by car journeys, it also induces car dependency. In fact, our oil dependence, immediate environmental impact and social fragility are intensifying.

Another key point is that today, we fail to identify the need, to ask "why" before wondering "how" a project should be undertaken. Numerous needs could be addressed by work which does not require the use of soil: through urban densification and renewal processes, perhaps even recycling processes, and by working on existing buildings. More than 60% of individual housing units are considered significantly under-occupied by INSEE. Households find themselves alone in oversized housing units, on oversized plots of land, often located far from the centre of town. It is quite clear that these are forms of obsolescence linked to a programme which, albeit legitimate at the time, is no longer viable, hence the importance of scalability.

Among the consequences of this state of affairs, you mention social segregation. How is generational fragmentation apparent in our cities at the moment?

In several so-called attractive cities, the production of new housing units, in particular privately rented, is not keeping up with the influx of new populations. This lack of supply compared with demand causes prices to soar, which effectively results in the eviction of households to the outskirts of the city centre and the metropolis. The heart of France's major cities is not welcoming for young children and their parents, whether in terms of services or space. Families are somewhat neglected by the housing supply, and public spaces are dangerous for children. Of course, some encouraging efforts have been made in terms of mobility and bicycles, schoolyards, etc., but these are partial efforts and it is necessary to go further by focusing on the supply of adapted and affordable housing, while aiming for attractive and diverse urban structures.

Re-use facilities
Transform existing facilities
Intensify the use of built-up space

Agricultural or natural land — *Urban uses* — *Urban wasterland*

[1]Sylvain Grisot, *Manifeste pour un urbanisme circulaire,* Dixit.net, 2020

> **You cannot change a system by gently moving the lines: you need to branch out into a different model.**

You also mention another consequence of urban sprawl: its exorbitant cost in the long term for local authorities. Why are they struggling to take into account the long-term consequences of this urban planning choice?

This difficulty is essentially due to the difficulty in anticipating and estimating the maintenance, operating but also service provision costs, which are not included in the developer's equation. Municipalities think primarily in terms of investment costs and fail to realise that economies of scale are lost in sparsely populated territories. For example, to extend networks, we neglected the maintenance of primary utilities which require heavy maintenance operations. This direct cost of urban sprawl is a ticking time bomb for municipalities as this work will have to be carried out sooner or later. Another indirect effect of automobile hypermobility is the health expenditure induced by pollution, etc. The cost of urban sprawl is higher than we think.

And yet we have the resources to make better use of existing structures rather than continue to build more. Why is the short term neglected in urban planning?

The time dimension is neglected in the planning process because the short term is, by its very nature, a time for managers, not for projects. It is complex, intangible, raises organisational and management issues, such as access rights and the insurance of spaces shared between several types of users. For example, Mab'lab is a co-working space operational in the Crous Mabillon university restaurant in Paris outside meal times. The Crous is not qualified to manage this space outside meal times, which is why they have called upon a third party, with all the complexities that this entails.

To get back to the long term, how could we facilitate the transformation of existing structures in the future?

There are three issues. Firstly, the knowledge issue: elected officials must be informed of the use and occupancy rates of public spaces and buildings. Local authorities should also be made aware of the densification capacity of their territory, whether underutilised housing units or industrial estates on the outskirts that can be densified. Secondly, the competence issue, with expertise in specific trades and the ability to undertake complex projects. Lastly, the organisation of the project process, in particular operations on existing structures, which require a greater level of dialogue between the numerous parties involved.

To conclude, is there anything else you wish to mention about this transition?

There is a notion of alert, and an urgent need to take action. You cannot change a system by gently moving the lines: you need to branch out into a different model. There is still a long road ahead to build the city. We are already living in the city of 2030; we have begun to design the city of 2050.

Future Plans
for Transitioning Cities

Public spaces

Buildings

Urban projects

The environmental, social and economic issues of our times prompt us to engage cities, neighbourhoods, public spaces and buildings in a transition intended to make better use of their spaces. How should this be done? Which practical initiatives help respond to this paradigm shift? New, very diverse approaches are emerging to make better use of urban spaces. We review a wide array of initiatives and solutions that are emerging across the world, using four major drivers:

TRANSFORMATION

Definition

The term transformation encompasses **approaches aimed at adapting existing places for new uses,** different from their original function, or for new user profiles.
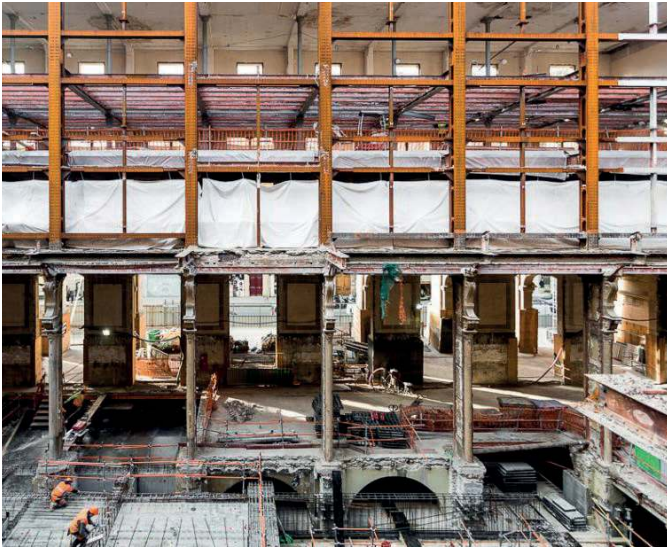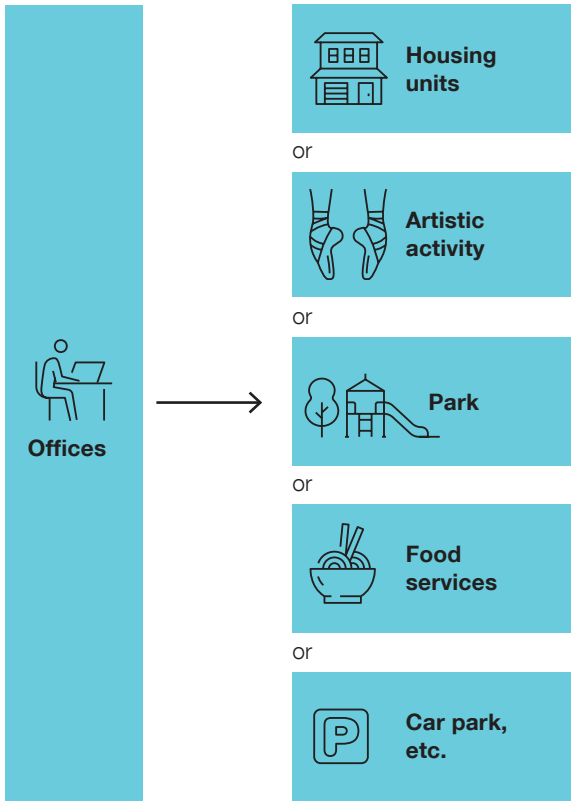
Useful concept

● **Transformation effort rate:** ratio of transformation cost to the initial building construction cost.

Example

A building cost €10 million to build. It is no longer adapted to new uses: a major overhaul is estimated at **€11 million,** i.e. a **110%** effort rate, whereas light renovation would cost **€3 million,** i.e. a **30%** transformation effort rate.

Key idea

Developments that do not meet or no longer meet requirements are not inevitable.

A building the initial use of which is no longer relevant, a poorly designed public space, a deserted area or a place that has not been designed to host any activities (underutilised car parks, roofs, etc.) can be transformed to accommodate new uses.

Offices →

- **Housing units**
  or
- **Artistic activity**
  or
- **Park**
  or
- **Food services**
  or
- **Car park, etc.**

● **Depending on the spatial organisation of the place and the intended uses, this transformation may often require conversion work or simply renewing street furniture or furnishings.**

Benefits

● **Adapting to new needs**
The territory where a building, public space or urban project is located changes over time: its economic, social and environmental parameters are altered and form a context to which certain uses of existing spaces are no longer suited. In addition to this local context, the evolution of society as a whole affects the needs: transforming a place helps make it more relevant to this new context.

● **Prioritising heritage and recounting the history of the place**
The form of buildings and public spaces carries the history of their construction and successive uses. Keeping track of these forms helps showcase fragments of this history and therefore keep records of former uses. This adds meaning to the place and creates connections with the past.

● **Regenerating spaces**
By focusing on vacant or neglected spaces, transformation drives localised revitalisation at neighbourhood level. This revival creates social momentum in the transformed space, which goes hand in hand with economic and institutional dynamics (meeting of entities), beneficial to surrounding areas.

● **Increasing proximity / reducing mobility requirements**
Newcomers to an already urbanised territory benefit from the vicinity of facilities, public services, shops and activities of all kinds. Integration is made easier and quicker by the fact that all these elements are already present in the territory.
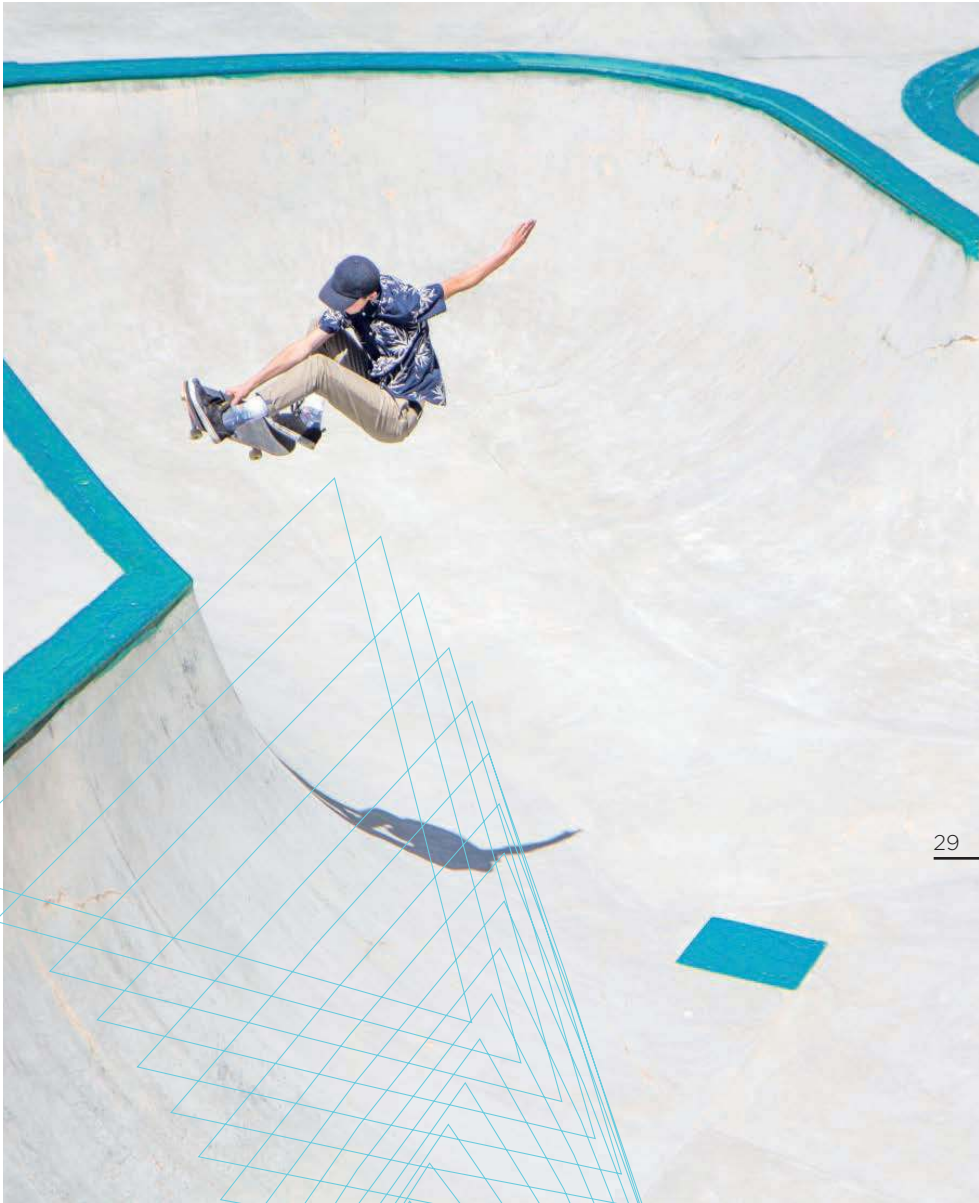
Converting Existing Structures

Over the life cycle of a building, as it is repaired and renovated, certain aspects of its form and operation change gradually, but its use often largely remains the same. All around the building however, the economy of the territory changes, as do social relations and needs. And then one day, the use for which the building was designed no longer meets the requirements. Conversion is a way of upgrading the form of the building from time to time to adapt it to these new uses.

The service sector is particularly concerned by conversions: declining needs for offices and the relocation of offices within major cities encourage the rehabilitation of these spaces.

The objective is to develop housing units in spaces which were initially intended for work, which can turn out to be complex. Industrial spaces are another type of building largely concerned by conversions. Their large volumes offer opportunities paving the way for conversions into cultural centres, convivial places and occasionally housing units.

These conversions require modifying the layout of spaces, in a way that varies depending on the extent of the change in use and the initial form of the building. This can involve major works and costly restructuring operations. Minor work is rarely sufficient. Examples of this include the Palais de Tokyo, which was transformed for moderate costs, by enhancing the raw aspect of the premises. From a legal perspective, building transformations can be subject to a sale of a building to be renovated, whereby the seller of an existing building makes a commitment to the buyer to carry out work within a given timeframe.

Conversion of offices into housing units

Le Colorama

Bouygues Construction reference

This originally tertiary building belonging to EDF was converted into a residential building in 2016-2017, including 67 housing units (upgradable for the elderly, assisted housing) and a sales office on the ground floor. The load-bearing structure was reinforced, balconies were added on the façade for every housing unit, and the building was insulated on the inside.

Colorama residence, Nîmes. Project owner: LinkCity. Architects: Duval Architectes. General contractor: Bouygues Construction

Rue de Mouzaïa

The property complex of Rue de Mouzaïa has had several lives: no. 66 was designed as a manufacturing plant for Athos sewing machines, while the office building at no. 58 was a blueprint for brutalist architecture by Claude Parent and André Remondet. In the early 2010s, the complex was home to an art squat and an emergency accommodation centre. In 2015, *Régie Immobilière de la Ville de Paris* (Property management department of the city of Paris) initiated work to create housing units for students and young workers, artists' workshops and a coworking space, while preserving the specific architectural features associated with the buildings' history.

58-66 Rue de Mouzaïa, Paris (19th arrondissement) Régie Immobilière de la Ville de Paris. Architects: CANAL architecture

Temporary occupation for social purposes

Unity Cube, temporary occupation of vacant buildings

The Unity Cube association has designed and developed emergency accommodation solutions since 2016. Its activities include assisting individuals and local authorities, assessing the potential of spaces and setting up projects. The use of modular technologies is instrumental in the association's research and achievements. For example, in 2019 Unity Cube worked on three floors of a former office building left vacant, located Boulevard Blanqui, to accommodate 31 people for 12 months in housing units consisting of individual bedrooms with communal areas.

Paris Nord humanitarian centre

This former SNCF warehouse was temporarily converted into a 400-bed migrant reception centre from 2016 to 2018. It was organised into districts with bedrooms and bathroom facilities, a canteen and a recreational area. An inflatable circular structure was used as a reception point.

Porte de la Chapelle, Paris. Architect: Julien Beller. Project owner: Emmaüs Solidarité

Emblematic transformations

Gasholders

Four former gasholders, with a height of 70m and a diameter of 60m, shut down in 1994 and underwent major rehabilitation, which was completed in 2001. Housing units, shops and recreational areas now occupy freed spaces in this unique architecture, where façades and parts of the roof were preserved.

Gasholders, Vienna, Austria. Architects: Jean Nouvel (Gasholder A), Coop-Himmelb(l)au (Gasholder B), Manfred Wehdorn (Gasholder C) and Wilhelm Holzbauer (Gasholder D)

Church-bookshop

An abandoned church in Maastricht served as a warehouse, boxing ring, car dealership and bicycle storage, before it was converted into a bookshop in 2005. For this purpose, the architects made the most of the height of this building to install a two-level structure giving access to rows of books. The choir and the ambulatory were converted into a reading room and tea room.

Selexyz Dominicanen Maastricht, Netherlands. Architects: Merkx + Girod

Reviving Derelict Sites

Abandoned buildings and land are legion, whether this is because industrial and military sites have closed for economic or political reasons, or hospital, administrative or logistical complexes have moved to the outskirts of cities. The space to be transformed includes buildings that have to be dealt with. The challenge with numerous renovations is to showcase and sometimes protect the historical architectural or industrial heritage, while reintegrating it into the life of today's cities.

On sites that are often vast and sometimes left abandoned for a long time, the challenge is to rehabilitate the wastelands in such a way that the public wants to take ownership of the sites. In other words, the objective is to facilitate the creation of a sense of community. Ephemeral urbanism can be a means of creating activity and helping to make the place discoverable to future residents and potential visitors alike. Although plans for the rehabilitation of derelict sites are sometimes defined as soon as the original sites are closed, the time required for their design can leave space for temporary occupation, in which a mix of uses, audiences and functions are created. Ephemeral urbanism projects developed in these derelict areas often overcome their temporary nature and turn into more sustainable projects. An example of this was Grands Voisins, the temporary occupation of the former Saint-Vincent de Paul hospital in Paris, from 2015 to 2020.

Prioritising existing structures in a new neighbourhood

La Maillerie

Bouygues Construction reference

Before its conversion (the development permit application was submitted in 2017), the site was dedicated to the textile industry and, later, to the logistics of the Les 3 Suisses group. One of its former warehouses, known as the "Compact building", was converted to include shops, a silo car park, offices and an urban rooftop farm.

A Project House was integrated into the site's former brick buildings and is home to associations and participants in the social and inclusive economy, local concierge services, an exhibition dedicated to the site's history, etc. These traces of the site's past are in keeping with a large-scale mixed-use neighbourhood project, which provides great scope for innovation: circular economy and local reuse of the site's materials, material "consignment" system, social (new types of interaction between residents and local players) and urban experiments (urban agriculture), etc.

La Maillerie, Villeneuve d'Ascq. Project owners: LinkCity, Nodi. Architect: Nicolas Michelin & Associés

---

"It's always easier, from a strictly engineering point of view, to wipe the slate clean and build new structures, except that the end result is not the same. I feel that, when people who used to work in the "Compact" building discover the market square, the hanging gardens or the car park we intend to create, they will recognise the volumes, posts, ceilings and the environment they used to work in[1].

Benoît Gérardin
Director, LinkCity Nord-Est
about the La Maillerie project - see opposite page

[1] Interview conducted by Marie-Jeanne Delepaul, *Le chantier de la Maillerie fait le pari du "zéro déchet"*, France Bleu Nord 7/05/2018

Ephemeral urbanism as a tool

Ephemeral urbanism is a temporary or short-lived approach which contributes to the long-term transformation of an urban project. Ephemeral urbanism makes it possible, through temporary occupation, to make use of a place during the transition period, and to anticipate, if not participate in the planning of future urban projects.

Improving public space
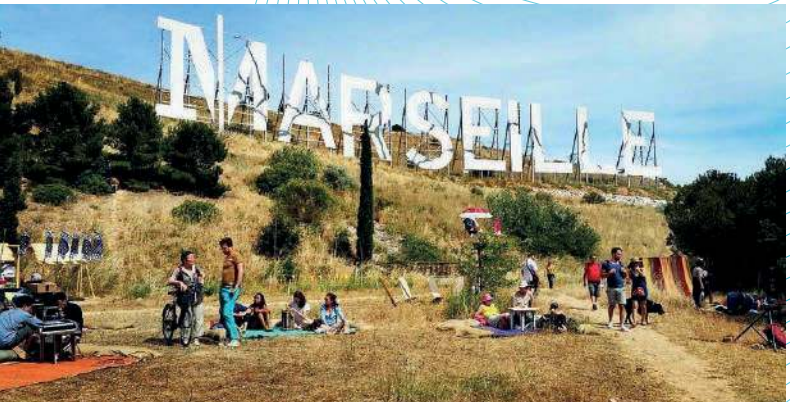
Foresta

Having become derelict, the Foresta area in Marseille has been subject to an eight-year occupancy agreement since 2018. It is being converted into a metropolitan park, a recreational but also local production area. Facilities are currently being built (hamlet, farm, clay ovens, etc.).

Foresta, Marseille.
Organisers: Yes We Camp, Résiliance, Coopérative Hôtel du Nord

Livening up a place through art and culture

La Belle-de-Mai

This former derelict site has become one of Marseille's major cultural institutions. Since 1992, over 45,000 m² of floor space, concert venues and exhibition halls, food courts, a bookshop, a nursery and, more generally, public spaces such as skateparks or playgrounds have been developed. The collective project was consolidated in 2002 and played an important role in the planning of 2013 when Marseille was European Capital of Culture.

Friche La Belle-de-Mai, Marseille

Plantage 9

In a former derelict textile factory, around thirty cultural initiatives were launched and resulted in the occupation of the premises before a factory transformation project. This helped get local residents on board and give Bremen a new image as a dynamic city, no longer a passive victim of deindustrialisation.

Plantage 9, Bremen (Allemagne)
ZwischeZeitZentrale (ZZZ)

Derelict sites as a place to live

Young project

Approximately 1,500 m² of offices and studios are being converted for 22 months in a former industrial municipal building of Montreal, and made available to cultural associations, artists and social entrepreneurs in need of vast spaces. This pilot project is the first of ten ephemeral urbanism projects, as part of a public-private partnership. A call for applications was made a few months before the inauguration of the project to find project initiators to take over the premises.

Young project, Montreal. McConnell Foundation, Entremise, Maison de l'Innovation Sociale

Espace Darwin

Since 2009, this former derelict barracks has been home to a very attractive Third Place: gardens and permaculture vegetable gardens, indoor skatepark, market hall, community spaces and cultural events. The Darwin project, initially intended to be temporary is a well-established local ecosystem, fighting for sustainability and aiming for the long-term development of the barracks and surrounding areas.

Espace Darwin, Bordeaux

4 questions for

Lauren Andres
Urban planner, Associate Professor,
Barlett School of Planning (University College London)

" Ephemeral developments have an impact on the property value but also on the symbolic value of the land. "

What is the context and what are the major issues transitional urban spaces are currently faced with, more specifically derelict sites?

I noticed a change in ephemeral urbanism on derelict sites. Fifteen years ago, ephemeral structures usually took the form of squats and citizens' initiatives. They were usually viewed negatively by local authorities and landowners, as an obstacle to a development project. Progressively, under pressure from increasingly scarce land and the residents' desire to access these spaces, empty urban areas have become an asset in the city's development; the temporary occupation of derelict sites have become the norm, as illustrated by current initiatives of a public entity such as SNCF in its former train stations and warehouses. Some contractors and developers view ephemeral structures as a way of supporting the urban project, by getting residents on board and creating activities on sites, from an early stage, as soon as the transformation process has been initiated. As a result, the sector has become more professional in the past ten years with the emergence of specialised operators.

It seems that there are more and more of these ephemeral urbanism operations. How do you explain this fad? What were the contributing political and social factors?

It is clearly a fad on the part of developers and policy-makers. It relates to a sort of return to the local level, with the idea of the "city for its residents" and the creativity and innovation resulting from the ephemeral nature. There is also an economic and financial aspect as ephemeral developments have an impact on the property value but also on the symbolic value of the land. It appears that certain difficult urban contexts benefit from the progressive transformation of a territory's image, and temporary structures have a positive impact as they gradually and flexibly invigorate a neglected space through its new uses. The fad on the part of developers and owners is also due to the fact that uses are changing so fast that ephemeral structures are becoming necessary to test and determine whether a type of use can work: it allows for changing uses and urban adaptability. All the more so, in my opinion, in light of the pandemic we have just experienced and the enhanced need for spatial adaptability.

What are the different international approaches to ephemeral urbanism?

In Europe, Berlin was the leading city on this matter for a long time. It characterises the evolution of the temporary occupation model, which initially started with spontaneous or alternative developments and moved towards a strategic and institutional vision (urban marketing) - for example, the Tacheles squat. Secondly, a diversity of approaches is observed: "shrinking cities" such as Detroit or Leipzig, where temporary structures have a more symbolic dimension, because there is a lot more space available, or major cities where land is scarce and the purpose of temporary facilities is to take advantage of the market value of vacant space. In London for example, a genuine temporary occupation market, based on container projects, was created with the "Boxparks". A similar approach to temporary structures can be found in developing countries. In Sao Paulo (Brazil) or Santiago (Chile) for example, the role of temporary and ephemeral structures is fairly similar to Europe, as they create a bond between people from different social backgrounds.

Does the ephemeral urbanism model have its limitations?

With ephemeral urbanism comes a risk of gentrification: the increase in value can ultimately be detrimental to the social diversity of the neighbourhood. The other problem is the emergence of more superficial temporary urbanism operations: when no thought is given to the influence of temporary occupation on the territorial project, the impact of the operation is very limited. All ephemeral urbanism operations should be guided by a strategy in order to be relevant and have positive effects on all those concerned.

Using Forgotten Areas

The urban fabric features underutilised and less desirable spaces: underground car parks rendered obsolete by the ban on the use of cars in some areas, abandoned basements intended for logistics activities, flat roofs with no planned use, underused public spaces.

While these spaces represent a cost (maintenance, security, etc.) for the owners and managers, they can also be a valuable resource in the heart of major cities. Their specific constraints (low light conditions, tight space, limited traffic, equipment) can turn into opportunities for other activities!

Shops, association offices, urban dams or even logistics spaces are developing as a result of the census of these neglected urban areas and the identification of both the activities most likely to develop there and the partnerships to be formed between owners or managers and future occupants. This was illustrated by the Paris City Council with the launch of the *Réinventer Paris 2* call for innovative urban projects, where 34 underground sites (road tunnels, car parks, petrol or metro stations, industrial infrastructures) were proposed.

2 million m²
of floor space in underground car parks under public roads in Paris[1]

There are around

700 green roofs
in central London[2],

which is the equivalent of

25 football pitches

Car parks and basements

Carpark Futures

A study conducted by DPA-X on behalf of the Indigo group highlights the transformation potential of underground car parks insofar as these spaces are viewed as "resourceful places" in a world where "urbanism is firmly rooted". Scenarios on the future use of car parks as spaces made available to users have been devised in various urban contexts. They outline the programmes they could host, as well as the obstacles encountered[1].

Carpark Futures study: Opportunities in the underground, DPA-X


La Caverne

As part of the Parisculteurs call for projects of the Paris City Council (intended for revegetation projects in Paris), social housing provider ICF La Sablière proposed an abandoned site: a 3,500 m2 underground car park located under a block of 300 council flats. This is where, in late 2017, the Cycloponics start-up company installed an underground urban farm called *La Caverne,* where organic food products are grown using LED lighting (microgreens) or in the dark (mushrooms and endives). Parking spaces were converted into mushroom beds where oyster, shiitake and button mushrooms grow on a substrate based on coffee grounds and residue from Parisian micro-breweries. The start-up company is a member of local direct sales networks in food co-ops, and also sells directly to individuals via bicycle deliveries. Since the call for projects, Cycloponics has moved into new sites which should open to the public in 2020, in Paris, Lyon and Bordeaux, as a result of fundraising operations.

26, rue Raymond Queneau (Paris 18th *arrondissement,* porte de la Chapelle).
IFC La Sablière / Cycloponics
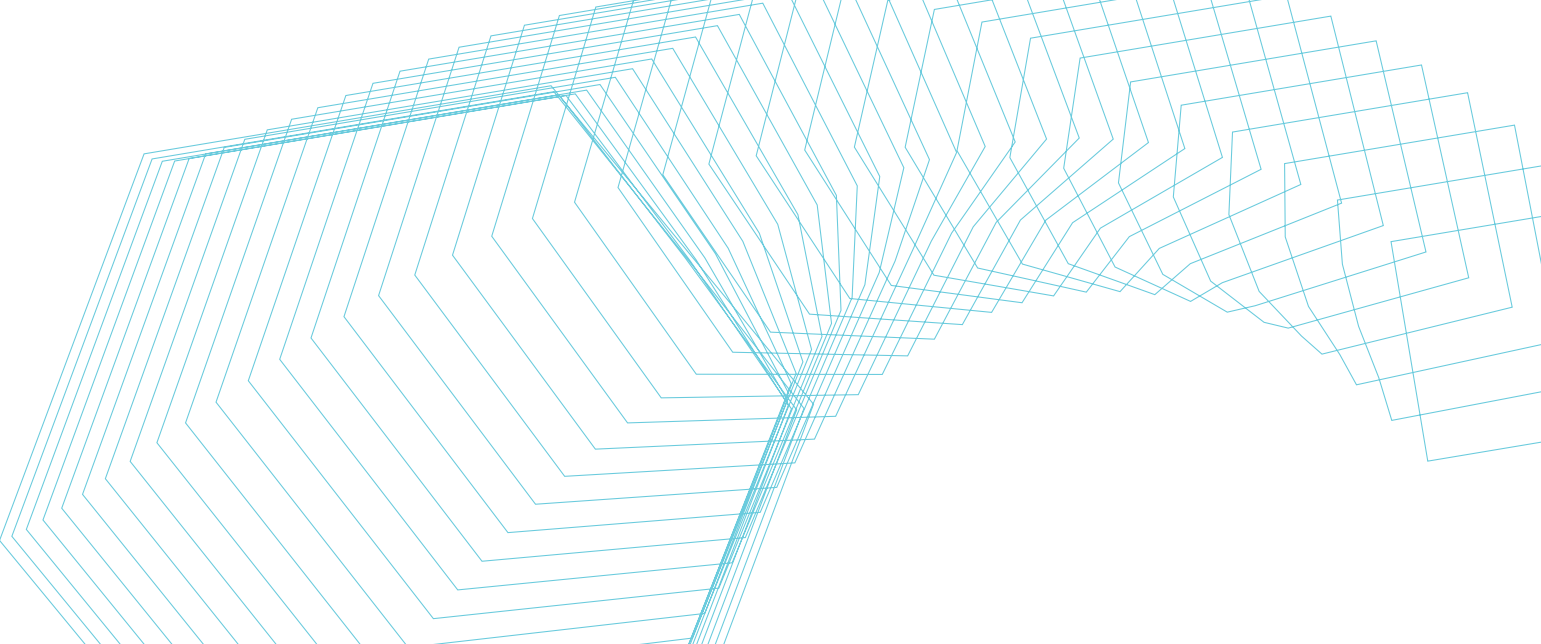
Le Terminus - Croix Rouge

**Winner of *Réinventer Paris 2* call for projects, the Terminus will take over a former metro station, Croix-Rouge, which has been closed to the public since 1939. Its central location from the heart of Paris will attract visitors eager for a gourmet experience in 2022.
The platforms will host various food courts, like a gourmet hall.**

Croix Rouge station - Metro line 10 (Paris 6th *arrondissement*, rue du Four).
Project owner: Novaxia. Architect: SAME

Peckham Levels

Seven storeys of a former supermarket car park were converted into a place to live for local residents. The architects worked on planning, with a view to fostering exchanges between visitors and artists. In particular, they feature food courts and play areas open to the public, artists' workshops, cultural events (concerts, art gallery), etc.

Peckham Levels, London.
Architects: Carl Turner Architects

[1] Carpark Futures, Opportunities in the Underground, DPA-X for Indigo Group, 2020
[2] The green roof Map, produced by GLA and the Green Roof Consultancy, 2014

The viewpoint of

Damien Antoni

Architect, co-founder
of Syvil

By definition, neglected urban spaces are unused. However, planning these forgotten spaces contributes to creating usage, architectural, urban and therefore economic value. These plans can be similar to what already exists, such as mobility services, or other forms of planning such as production (urban agriculture, object production or repair, etc.), food laboratories, recreational areas (table tennis, arms room, escape game), etc.

Urban logistics and distribution are an underlying trend arising from a growing need for distributions in the city centre. The first example dates back to 2013 during the conversion of a Beaugrenelle car park in the centre of Paris. We are now working on numerous logistics or storage projects. We have also begun to explore ground floor activities and how they can be linked to underground levels, perhaps by integrating the basement or mezzanine to host productive functions for example.

To undertake these projects, a number of barriers have to be removed: technical, regulatory (as work is carried out on existing buildings and sometimes under structures), land-related, legal and programmatic, with regard to the low rental value of the space or constraints in terms of height, operating costs, access and exposure to natural sunlight. I believe the processes involve in the setting up of these projects should be streamlined, and the legislation should be adapted, to be less general and aim for a case-by-case approach.

Reintroducing production into the city

The desire for greater proximity, the questioning of urban sprawl and the growing awareness of the dependence of cities on increasingly long supply chains have given rise to projects aimed at rebalancing the distribution of urban functions between the cities and their outskirts. Hence the launch of many projects with the aim of transforming an existing space so that it can adopt a "productive" function:

● Urban agriculture is booming and is generally implemented on the roofs of residential buildings, or iconic buildings, but also underground where specific products are grown. In 2020, Europe's largest urban farm was set up on the roof of one of the halls of the Paris Exhibition Centre.

● New forms of artisan production sites are emerging, such as "ICI Marseille", a space integrated into the Fabriques project led by Bouygues Construction/LinkCity (see page 76), where workshops are shared to promote the exchange of knowledge among professionals. The development of FabLabs in city centres also has the aim of sharing knowledge, with a focus on design and manufacturing.

● This trend also applies to logistics, which emerged as a vital function during the COVID-19 crisis and is already affected by a major trend: the growth of e-commerce, which currently accounts for 8% of the retail sector, up 12%-15% per year. In particular, these projects include the Sogaris logistics space, built under a road bridge in Paris' Porte de Pantin, in an underused area.

¹6-t

Roofs

Park'n'Play

A children's playground was created on top of this car park building in Copenhagen. Accessible via two external staircases on the façade of the building, this 24-metre high public facility offers amazing views of the city, port and Øresund strait.

Konditaget Lüders, Copenhagen. JAJA Architects

CultiCime

CultiCime is an urban vegetable garden created on the roof of the Fashion shopping centre. The Espaces association is in charge of its development, using an approach that combines agriculture with social concerns. Five people work on the site, three of whom under a job training contract. Crop development includes home-made manure and composts, mulching and net fabric, over 1,500 m², as well as 38 varieties of vegetables.

CultiCime, Aubervilliers. Association Espace, Aubervilliers Fashion Center

Neglected urban spaces

The Cascade Project

An ordinary staircase in the streets of Hong Kong was converted into a dynamic and attractive public space. A sculpture mirrors the shape of the steps and provides shaded seating. At night, an integrated lighting system livens up the site and creates a sense of security.

The Cascade Project, Hong Kong. Edge Design

Urban distribution space

A vast, steep-sided area under a suspended section of the Paris ring road was transformed into an urban logistics area, serving as a link between major logisticshubs (Rungis and Arras) and Paris stores.

See "viewpoint of Sonia Samadi", Director of development and innovation at Sogaris (page 67). Sogaris, Porte de Pantin. SYVIL Architectures du Système Ville

Densification: Striking the Right Balance

To combat soil sealing while addressing population growth in some territories affected by a lack of housing units, offices and facilities, already urbanised land must sometimes be densified: this involves questioning our relationship with density. It can be a good thing: it brings populations closer to existing utilities, waste management or transport services.

However, density is often perceived negatively. In 2020, an observatory of the uses and representations of the territories[1] revealed that 40% of French people were unhappy with the density of their living environment. 28% of French people feel their municipality is "a little too" or "far too" dense[2] in terms of population density. The term frightens people, and wrongly so, points out Sylvain Grisot, urban planner:
"Increasing density does not mean turning regional cities into Paris after Haussmann's renovation, or building tower blocks everywhere"[3]. In addition, too low a density is also perceived negatively: 12% of French people feel that their municipality is too empty[4].

There are several approaches to densification: Grouping together a larger built-up area in the same space (building density) or more population (population density). To go even further, rather than measuring population density or built-up density, one can imagine that a more accurate measurement of the actual use of urban spaces would make it possible, in the future, to determine the density of uses of a given space.

- **Population density:** number of inhabitants per unit of area, generally one square kilometre[5]

- **Built-up density:** ratio of built-up area to land area[6]

- **Density of uses:** actual use of a given space per unit of area (experimental concept difficult to measure)

As part of the transformation of a neighbourhood to make it denser, solutions are available to make density more pleasant, by eliminating the sense of crowding which often comes with it.

This involves for example higher-quality built-up areas, which are not overlooked, to reduce visual clutter; including vegetation to bring a fresh note and please the eye; with public spaces designed to create a quiet atmosphere in places and liven things up in others.

Regulations

The withdrawal of the maximum floor area ratio since the ALUR law[7] of 2014 made it possible to increase the floor area on a plot of land and, as a result, the number of floors, as permitted by the PLU's (local urban development plan) rules in terms of volumes.

Densifying up : raised structures

Les Piaules
Bouygues Construction reference

By raising an existing supermarket, LinkCity built a multi-storey youth hostel, wit a bar-restaurant on the rooftop that offers a panoramic view of Place de la Nation. The wood joinery and structure blend in with the built environment.

Place de la Nation, Paris. LinkCity.
Architects: JBMN Architectes, Architecture Pelegrin.
Hostel management: Just Like Home

Alex Monroe Studio

In central London, three contemporary floors have been erected on top of a renowned jeweller's shop on the ground floor. In addition to the shop, this mixed-use building hosts the workshop, a recreation room and a roof terrace accessible to employees. All functions, from production to sale, are now under the same roof.

Alex Monroe Studio, London. Architects: DSDHA

[1] ObSoCo / Chronos / ADEME / Banque des Territoires / Bouygues Construction / La Poste, Observatory of the uses and representations of the territories, 2020
[2] ibid
[3] Sylvain GRISOT, *Manifeste pour un urbanisme circulaire,* Dixit.net, 2020, p.117
[4] ObSoCo / Chronos / ADEME / Banque des Territoires / Bouygues Construction / La Poste, Observatory of the uses and representations of the territories, 2020
[5] CNRTL definition
[6] *Référentiel de densités et de formes urbaines,* Institute for Urban Planning and Development of the Île-de-France region
[7] Except on land use plans (P.O.S.) still in force

Densifying down: underground structures

The city-State of Singapore has a very limited territory but needs space to improve the quality and vitality of the City.

After building many polders in the late 20th century, the urban development strategy, which covers the period until 2030, focuses on the city's basements, used for activities that do not require a major human presence as a priority, to ensure the largest number of people enjoy natural sunlight.

Jurong Rock Caverns

Since 2015, oil products have been stored in five man-made caverns, 150 metres below Jurong Island. Petrochemical companies can rent these tanks with a capacity of 1.5 million cubic metres to store their oil stocks without encroaching on open air areas, which are therefore used for other activities as a priority.

Jurong Rock Caverns, Singapour

In the benchmark[1] on the development of underground passages conducted by the authority in charge of urban redevelopment, Singapore announced its intention to organise the underground space into shallow, deep and cavernous layers. Shallow layers will be reserved for city dwellers' activities which do not require natural sunlight, such as laboratories for example. Deeper layers will host industrial and storage facilities, as well as infrastructures such as transport.

Singapore is directly inspired by practices observed in other major cities around the world. To name but two, Helsinki is a model in the use of underground caves for storage and parking purposes, and developed the first master plan on the development and use of underground spaces in cities. Montreal has the largest underground pedestrian network (32 km), largely developed through a public-private partnership.

Densifying the residential urban fabric

In 2019,

173,660

new houses were built in the UK[2]

The suburbs, with their residential areas, are the result of urban sprawl. However, these spaces are also a source of densification, conducive to innovative practices such as plot division. These approaches are still faced with legal and operational obstacles, and depend on the local context in terms of existing facilities and dynamics.

The soft densification process is viewed in a PUCA study[3] (French Urban Construction and Architecture Plan) as an alternative housing production method, insofar as these operations are not planned like ZACs (Joint development zones) or housing estates or any "traditional" urbanisation" by "extension". This study shows that the soft densification process (plot division, plot densification, residential division) is already in use: on the outskirts of Limoges, 17% of the houses built between 1999 and 2011 are the result of soft densification, and 37% in the Paris conurbation. However, recent initiatives have accelerated this trend.

The BIMBY experience

The BIMBY approach (Build Beauty In My BackYard) aims at developing soft densification by targeting individual properties. It involves extensions or new constructions on vacated land, essentially in the gardens of residents willing to divide their land. Périgueux was the first municipality to embark on this project in 2018, thus creating 100 new housing units[4].

Benoît Le Foll and David Miet

4 questions for

Erwan Bonduelle and Benjamin Aubry

Architects and co-founders of iudo

> The densification of residential neighbourhoods should enable a greater diversity of housing units and services.

Why take an interest in the transformation potential of residential areas?

Residential areas are one of the largest sources of urban land in France. In the Île-de-France region, they cover more than 95,000 ha (i.e. 9 times the area of Paris), and represent nearly 80% of the land earmarked for housing. As one of the key issues is to curb urban sprawl and rebuild the city on top of the city, the future of these neighbourhoods is a major concern. We believe however that their transformation should be supported by new property services around small and micro-operations. We estimated that, at the present stage of PLUs, there was a very strong potential for small-scale densification: around 100 m² extra per plot of land. This may not sound like a lot but, on the scale of the region, this represents more than 140 million m², which is considerably large.

What benefits can be expected from this densification?

A lot of benefits! The densification of residential neighbourhoods should enable a greater diversity of housing units and services. These services can build upon the digital economy (drop-off points, pedestrian pick-up points, local coworking spaces, etc.). In addition, densification is an opportunity to upgrade the energy efficiency of existing structures: for an owner, building additional housing units on their land (raised structure, extension, new construction, etc.) helps generate revenue for the renovation of their own home. Densification also addresses the issue of the ageing population when more than one in two house owners are over 55 years of age and live alone or as a couple. Densifying their own land allows them to generate new revenue, renovate their assets and reduce their expenses, at a lower cost thanks to the absence of land charges. Welcoming new neighbours is also a way to reduce the risk of isolation. Lastly, macroscopically speaking, soft densification contributes to creating new housing units in urban areas and helps reduce urban sprawl.

Are small owners capable of going into this type of project alone?

Yes and no. Today, certain owners tinker away to create an apartment in their house or install a garden studio, but not always successfully, and they won't take full advantage of the potential they could derive from their land. Some of them are familiar with real estate professions and may be a little more ambitious. However, the complexity of the topics (urban planning, standards, accessibility, estimates, reporting to administrations, legal arrangements, works, etc.) is a serious entry barrier and requires the use of services currently inaccessible to individuals. This is why we created iudo, to enhance the vertical integration of the service chain, from decision-making support to construction. We are working in particular on the development of an application to ensure broader access to information on the potential of land, as well as on services such as personalised property trend studies. Our objective is to democratise the urban development process.

Are there other development prospects for the residential fabric?

It all depends on their specificity and land pressure. With regard to services and the integration of new uses, there is much to be done. The model we suggest compliments the property development model. Density can be increased by reparcelling land or through more fragmented individual initiatives. We also feel that local authorities must support these actions in the form of smarter, more flexible regulations to promote shared urban development. Much needs to be done, that's the exciting part of it!

[1] https://www.ura.gov.sg/-/media/Corporate/Get-Involved/Plan-Our-Future-SG/Underground-Works/Benchmarking_Study.pdf?la=en
[2] "Ministry of Housing, Communities and Local Government, Number of New Homes Built soars to an 11 year high, 3 October 2019
[3] "Soft densification" in France: initial quantification, May 2014. PUCA
[4] https://www.urbanews.fr/2011/04/07/12911-build-in-your-backyard-pour-sauver-le-periurbain/

REVERSIBILITY

Definition

Reversibility is the ability for a place to be transformed in the future to accommodate other uses. When designing a reversible structure, **subsequent uses must be anticipated to facilitate future transformations.**

Synonym

Adaptable construction

Decisive phases for the reversibility of the structure

Layout Planning — Design — Construction

Transformation — Operation

Changing needs

Key idea

● If a building or public space is designed to change function in the long term, long-term costs are reduced, as is the scale of the transformation and resulting disturbances, while the change in the building's function gathers pace.

● Reversibility must be thought out at the planning stage and enabled by local urban planning regulations and development methods. The principle of reversibility must then drive the design to define the technical and architectural choices guiding the construction and concretely facilitating future transformations. The ability of the site to be transformed is subsequently enhanced throughout the operation of the structure, as real estate needs evolve.

As with any new approach, reversibility poses challenges:

Architectural	Technical
Financial	Legal and fiscal

Benefit

● **Reducing carbon footprint**
To address the challenge of climate change faced by humanity, reversibility is a change factor in the transformation of the construction sector, which needs to find cleaner ways to build our living spaces, while drastically reducing its emissions.

The building sector is in the front line. It accounts for

1/3

of national emissions, taking into account the energy used by buildings, in their construction, maintenance and renovation[1]

● **Reducing transformation costs**
Reversible constructions generate, at the cost of marginal efforts in the design phase, substantial savings during future transformations. It will be far more economical to transform the structure than to destroy and rebuild it.

● **Optimising existing assets**
The owner, or a potential investor, can optimise the intrinsic adaptability of the structure, and take it into account during the financial valuation of the asset as soon as it is built. This requires long-term vision when appraising the structure.

● **Safeguarding natural resources**
Facilitating the reuse of structures helps reduce the scale of future transformations, as well as future needs for new constructions. This lowers the quantity of material needed and ultimately the use of natural resources such as sand used for making concrete. This means that the construction sector will be able to cut its dependence on these natural resources, available in finite amounts on the planet.

Construction materials represent

50%

of the mass of material used in France for domestic consumption[2]

● **Reducing waste**
Similarly, anticipation helps avoid future demolitions, thereby reducing waste generation in the sector.

Construction and demolition waste accounts for approximately

30%
of the all waste generated in the EU[3]

In Europe, construction and demolition generate

450 million

tonnes of waste every year
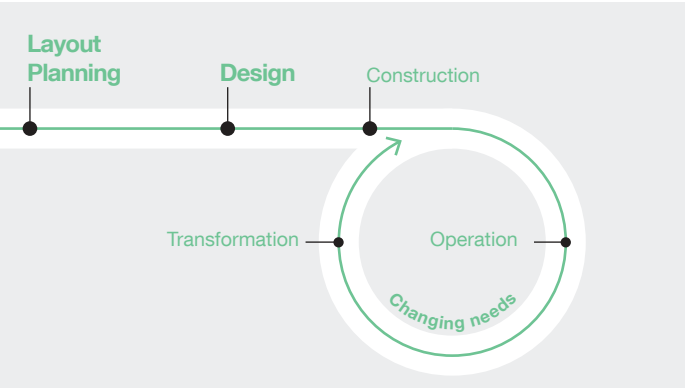
● **Adaptation to changing uses**
The rapid transformation of our living spaces allows the near-instantaneous adaptation to our changing uses. Greater adaptability of existing places to new uses would help prevent unnecessary new constructions every time our lifestyles change, or every time the household structure changes.

Over the past thirty years, the size of households has decreased overall, with an increase in the proportion of people living alone, an increase in the proportion of childless couples and a sharp increase in single-parent families (INSEE, 2019).

● **Better resilience in the face of uncertainty**
We need places that could be transformed quickly and cost-effectively to cope with various crises and temporary emergencies. The idea is to be able to deal with a variety of disruptive events, some of which, such as the lockdown periods of 2020, are unpredictable.

[1] ADEME, Carbone 4. June 2019. *Comment les acteurs du secteur peuvent s'inscrire dans une démarche zéro émission nette*

[2] ADEME
[3] European Commission, Construction and Demolition Waste, 2019

Convertible Floors

While the idea of converting offices into housing units is gaining momentum, its feasibility varies greatly depending on the configuration, and the process remains expensive. At present, it is often as expensive, if not more so, to refurbish an existing structure by transforming its uses as it is to destroy it and rebuild a new one. In this context, the reversibility approach consists of anticipating this new lease of life of buildings by designing unassigned programmes which can accommodate offices, housing or even parking spaces over time.

An assessment is essential to establish the need for reversibility and to choose the right approach. On the scale of the project, the assessment must establish the provisions of the local urban plan to determine the most relevant form of the building.

At neighbourhood level, the reversibility of offices into housing also opens up the question of the quantity of public facilities available nearby: what future transformations prefigure the public services and the profile of uses in the neighbourhood?

This aspect of reversibility raises many technical and architectural questions, which themselves lead to an additional cost of 5% to 20% during initial construction. For example, it is necessary to choose a ceiling height for the floors and a grid of façades that reconciles the constraints of housing and offices. Building structures, such as the design of utilities, must allow maximum adaptability of the storeys. The organisation of vertical flows is at the heart of safety issues, and these blocks must be designed in compliance with various regulations, corresponding with all potential uses of the building. While tentative solutions have already been found, there is still a long way to go in terms of regulations, urban planning and tax issues.

The Paris region had
3.3 million m^2
of vacant offices in 2017, while housing units were lacking[1]

[1]ORIE

Regulations and Reversibility

Hindrances

- **Building permit:** applications must specify the function of the building and do not accept unassigned projects.
- **Fire regulations:** fire safety rules vary depending on the type of building: Public (PAB), Employee Access Building (EAB), Labour code, housing.
- **Office creation tax (in the Île-de-France region):** the tax for the creation of offices, retail premises and storage premises applies and identifies those liable at the start of operations.
- **PLU:** sometimes the zoning provided for in the PLU only has a single purpose, and any change is subject to an application for an authorisation to change the purpose.

Aids

- **Permis à double état:** introduced in 2018 with a view to the 2024 Paris Olympics, this system allows, in these exceptional circumstances, for the future transformation of the building. It has yet to be extended outside the Olympics.
- **ALUR law:** helps local authorities differentiate between urban planning rules for existing and new constructions.
- **Innovation permit:** introduced by the ELAN law, it is used to derogate from certain construction rules in some areas: operations of national interest (OIN), but also major urban planning operations (GOU) and territorial revitalisation operations (ORT).
- **Permission to experiment:** the ESSOC law provides for the future inclusion in the French construction code of a results-based instead of means-based logic, which will facilitate innovation.

Historical example

Haussmann-style building

With their high ceilings, some Haussmann-style buildings were converted into offices in the 20th century, even though the concept of working in an office did not yet exist when these bourgeois dwellings were designed. The "Paris Haussmann" exhibition[2] publicly emphasised the reversibility properties of Haussmann-style architecture.

A vision for tomorrow

Office Switch Home

Bouygues Construction solution

The Office Switch Home concept, developed by Bouygues Bâtiment Ile-de-France Construction Privée within the Bouygues Construction Group, proposes an ingenious model of office buildings designed to be easily converted into housing units, using in particular innovative, standardised subfloors to this end.

[2] *Paris Haussmann. Modèle de Ville?* exhibition, Pavillon de l'Arsenal, 2017

Work#1

Bouygues Construction reference

Designed using the "Office Switch Home" concept, this 8-floor office building is destined to be converted into housing units to adapt to changes in the Confluence neighbourhood. The A7 motorway, immediately adjacent to the Work#1 reversible building, will be downgraded, within the next ten years or so, to a higher-quality urban boulevard and will enable a change of function conducive to housing units.

Work #1, Confluence neighbourhood, Lyon. Planner: SPL Lyon-Confluence, Métropole de Lyon. Developer: LinkCity. Architect: David Chipperfield Architects. Contractor: Bouygues Bâtiment Sud-Est

Saint-Roch car park

This new 800-space above-ground silo car park, with shops on the ground floor, anticipates future uses as housing units, services or activities. This silo car park creation with undetermined future use is a unique approach which results from its proximity to the Montpellier Saint-Roch TGV station and the ensuing need for parking spaces. The eight floors are designed with reversibility in mind, including a ceiling height far greater than the required standards for car parks. They could therefore accommodate housing units in the future.

Saint-Roch Car park, Montpellier.
Architect: Archikubik.
Project owner: SERM (City of Montpellier)

La Tossée shared car park - L'Union

This mixed-use building, which includes a silo car park and a business incubator, is destined to become exclusively an office building. The ceiling height (2.90 m) and the location of access ramps were anticipated for the future change in use. This desire is in keeping with the more general objective of ultimately transforming the neighbourhood into a car-free eco-district.

La Tossée shared car park. L'Union, Tourcoing.
Project owner: SEM Ville Renouvelée.
Project coordination: Tank Architectes

Stream Building

The strength of the Stream Building project is its convertible aspect, based on a principle of extreme diversity and interchangeability: 6 floors are intended for offices of start-up companies or large corporations, aparthotels, shops and housing units, etc. This is made possible by the unique wooden frame structure and the anticipation of technical and operational issues from the design phase.

Stream Building, Clichy-Batignolles ZAC.
Winning project of Réinventer Paris.
Project initiator: Covivio.
Architect: Philippe Chiambaretta, PCA-Stream

CANAL Architecture's vision of the reversible building[1]

The CANAL architectural office came up with a system based on seven principles for a reversible construction, for a standard five-storey, 60-m long building:

Building thickness: 13 metres

Floor-to-floor height: 2.70 metres

Circulation: exterior plots and pontoons

Construction process: girder-slab floors

Distribution of utilities: exterior, with no underpinning work

Envelope: less than 30% of components to be modified

Split-level, active ground floor and use of the roof

[1] *Construire Réversible, Canal Architecture*

3 questions for

Patrick Rubin
Architect
CANAL Architecture

What is your objective when you develop this principle of building reversibility?

With these seven principles, our goal was to address the issues raised by reversibility in terms of construction, technique, structure, fluids and safety. Our demonstration (there are others) consists of claiming that, technically speaking, it is entirely possible to create reversible buildings… One of the criteria of sustainable development.

The objective is to anticipate to quickly adapt the space to the desired function, with only limited extra costs.

The principles you develop take the form of a standard 60m long tower. Will reversible construction be defined by a single matrix?

No, the future is not limited to imposing a single matrix that would set in stone architectural forms and urban models. The development of the theoretical framework gave us an opportunity to re-examine interior design criteria within housing units and offices, primarily in terms of everyday uses. The models are capable of absorbing all types of function. Generic buildings should not be perceived negatively: one just has to look at Paris after Haussmann's renovation. But of course we tested different forms, not just the tower, i.e. building blocks and islets, on reversible buildings in actual urban contexts.

How can a reversible building permit be filed?

The innovation permit, for example, is used to derogate from traditional construction rules to test new techniques, including reversibility. The State launched a call for expressions of interest at the end of 2017, following which we were fortunate enough to be selected to make our visions come true. A planning permission application, with no specified purpose, will be submitted in Bordeaux for the Euratlantique area, in December 2020. The building, built in conjunction with Elithis, will develop, over 5,000 m[2] and nine levels, convertible floors for all uses. The form of this first demonstrator is quite different from our initial theoretical exercise…

Appropriation and Future Extension of Housing units

There are many changes within the household population through the life cycle: living alone, with a partner, apartment sharing, arrival of children, even separation and stepfamilies, etc. Reversibility helps put an end to spaces with a limited lifespan, for example by facilitating the extension of housing units.

This approach also encourages the appropriation of one's housing unit in the medium and long term. This is not a new issue, as attested by raising operations carried out in numerous Paris buildings in the 17th century. Today however, to anticipate safe physical modifications of housing units, a number of technical parameters must be factored into the design of the building.

To this end, the notion of variable geometry must be integrated into housing programmes, for example to combine a studio apartment and a 1-bedroom apartment with a 2-bedroom apartment to obtain a 4-bedroom apartment, by anticipating access openings and joint ownership arrangements. The change in typology can also result in student housing converted into housing for elderly people.

However, there is a lot of pressure from local authorities on the housing issue, and regulatory changes on this matter are increasingly in favour of operations such as raised structures or extension.

The half-house principle, as part of a logic of housing accessible to all, was deployed in South America based on an idea that emerged in the 1970s. Edwin Haramoto developed an inventive strategy for housing appropriation, referred to as "Sistema Haramoto", within the Instituto Nacional de la Vivienda (INVI) in Chile. The objective is to identify the primary and necessary elements of a housing unit to design its core, thus preparing for the possibility of extensions or raised structures, like the controversial projects of architect Alejandro Aravena several decades later.

Villa Verde

The "half-house" model can be personalised and extended, as attested by the Quinta Monroy project designed by Alejandro Aravena. This very simple, sober and functional housing programme responds to the urgent needs which arose after a devastating earthquake hit the city of Concepcion.

Villa Verde, Concepción (Chile).
Architect: Alejandro Aravena

Boulevard Davout

This project, consisting of 68 social housing units, premises for associations and a kindergarten, won the EDF Bas Carbone 2012 competition with honours for its foresight approach to urban planning. The future of the building is taken into consideration from the beginning, in terms of the scalability of housing units or raised structures. The foundations and façade walls are reinforced to enable the construction of an additional three to five levels. The envelope of the building is also designed to be subsequently improved with the addition of balconies and conservatories.

134 Boulevard Davout, Paris 20th *arrondissement*.
Architects: Naud & Poux / Environmental technical consultants: Franck Boutté. Project owner: RIVP

Lodges

This project involving 35 timber-frame independent houses is unique because of its upgradable and modular nature. The two-bedroom houses can easily be extended using prefabricated modules, to create a five-bedroom house depending on changes within the home. Furthermore, housing units are passive and materials are bio-based.

Lodges, Chanteloup-en-Brie.
Project owner: Bouygues Immobilier.
Architects: AW2 Stéphanie Ledoux & Reda Amalou architect

La Serre habitée

By 2021, La Serre habitée will be home to a social student residence in the form of shared flats, topped by a greenhouse on the roof. The timber structure is designed to combine several family housing units. The choice of innovation for this project was reflected in the method (participatory approach with architecture students) and the integration of reversibility into the planning phase.

La Serre habitée, *Réinventer Paris,* Paris 20th *arrondissement*.
Project owner: City of Paris. ICF Habitat la Sablière
Designer: Vincent Saulier
Architect: Choreme (landscaper)

Housing units designed to change typology, with a constant surface area

Wizom for Life
`Bouygues Construction solution`

The offer proposes a medium and long-term housing unit. For example, wall reinforcements are provided to install grab bars and partitions are easily demountable to adapt to the changing composition of the household. Emphasis is given among other things to the use of the housing unit by elderly people: it is equipped with connected objects capable of detecting emergency situations and raising the alert.

Homdyssée

Homdyssée (Crédit Agricole Immobilier) provides a housing unit that is designed to adapt easily to its occupants: a 3-in-1 apartment to suit every situation in life, which can be arranged according to three possible configurations, with a constant surface area. Everything is already in place to facilitate the change in configuration: the floor covering is the same throughout and the entire electrical and heating installation is already integrated.

Owwi

Thanks to an innovative power distribution system, the Owwi start-up company enables the scalable personalisation of housing units via connected removable partitions. The housing unit does not become obsolete but adapts to its occupants.

Unique
Reversible Facilities

Mega-events often result in the construction of major facilities. One of the strengths of the Paris bid for the organisation of the 2024 Olympic and Paralympic Games was that more than three quarters of the infrastructure is already in place. Involving less heavy construction, this also avoids repeating the recurring pattern of cities hosting international events who often inherit expensive and oversized facilities that have become obsolete, also known as "white elephants".

Planning for the second life and future uses of these infrastructures, requires upstream consideration of the technical and legal constraints necessary for transformation once the event is over. In most existing projects, regulatory issues do not seem to be burdensome insofar as the facilities, in most cases, maintains the same function, often with a reduced capacity. However, one might imagine that new uses could be assigned to these facilities, thus providing single-purpose super-facilities that meet the needs of the exceptional event, convertible into mixed multi-facilities that meet local needs.
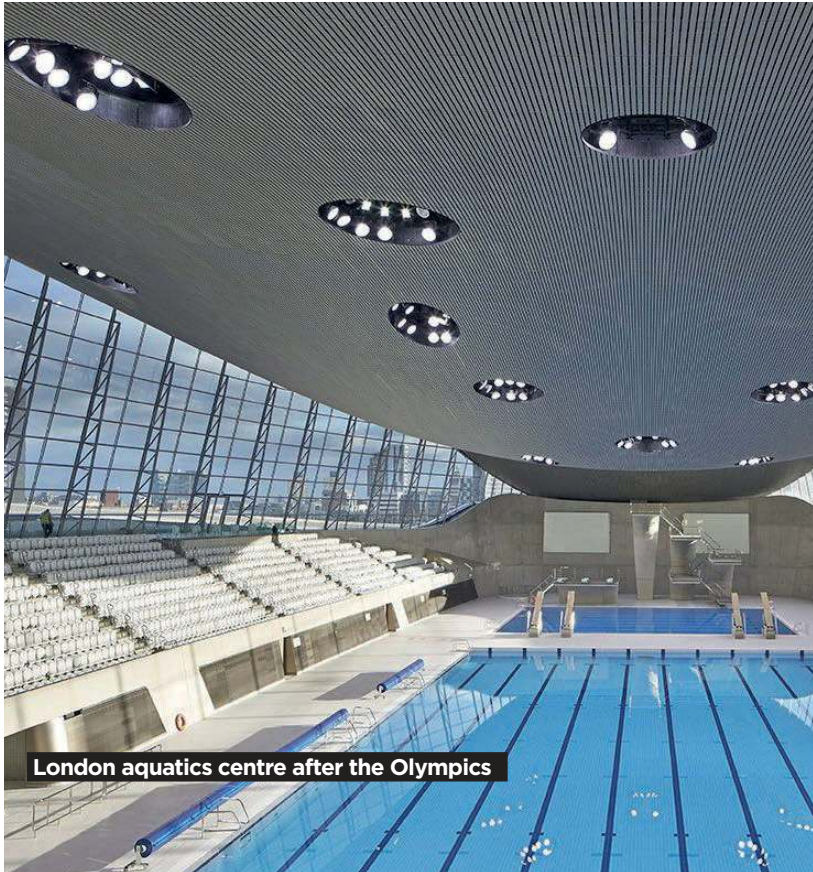
Aquatics Centre, a tailor-made sports facility

The second life of infrastructures was designed as part of the 2012 London Olympic and Paralympic Games, for the construction of the aquatics centre. Its stands were like two wings designed to accommodate 17,000 people for the Games. Subsequently dismantled, the two wings were replaced with large glass façades, giving the building its final form with a capacity reduced to 2,500 people. It is now intended for amateurs or professionals, taking part in local or international events.

London aquatics centre, 2012 Olympics
Architect: Zaha Hadid

## Bridge and Aquatic Center, Saint-Denis

Bouygues Construction reference

Like the London Aquatics Centre, the site's legacy has been envisaged from the design stage. During the Games, the aquatic centre will host water-polo, diving, artistic swimming and Boccia events.

At the end of the event, the number of seats may be reduced (from 5,000 to 2,500) and the removable partitions and bottoms of the pools will adapt to various configurations, with a view to welcoming the general public and hosting competitions. Other sports facilities (climbing walls, basketball courts, fitness centre, etc.) should be added to the aquatic centre during the legacy phase.

Bridge and Aquatic Center, Saint-Denis. General contractor:Bouygues Bâtiment Ile-de-France. Project owner: SIMBALA (RECREA, OMNES, Bouygues Bâtiment Ile-de-France). Licensor: Métropole du Grand Paris
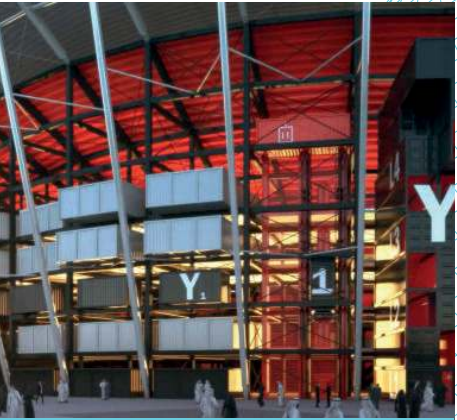
Ras Abu Aboud Stadium

The project of the Ras Abu Aboud stadium, due to host the 2022 football world cup in Qatar, is a first: it is designed to be fully demountable, transportable and reusable, from the toilet facilities to the 40,000 seats provided for the event. Made up of modular blocks, it features in particular recycled shipping containers.

Ras Abu Aboud Stadium Doha, Qatar. Project owner: FIFA. Architect: Fenwick Iribarren Architects

London aquatics centre during the Olympics

London aquatics centre after the Olympics
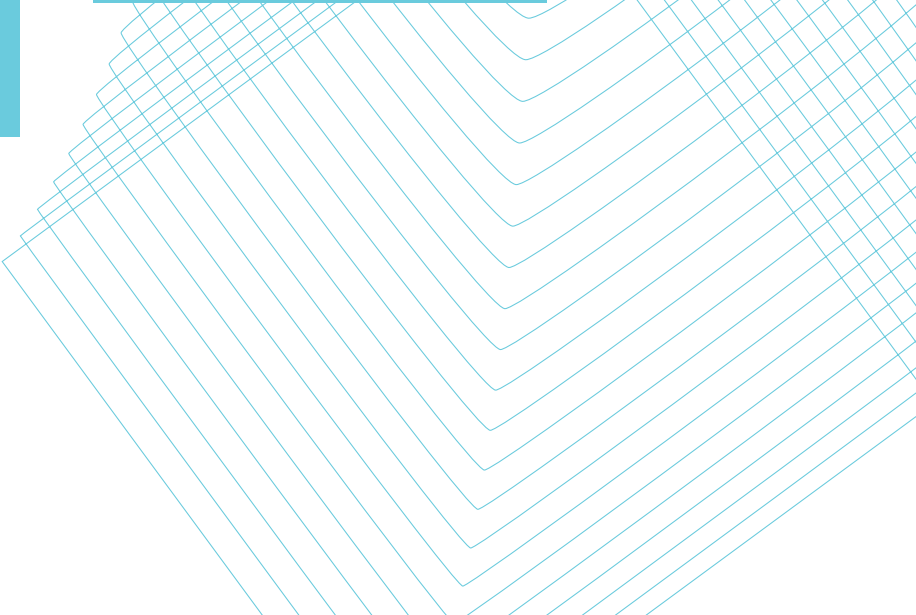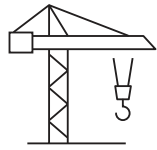
Demountable Construction

Reversible construction also means that the land on which the structure was built can revert to a state prior to construction, effectively making it fully reversible. We shall now address the ability of structures to be easily dismantled, and their components reused: reversibility for the end of the building's life.

Once the structure has been easily deconstructed, the plot of land becomes available for new users, and building components can be used to recreate a similar structure on another plot. The structure is therefore flexible in time and space. This type of demountable construction is made possible by prefabricated and standardised modules or elements. The components and materials of the building must be easy to recycle and reuse.

From the 15th century, for economic reasons, the typology of half-timbered houses in the Bresse region, for example, made it possible to dismantle the houses in order to move their components. Nowadays, the strong ecological dimension of this feature raises issues in terms of resources, waste and material transformation. Historically, in 1950s France, architect Jean Prouvé proposed ephemeral architecture projects for demountable independent houses or public facilities. This approach is currently re-emerging against the backdrop of the development of the circular economy. It is referred to as the reuse and recovery of building components at the end of their life cycle.

Clisson secondary school

Bouygues Construction reference

This secondary school was designed using 98 wooden modules (4 m x 8 to 16 m long) prefabricated off-site. Its scalable nature is apparent in the possibility of adding or removing modules later, depending on changes in the number of students.

Clisson secondary school. Project owner: Loire-Atlantique Departmental Council

Villejuif temporary school

The roadmap of this school with 18 classes included requirements in terms of speed of construction and future deconstruction of the structure. The light steel structure, half-timbered roof and bolting assembly system make this school, which was erected in just a few weeks, unique. Built in 1957, it was actually dismantled three years later, before being reassembled later and partially reused for other purposes.

Villejuif temporary school, 1957. Architect: Jean Prouvé. Project owner: municipality of Villejuif

Le Havre Pressoir offices

Le Havre Pressoir is a building made up of timber-frame modules, fixed to a fully demountable structure on stilts. Certain parts of the building can be entirely relocated and reassembled on another site while the rest of the building remains operational. In addition to being fully demountable, the floors of this office building can be converted into housing units. Architect Julie Delamare contributed to a successful and multifaceted reversibility approach.

Offices, Pressoir ZAC, Le Havre. Project owner: CODAH (Le Havre Conurbation Committee). Architect: Cabinet d'architecture 6.24, Julie Delamare registered architect

Ephemeral cities

Reversibility also applies to major temporary events, insofar as the land where they are organised subsequently reverts to its initial state. These "cities" are assembled within a very short period of time, using organisational patterns that sometimes make them resemble actual cities: streets, squares, sometimes transportation infrastructures, etc.

Bellastock QC Festival

Since its creation in the form of a student association, Bellastock has regularly organised ephemeral structure construction festivals. Now a cooperative entity, Bellastock has lent its assistance to Quebec City in the creation of an ephemeral city as part of a festival. To this end, wood residues were reused.

Kumbh Mela

Kumbh Mela is one of the world's major religious pilgrimages. It is held every three years successively in different cities of India. An ephemeral city hosting approximately 120 million people is assembled and dismantled each time. The facilities are designed to be recycled or easily stored until the next festival.

Kumbh Mela, Inde

Black Rock City

More than 60,000 people come together every year for one week in the Black Rock desert on the occasion of the Burning Man festival. Black Rock City is the name given to the semi-circular temporary city, with a central meeting place in the middle of the villages and theme camps. Once the festival is over, the overriding rule is to leave no trace on site. The desert reverts to its initial form for one year. This gathering has inspired other similar events in other parts of the world, such as the Nowhere festival in Spain.

Burning Man, Nevada
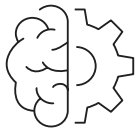
From Tactical Urbanism to Reversible Public Spaces

While the concept of reversibility is valid for the construction of buildings and facilities, it also applies to public spaces. Whether they are led by municipalities, citizen collectives or other public institutions, quickly implemented and economical initiatives are emerging in cities. They can take the form of temporary facilities, or facilities undergoing tests before being made sustainable.

This is referred to as tactical urbanism, a term made popular by the Rebar collective in the USA in the 2000s. Users, at the core of the approach, test the facilities implemented quickly and cost-effectively, via an array of tools, including:

- furniture
- signs
- paint
- works of art
- plantations
- suspended elements above the street

Tactical urbanism is not dissimilar to the notion of "urban acupuncture", introduced by Jaime Lerner (Brazilian architect and urban planner, former governor of the State of Parana) in the 1980s. He drew an analogy with the city where certain neglected places are "ill" or "dormant" and need to be revitalised by way of interventions.

In New Zealand, the government decided to invest more than

7 million

New Zealand dollars (€3.8 million) in a call for tactical urbanism projects in public spaces, to be delivered in 2021[1]

[1] "Innovating Streets for People pilot fund", www.nzta.govt.nz

Bottom-up initiatives

Nutibara Avenue

The Colombian city of Medellin is plagued with many traffic accidents. The "Movilidad Humana" collective participated in the painting of the intersection of two accident-prone avenues, to encourage motorists to slow down. As a result, the number of accidents in this spot has drastically decreased since this intervention.

Nutibara Avenue, Medellin. Movilidad Humana

Pavement to Parks

Initiated by a group of activists and designers before becoming more popular, the temporary occupation of parking spaces in San Francisco inspired many street reclaiming trends in a number of cities in the USA and worldwide. Certain parking spaces are converted into gardens, others into places of artistic creation or meetings places for neighbours. As a result of these installations, these places are being reclaimed by residents and increasingly used by pedestrians and cyclists, in particular at weekends.

Pavement to Parks, San Francisco.
Original designers: Rebar Group. Local authorities: San Francisco Planning Dpt, Dpt of public works, Municipal Transportation Agency

Top-down initiatives

JC Walks Pedestrian Enhancement Plan

In October and November 2017, six workshops were organised with the residents of Jersey City in locations deemed "unsafe" for pedestrians. The objective was to change the size of pavements using road paint, add temporary furniture, facilitate signalling, etc. These workshops generated feedback for the preparation of the city's Pedestrian Enhancement Plan.

Architects/urban planners: The Street Plans Collaborative, Fitzgerald and Halliday, Inc

Biscayne Green Pilot Project

In 2017, approximately one hundred parking spaces on Biscayne Boulevard were converted into public spaces for three weeks. Dog parks, dance areas, seating areas, children's playgrounds: this space attracted 17,000 visitors over three weeks, and consideration is now given to the long-term conversion of car parks into public spaces and the redesigning of the boulevard.

Biscayne Green Pilot Project, Miami Architects/urban planners: The Street Plans Collaborative

Plaza Program

Cars were suddenly banned from Times Square through the use of road paint, planters, tables and deckchairs in 2009. This example of tactical planning was put in place for six months to test its consequences, before the developments became final in 2015. Since then, other places in New York have participated in the programme, resulting in an increasing use of public spaces and a drop in the number of traffic accidents.

Plaza Program, Times Square. New York. New York Department of Transportation. Architects/landscapers: Snøhetta

Redesigning the Banks of the Seine

In Paris, the conversion of the banks of the Seine into a pedestrian area initially involved minor, demountable units, mostly made of wood, that could be removed quickly, in case this space had to be reopened to vehicular traffic, or replaced with other units intended for other uses. Preliminary tests were conducted with one-off operations such as the ban on vehicular traffic on Sundays or in summer during the *Paris Plages* festival.

Banks of the Seine, Paris.
Architects: Franklin Azzi Architecture

The Shower

Installed in a public square of the city of Shanghai in the summer of 2020, the imposing and playful installation of a shower-playground highlights features evocative of water and summer. This temporary 350 m² public space project revitalises the square and encourages social interactions during summer, while leaving a lasting mark (social and spatial) in the urban space.

The Shower, Daning Road Shanghai. Architect: 100 architects

Tactical urbanism has been brought to the forefront in the context of the 2020 health crisis, as it allows rapid adaptation to the crisis. Mobility is at the heart of this issue, and several cities in France and worldwide have come up with tactical adjustments on topics relating to mobility, in particular the numerous and high-profile temporary cycle paths.

At the end of the lockdown period, Cerema published a document intended for French local authorities, listing technical recommendations for implementing temporary cycling facilities.

In the Greater Paris metropolis,

210 km

of temporary cycle paths had been or were being created in the summer of 2020[1]

56

streets have been temporarily pedestrianised in Paris

On a world scale, in the 2000s Bogota introduced the Ciclovia, or "cycling Sundays", by suspending part of the road traffic in favour of bicycles. During the health crisis, the municipality adapted the number of kilometres of extra paths to real-time needs. The frugality of tactical urbanism developments is conducive to testing and building on feedback, and even helps ensure the sustainability of facilities.

[1] APUR, *La marche et le vélo plébiscités en période de crise sanitaire* Brief, July 2020

Tactical experiments in France

Parking spaces

In the context of health crisis, derogations are made by the City of Paris to authorise the extension of café and restaurant terraces beyond the boundaries initially set out. These ephemeral terraces reveal the unseen urban potential of parking spaces by bringing vitality to the streets. Some streets have been temporarily pedestrianised.

Derogation for the temporary occupation of parking spaces, Paris, 2020

"Drive-through" testing

Covid screening tests proliferated in the spring of 2020. To avoid overburdening hospitals, screening centres cropped up in unusual locations. For example, city buses were converted into offices where personal patient data was registered. In Strasbourg, a partnership between a laboratory and car park operator ZenPark allowed the temporary use of car parks for the implementation of drive-through tests at the end of the lockdown period in May 2020.

Drive-through Covid testing, Strasbourg

4 questions for

Benjamin Pradel
Sociologist, consultant at Kaléido'Scop and co-founder of Intermède

" We must address the rhythms of the city in their material as well as organisational dimension. "

Are tactical urbanism developments destined to disappear or will they last?

Temporary adjustments to public spaces, referred to as tactical, may achieve a number of results. They may be genuinely temporary and result in micro-adjustments or mobile facilities, implemented by the municipalities or interest groups for a special circumstance: event, crisis, etc. Demountability is in their DNA as they are not destined to last. The other option for these developments is sustainability, in which case they are installed temporarily to serve as a laboratory of urban uses. Insofar as their relevance is deemed to exceed the negative externalities, they are made sustainable and referred to as "transitional" developments.

Lastly, another vision takes the form of developments installed from the onset with a view to transitioning to a more sustainable status or to a comprehensive redevelopment of the road. They are consistent with a well-designed urban transformation process, in which case they are referred to as ephemeral developments. They support a form of participation, communication or demonstration via the use of what can be achieved in a development project.

Do these various configurations share the reversible nature of the urban development?

It should be kept in mind that reversibility in public spaces never means a return to the starting point. While the physical embodiment of the development is reversible, time is a continuum: whatever the development implemented, it will leave a mark on the uses it changes, the conflicts and debates it gives rise to or the new representations of the places it generates. This spatial and social mark left by reversibility is palpable in development processes.

If we manage to systematically use reversibility in public space development projects, it will give rise to a top-down approach. But what place does that leave for community initiatives (bottom-up)?

I work on the assumption that it is not because ephemeral developments are included in the toolbox of developers and institutional bodies that they will be systematically internalised, and that ephemeral developments led by civil society can no longer exist. On the one hand, the spaces and challenges are so substantial that there is room for everyone. On the other hand, it is in the interest of local authorities and developers to rely on civil society groups to lead this type of development as close as possible to local residents.

Which other benefits can be derived from the consideration of temporality in public space projects?

Time is a very complex matter; it relates to the evolution of our society, which is also increasingly complex. We must address the rhythms of the city in their material as well as organisational dimension. Short-term, or temporary issues, for public spaces as well as built-up areas, can bring all those involved to the table. They help synchronise all those involved to increase permeability between project stages, between professional silos and between professionals and civil society. To push the logic even further, perhaps tomorrow will see the emergence of "urban temporality planners", ephemeral project managers or observatories of local rhythms. The evolution and realisation of temporary operations show that time considerations can result in tangible achievements which could be, in the near future, used in the urban development process.

URBAN DIVERSITY

Useful concepts

Urban diversity is the opposite of separating urban functions

The principle of function separation guided how we planned cities for decades after it was theorised in the Athens Charter under the auspices of Le Corbusier in 1933. With a view to limiting cohabitation difficulties between functions and the nuisances generated by certain activities, this approach, largely facilitated and accelerated by the expansion of the automotive industry, was conducive to the development of dedicated and monofunctional working, living, circulation and entertainment spaces. In light of the limitations of this model (isolation, car dependency, etc.), functional diversity is the exact opposite to this vision as it advocates bringing functions closer together. It has gradually established itself as a new urban planning dogma since the 1990s.

How to measure diversity?

Despite being widely used in the sphere of regulatory and operational urban planning, the notion of diversity remains difficult to measure. The different pieces of legislation aimed at promoting it do not offer a specific definition. Furthermore, functional diversity is not subject to an established framework of target figures. Last but not least, it may concern a variety of factors, from the "mixed neighbourhood" to the block or the building.

The following indicators provide an approximate assessment of functional diversity:
- **Population density/job density**
- **Proximity to shops and services**
- **Existence and capacity of public facilities** (social, cultural, educational, etc.)
- **Multifunctionality of economic areas**
- **Diversity of user profiles who spend time in the neighbourhood**

35XV, New York. Architects: FX-Collaborative

Key idea

The idea of functional diversity emerged more than thirty years ago and is now universally recognised as the best suited vision for the cities of tomorrow. Why mention it in a publication intended to be forward-looking?

● **Because diversity of uses remains one of the keys to the effective use of our cities' land resources.** A monofunctional space is doomed to become "dormant" at certain times of the day, week or year. Conversely, a mixed neighbourhood leads to a more intense use of space by hosting a variety of uses, thereby promoting exchanges and mix of uses.

● **Because despite the consensus around the notion, its implementation remains limited due to various obstacles and oppositions.** Consequently, the effective implementation of mixed neighbourhoods, blocks and buildings is often experimental and continues to reveal unique opportunities, in particular in terms of sharing and reintroducing productive and logistics functions in the heart of the territories.

Benefits

● **Functional diversity is regularly identified as a factor likely to favour social diversity:** mixed neighbourhoods are supposed to attract users with a variety of socio-economic profiles who are destined to come together and interact. A mixed city is therefore a more cohesive and inclusive city.

● **From an economic point of view, functional diversity is also used with a view to reducing territorial inequalities** by responding to the major imbalances between housing and employment in some neighbourhoods.

● **Functional diversity is also expected to contribute to the quality of life of urban dwellers** by facilitating access to a variety of services and opportunities. Therefore a mixed city is also a lively, intense city.

● **Lastly, mixed neighbourhoods are conducive to urban proximity and short distances.**
Bringing functions closer together also participates in an environmental approach, by reducing forced journeys, promoting the use of active mobility and guaranteeing the rational use of the cities' land resources. The "15-minute city" has become a political promise as well as an operational objective to develop the city in a different way.

The Paradox of Urban Diversity

A ubiquitous notion...

Functional diversity benefits from a legal framework intended to promote it, which has developed over time.

● **In 1991,** the French framework law on the city advocates the "right to the city", an indirect reference to the functional diversity objective.

● **In 2000,** the Urban renewal and Solidarity law (SRU) makes a more explicit reference to diversity by indicating that "urban planning documents should ensure the variety of urban functions and social diversity [...]". At this stage, however, diversity falls under a due diligence obligation rather than an obligation to achieve results.

● **In 2005,** the purpose of the "Social and territorial equity" programme of the finance bill is also to "reinforce the functional diversity of these spaces, initially designed as essentially residential".

● **In 2010** at last, functional diversity forms an integral part of the objectives of the Grenelle 2 law on the national commitment to the environment. Functional diversity must therefore be taken into account in urban planning documents such as SCoT and PLU.

Functional diversity has become a high requirement for local authorities when developing their territory. This requirement is clearly expressed as part of the calls for innovative urban projects (APUI) which have proliferated since 2014. The tender documents for the first of these calls for projects, *Réinventer Paris,* launched in 2014 by the City of Paris, mentioned "sharing paces and bringing functions closer together are ways of creating new social and solidarity bonds, developing intergenerational synergy, reducing the need for mobility [...]. A "plural" building combining various functions - housing units, offices, communal areas, showrooms, virtual data centre, promotes the diversity of uses within the same building". As a result, functional diversity has become a prerequisite to winning this type of tender.

...but a somewhat disappointing reality

Beyond certain emblematic urban projects for which functional diversity is a marker of their identity and a success factor, the hybridisation of functions does not always prevail, even in high demand sectors.

For example, in its analysis of the 35 train station districts of *Grand Paris Express* carried out in 2019, APUR stressed that "only 40% of the area of the 35 train station districts is actually conducive to the construction of a mixed city: most of the land is covered by monofunctional zoning"[1]: collective or single-family housing, facilities, activities, natural or agricultural area, etc.

In addition to this regulatory constraint which may hinder the deployment of mixed programmes, the hybridisation of uses can also be hindered by organisational difficulties. In 2011, the Paris Région Institute pointed out the frequent difficulties faced by various stakeholders[2]:

● **certain real estate operators** perceive functional diversity as a "source of added planning complexity, likely to slow down the definition or even marketing of the project";

● **businesses** may be wary of a more complex way of managing flows in terms of access control and office space security. They may also fear neighbourhood disturbances, in particular in reputedly deprived areas;

● **insurers** whose insurance products are specialised and poorly adapted to functional diversity criteria;

● **notaries** who struggle to define everyone's rights and responsibilities in the context of functional diversity, in particular in case of a division into volumes.

Lastly, functional diversity raises major issues in terms of the economic balance of projects. While the urban and environmental benefits of the diversity of uses are strong incentives, economic feasibility remains a prerequisite for this type of programme to come to fruition. However, it can be difficult to strike the balance between guaranteeing high added value and offering less financially attractive premises to operators[3].

● offices
● hotel, restaurant and public bar
● youth hostel
● housing units
● fitness centre and swimming pool
● shops and organic market
● kindergarten
● cultural centre

Morland Mixité Capitale
Bouygues Construction reference

Winner of the *Réinventer Paris* competition in 2016 and having entered the work phase, the purpose of the *Morland Mixité Capitale* project is to rehabilitate the former administrative site of the Paris Prefecture, located in the 4th *arrondissement.* The project's originality lies in its extreme functional diversity. Eleven complementary uses will be brought together under the same roof: kindergarten, fitness centre, youth hostel, and more standard functions such as offices, housing units and shops.

Morland Mixité Capitale, Paris. Architects: David Chipperfield Architects, Calq Architecture. Landscaper: Michel Desvigne. Developer: Emerige. Project owner: Société parisienne du nouvel arsenal. Construction: Bouygues Bâtiment Ile-de-France - Construction Privée

[1] APUR, *Les mutations dans les quartiers de gare du Grand Paris Express,* 28 November 2019, https://www.apur.org/fr/nos-travaux/28-novembre-2019-mutations-quartiers-gare-grand-paris-express
[2] IAU, *La mixité fonctionnelle : un objectif à définir et à négocier au cas par cas,* July 2011
[3] Ibid

The Challenge of Functional Diversity Within a Building

Another difficulty occurs when the ambition is to make one single building diverse.

This is only possible when the Local urban development plan (PLU) allows it. Project coordination teams are sometimes required to create separate access points for each of the functions within the building (housing units, offices, etc.), which reduces the areas available on the ground floor. Moreover, designers must combine the construction standards applicable to the different functions, while preserving the overall architectural coherence of the building and the economic balance of the project.

To overcome these difficulties, the anticipation of functional diversity, i.e. its early inclusion in urban planning documents, is an essential condition for success, in addition to the adoption of this new concept, changes in work cultures and the development of culture of dialogue and compromise between all those involved in the project. In spite of these difficulties, functional diversity within a single structure remains an objective for local authorities, who can rely on the ingenuity of the most innovative architects, developers and contractors, keen to come up with novel solutions to overcome these difficulties.

Shake

In the heart of the Euralille business district, a new kind of office building will see the light of day in 2022: the Shake building, which provides a predominantly tertiary ecosystem combining city with nature, economy with social life, work with relaxation. Although destined to host the head office of Caisse d'Epargne Nord France Europe, the building is by no means limited to this function: it will also host co-working areas, an incubator and a business centre, restaurants and shops, a kindergarten, a gym, private apartments as well as an urban plaza, terraces and rooftop farms. With the diversity of this programme, Shake "decompartmentalises" offices and hosts other users, thereby bringing people together and adapting to new lifestyles.

Shake, Lille. Architect: PCA-Stream.
SPL Euralille, City of Lille,
Métropole européenne de Lille

The first IKEA store without a car park

In January 2020, the Swedish furniture and home furnishings giant announced the launch of Its first store without parking spaces. Located in the heart of Vienna, the store is intended for customers who travel by public transport, on foot or by bicycle. It guarantees the delivery of substantial purchases within 24 hours by electric truck. With this project, the brand breaks away from its traditional model of single-storey retail areas on the outskirts of cities, and engages in proximity.

Ikea, Vienna. Project owner: Ikea.
Architects: Querkraft Architekten

[1] Opinion piece published on 9 January 2020 on Bouygues Construction's blog, Shared Innovation

Le Belaroïa

Bouygues Construction reference

Planning diversity is one of the objectives of the Saint-Roch ZAC project in Montpellier, and buildings such as Le Belaroïa incorporate this principle in their planning. Completed in September 2019, this building opposite the station hosts:

● two hotels over five storeys,
● offices,
● a brasserie on the ground floor,
● twelve housing units and an overhanging balcony on the top floors.

Belaroïa, Saint-Roch Montpellier ZAC. LinkCity.
Architect: Manuelle Gautrand

> While it is important to think in terms of large multi-programme urban areas, this planning diversity also permeates through built projects such as Le Belaroïa. In this case, diversity takes the form of overlapping programmes, like a programmatic layer cake [1].

Manuelle Gautrand
Architect of the Belaroïa project

Diversity Creates New Opportunities

Functional diversity to improve proximity to logistics functions

Agreeing to mix functions and keeping the conditions of a peaceful cohabitation means being able to reintroducing activities that are potentially disruptive in a city but making them work in areas outside urban centres.

Logistics activities, the provision of services contributing to effectively managing the movement of goods, which were banished from the cities for a long time, are gradually returning, in particular under the effect of the growth of e-commerce and its need for immediacy. The return of logistics functions to city centres is viewed favourably as it is deemed environmentally virtuous, by contributing to reducing the distances travelled to deliver goods.

Toulouse Logistique Urbaine

At the gates of the city, an urban logistics area of nearly 20,000 m² will be completed in 2021. Strategically located near Toulouse's wholesale market (*Marché d'Intérêt National* - MIN or National interest market), it will feature two halls for the storage and preparation of goods, as well as a parking area for carriers and delivery vans, who will be able to charge their electric vehicle on site. La Poste Immo has even provided for the use of cargo bikes for certain deliveries.

Toulouse logistique urbaine.
Lumin'Toulouse consortium: Semmaris, La Poste Immo, La Caisse d'Epargne

Chapelle International Logistics Hotel, Paris 18th *arrondissement*

Since 2018, in the 18th *arrondissement* of Paris, a 45,000 m² property development project has repositioned logistics in the heart of the city to better serve the needs of the City of Paris and the Metropolis, with a view to reducing the environmental impact in terms of noise, polluting and greenhouse gas emissions. This operation is underpinned by three innovative approaches:

● multimodality, with a 400-metre-long Urban Rail Terminal to transport goods in Paris via an Urban Rail Shuttle;

● mixed planning whereby logistics activities, offices, vocational schools, a Data Centre and public facilities coexist within the same building;

● exemplary urban integration thanks to the architectural quality of the building which features a roof partly dedicated to urban farming[1].

Logistics "hotel", Chapelle International.
Project owner: Sogaris, City of Paris.
Architects: A26 Architectures

The viewpoint of

Sonia Samadi
Director of development and innovation, Sogaris

Logistics has long been neglected in urban planning even it is needs for a functioning sustainable city. The movement of goods is becoming a genuine challenge with the explosion of e-commerce, which continues to soar by 10% to 15% each year, thus increasing the number of deliveries. The integration of urban logistics into projects cannot however be taken for granted, particularly in large and dense metropolitan and urban centres. To bring back logistics to the city, it is imperative that the project initiators integrate this dimension from the onset. However, this process is not yet ingrained in the work culture.

Nevertheless, the urban logistics market is becoming more structured. It is characterised by very strong demand, and values similar to the trade and retail market in some sectors. There are currently three major types of urban logistics programme: urban logistics platforms (PF), logistics "hotels" (LH) and urban distribution areas (UDA).

These programmes are marked by growing diversification, with increasingly varied uses, users and configurations (building bases, conversion of obsolete business premises or car parks), as attested by the transformation of a former six-level car park on Rue du Grenier Saint-Lazare (see below). The feasibility of such projects depends on a number of technical parameters. The legislation must also change to respond to environmental requirements imposed on operators, with the introduction of LEZs (low-emission zones). These logistics spaces integrated into the heart of urban centres provide an opportunity to develop new services on the scale of a neighbourhood, but also solutions in keeping with the circular economy.

Le Grenier Saint-Lazare, Paris 3rd *arrondissement*

The project proposes the transformation of a former underground car park into a services and storage centre entirely geared towards the needs of shopkeepers and local residents. This space dedicated to local logistics, across six underground levels, will host remote storage facilities and services for professionals (shopkeepers, artisans, gallery owners), as well as local storage areas for individuals. Local concierge services will be available at ground level, run by *Lulu dans ma rue,* a new service for local residents, consistent with the principles of social and inclusive economy. It will also include a room dedicated to local associations, so that the project can become part of the everyday life of all the locals[1].

Le Grenier Saint-Lazare, Paris. Project owner: Sogaris, City of Paris. Architects: Syvil

[1] Sogaris

Diversity of uses, a source of shared energy

In addition to the compactness of a mixed project, other positive results may emerge from the hybridisation of uses including, first and foremost, ease of sharing. This aspect paves the way for intensified uses, examined in the next section - Chronotopy.

The objectives of energy transition involve breaking with a "linear use of resources, i.e. [with] the pattern that begins with collection, continues with consumption and ends with waste discharge into the environment"[1]. The urgency of climate change issues requires rethinking this pattern to move towards the recycling of energy flows. The challenge lies in the recovery of "waste heat", in other words the heat produced via a process the primary purpose of which is not heat production (ADEME, 2015). However, the location of activities impacts energy systems: as the idea is to carry this waste heat from the place where it is generated to the place where it can be used. The proximity of urban functions with different energy needs facilitates the development of virtuous energy systems. The recovery of the heat generated by data centres (date storage centres essential for the running of our digital activities, but particularly energy-intensive) is one of the emblematic examples of flow sharing made possible by functional diversity.

What is applicable in a building is also in a block: several urban projects have already tested these energy sharing systems by making the most of the different energy needs of the urban functions found on site.

Sollys

Bouygues Construction project

This block of the Confluence neighbourhood in Lyon forms part of the Eurêka programme, which involves a consortium of 14 public and private partners and 70 businesses and start-up companies, heralding a more collective mode of urban production. The "Health and Well-being" block forms a group of five buildings, combining offices, housing units, shops and a range of health and prevention services. The complementary nature of the programmes helps share the energy consumption and production cycles as well as rainwater collection. It will be operated by EMBIX, who specialise in the implementation of smart grids.

Health & Well-being block, A1 Sud Lyon confluence ZAC. Developer: SPL Lyon Confluence. Project owner: LinkCity Sud-Est. Contractor: Bouygues Bâtiment Sud-Est. Architects: David Chipperfield, Atelier Vera, Aires Mateus. A1 Nord and A2 Nord blocks. Project owner: Bouygues Immobilier. Smart-grid operator: EMBIX

Recycling the heat of data centres to…

…heat 150 social housing units in Paris' 15th *arrondissement*

The Paris Habitat social housing provider uses the heat produced by the data centre of the Iliad telecommunications company to heat 150 social housing units and a kindergarten. The project reduces energy consumption by 80% on individual heating and 50% on hot water, i.e. the equivalent of a €500 cost reduction per year per household[2].

Paris Habitat, Iliad Group. Architects: BRS Architectes

…heat a municipal swimming pool in Paris' 13th *arrondissement*

The Butte aux Cailles swimming pool is testing the digital boilers developed by start-up company Stimergy. The system recycles heat from IT servers installed in the basement: water from the swimming pool is partially and cheaply heated, while the servers are cooled down without have to use air conditioning. The system covers 10% to 20% of the pool's energy needs and avoids 45 tonnes of CO_2 emissions for heating the water, plus another 20 tonnes which would have been emitted each year for the cooling of computer servers[3].

Butte aux Cailles swimming pool. City of Paris. Digital boiler start-up company: Stimergy

[1] Zélia Hampikian, *Nouveaux tuyaux en ville : les synergies énergétiques et la planification de la localisation des activités dans l'espace urbain,* Urbanités Magazine, November 2015
[2] La Tribune, *Se chauffer gratuitement grâce aux data centers,* August 2017
[3] EcoCO₂, *L'eau d'une piscine chauffée par un data center,* May 2017

Functional diversity: a major drawcard

In addition to its urban and environmental benefits, functional diversity is also a major drawcard for cities.

By combining apparently opposed functions, certain projects manage to create exceptional and surprising spaces, so original that they become a metropolitan, national, and sometimes international attraction.

Markthal

In 2004, the Provast - MVRDV team won the competition launched by the municipality of Rotterdam for the completion of a project combining housing units, covered market and underground car park, also serving as a logistics platform for the merchants of the main square in the city centre. Rather than erecting two residential buildings around a simple covered market, the architects decided to transform the housing blocks into an immense canopy overlooking the market hall. With its diversity of uses and iconic horseshoe shape, the building quickly became Rotterdam's new urban emblem. A fully fledged tourist attraction, the market attracted 8 million visitors in the first year, i.e. more than the Eiffel Tower.

Markthal, Rotterdam. Architects: MVRDV

Copenhill Electric power plant and… urban leisure centre

Inaugurated in 2017, the new waste incineration plant of the City of Copenhagen claims to be the "cleanest in the world". The other major innovation of the building lies in its functional diversity. The BIG (Bjarke Ingels Group) architectural office managed to turn it into an iconic building with a metropolitan outreach. To do this, the roof of the facility was designed as a grass ski slope and a sports and leisure centre open to all. A climbing wall was even added in 2020 along one of the facades. The combination of apparently opposed urban functions is key to the outreach of this building, which has become iconic.

Copenhill (Amager Bakke plant), Copenhagen. Architects: Bjarke Ingels Group (BIG)

The viewpoint of

Pierre des Coutis

Project manager, MVRDV architectural office

When we address the diversity of uses, we are immediately confronted with a series of constraints.

Although obstacles arising from regulations and standards are a reality, in my view they can almost always be overcome. To a certain extent, the building is what you make it. The most difficult thing in the functional diversity equation is the human aspect: listening to users, enabling dialogue between project stakeholders. For example, one of the major challenges is to get local residents to agree to live in a smaller apartment, but to benefit from a shared room and facilities. We must cultivate the "common" notion. This is the condition on which functional diversity can turn into a genuine opportunity to share resources and create different, sometimes exceptional places, where diversity is truly a source of attractiveness.

CHRONOTOPY

Definition

The notion of **chronotopy** derives from the Greek **chronos** [χρόνος], meaning time, and **topos** [Τόπος], meaning place. It refers to the simultaneous consideration of temporal and spatial dimensions in living spaces.

This chapter covers different **approaches consisting of working on temporality to facilitate the coexistence of several user profiles or several uses in the same place.**
These approaches aim at intensifying the use of space, i.e. increasing its use rate.

Useful concepts

● **Occupancy rate:** proportion of people assigned to a site present on said site (not to be confused with the use rate, see opposite).

Example

Out of the 1,000 employees assigned to an office building, 300 are on the road or have an appointment outside the office, 200 work from home and 50 are not working today:

450/1,000 are actually present in the offices, giving an occupancy rate of

45%
at this moment in time

● **Use rate:** proportion of time during which the location is used

Example

An office building is used by workers from 8am to 8pm Monday to Friday (i.e. 12/24 hours), but is empty at weekends (i.e. used 5/7 days) and generally empty in August (i.e. used 11/12 months).

Multiply (12/24)x(5/7) x(11/12) to obtain a use rate of

33%
of the time on a full year basis

● **Intensified use:** approach consisting of increasing the use rate of a space:

by adjusting operating hours;

by involving new users (sharing);

by diversifying the uses of the place (mix of uses);

or by combining these different approaches.

Saunalahti school, Espoo (Finland). Architects: Verstas Architects

Key idea

If activities usually carried out in two buildings are brought together in a single building - by optimising hours of service, alternating uses and users - the need to build one out of every two buildings is eliminated.

This helps cut construction costs, fixed operating, servicing and maintenance expenses, natural and land resources used in half (in order of magnitude). The use of built-up space is intensified to derive significant gains, provided technical, architectural and organisational challenges can be overcome.

+

2 structures built with a 30% use rate

=

1 structure built with a 60% use rate
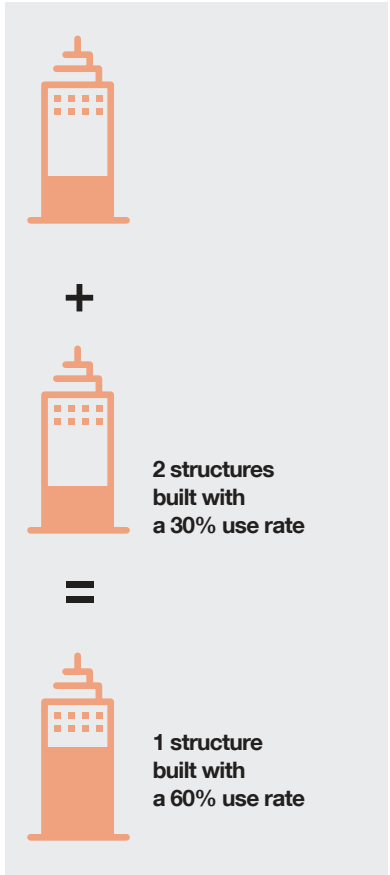
Benefits

● **Reduction in property costs**
The expenses relating to a building, e.g. maintenance, are divided by the number of users, insofar as these users financially contribute to the payment of expenses.

Real estate, on average, is the second largest cost item for businesses after human resources.

● **New revenue streams**
Additional revenue can be generated by increasing the use of space: rental revenue or new business models.

● **Social dynamic**
Different user categories may come together or meet more often, creating or reinforcing dynamics within neighbourhoods and communities in the broad sense. It is in the interest of various organisations to get more involved in their territory, so that everyone can benefit from it.

● **Environmental benefits**
Solutions may already exist, by adjusting hours of service or extending the audience and uses initially intended. This could reduce the need for new construction, and therefore the associated use of natural resources.

57%
of French people would like to get more involved in their neighbourhood[1]

73%
of French people are concerned about the potential consequences of global warming on the quality of life within their region[1]

[1] ObSoCo / Chronos / ADEME / Banque des Territoires / Bouygues Construction / La Poste, Observatory of the uses and representations of the territories, 2020

Intensify the Use of Built-up Space

Different approaches can be used to increase the intensity of use of an urban or property asset.

These approaches share the same goal - reducing the periods during which the structure is unused, i.e. increasing its use rate - and the same expected benefits, which come in many shapes, commercial or otherwise. Three separate factors can generally be adjusted:

- **hours of service**

- **different uses for which the place is intended**

- **different profiles who have access to the space**

We find these factors which, when combined, form different approaches to chronotopy:

	main use	+ new uses
main user	**extended hours of service**	**mix of uses** (page 80) use of space for a variety of uses
+ new user profiles	**sharing** (page 74) space shared between several users	**combined sharing and mix of uses** (page 83)

Chronotopy can also be approached from the perspective of supply and demand. In the specific context of the intensified use of buildings, neighbourhoods and public spaces, one should refer instead to property resources and needs[1]:

Property resources (supply)

- **location** (room, building, outdoor space, public space, etc.)
- **characteristics** of the location critical for its use
- **available slots** (hours, days, months) when the space is unused
- **economic need** of the main user

1. Assessment
2. Matching
3. Evaluation of the benefits and risks inherent in sharing space
4. Contractual, architectural and technical solutions

Property needs (demand)

- **user** (natural or legal person, group, etc.)
- **desired use**
- **desired slots** (hours, days, months)
- **ability or inability to incur expenses** to meet this need

The crucial step when determining opportunities to intensify uses is the territorial assessment, carried out to identify and qualify these needs and resources. It makes it easier to match offers with compatible needs.

The main technical dimensions identified to help intensify uses are as follows:

- **Access management**
- **Security**
- **Cleanliness**
- **Noise**
- **Regulations: PAB, Housing, Labour Code**

Beyond these technical and regulatory points, the main implementation difficulty lies in the management of chronotopy. This is why the operator or integrator who manages the alternating uses and users of a space seems to be a key player in chronotopy. There are technical, architectural and contractual solutions to take the sharing of spaces to the next level, but the challenge is to ensure the optimal day-to-day running of the entire system. Digital tools will not always be sufficient, and human presence will often be required and desirable.

Will universal platforms soon emerge to match property needs with resources, which already exist for the selling and renting of housing properties (SeLoger, MeilleursAgents), short-stay accommodation (Airbnb, HomeAway) or the renting of workspace by the hour or month (Neo-Nomade, Hub-Grade)?

84%
of French people who feel their municipality of residence is "far too dense" want to move (compared with half as many in those who feel their municipality has "the right density")

Which uses is it social acceptable to intensify?

- **High urban density is generally perceived negatively by the French population. One of the challenges of intensification is to clearly distinguish it from built-up density.**

- **The limits to intensifying uses should be kept in mind: how humanly and culturally acceptable is it? There is a thin line between the dream of sharing and the nightmare of losing one's bearings.**

- **In 2020, the COVID-19 health crisis led to increasing distrust of certain shared systems, linked to the "social distancing" imperative and the fear of infection through shared facilities. This distrust affected public transportation first of all, but also coworking spaces, hotels and other enclosed, crowded places. Is this new mistrust in "common" areas here to stay?**

- **To reassure users, those involved in sharing spaces point to lists of measures and recommendations for reopening: hygiene and cleaning, personal protection, distancing, prevention and dialogue for example are presented as compulsory measures by the Neo-Nomade platform[2].**
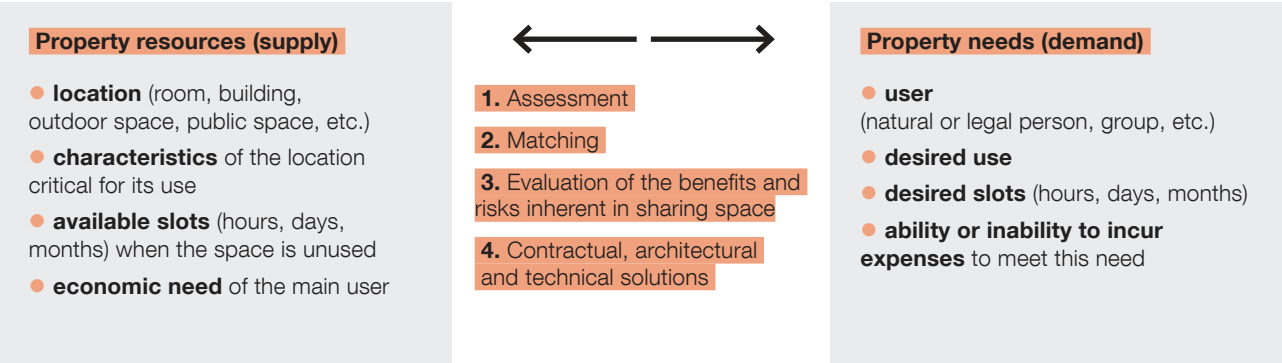
[1]Method developed by the forward planning teams of Bouygues Construction, OuiShare and Chronos with a view to the *Un espace, plusieurs usages* forward planning workshop of 27/02/2020

[2]Neo-Nomade blog, Checklist of Covid-19 measures in the coworking sector, April 2020

Sharing Space: Different User Profiles for Similar Uses

Uses can be intensified within a given space by broadening the range of users, while retaining the same function: more diverse users share the same uses. For example, more workers can share the same office building, different sports groups can share the same gym, and residents and employees can share parking spaces. This is referred to as a shared site.

Sharing parking spaces

Above-ground, underground or open-air car parks are hungry for space and, on the whole, financial investments in the construction and maintenance of parking lots are substantial.

According to an INSEE study highlighted by APUR[1], Parisian households owned 462,690 cars in 2015, for a total of 612,610 spaces reserved for residents, on roads or in private car parks. This suggests that approximately 150,000 spaces are unused, unevenly distributed across the Paris territory. At the same time, the number of cars in Paris has declined by 17% between 1999 and 2015[2].

This underutilisation or partial use trend is more pronounced in monofunctional neighbourhoods, where certain car parks are empty for the best part of the day or night, depending on whether they are located in a mostly residential or tertiary area. From a regulatory perspective, the notion of "sharing parking areas" was introduced in the French Town planning code by decree in 2015[3]. This is used to reduce the number of parking spaces created as part of mixed operations, which involve a natural rotation between offices and housing units.

[1] APUR, *Évolution du stationnement et nouveaux usages – Volet 1,* May 2019
[2] INSEE 2015
[3] Article R151-45 of the French Town planning code, codified by decree no. 2015-1783 of 28 December 2015
[4] Research Institute for Housing America, Quantified Parking: Comprehensive Parking Inventories for Five U.S. Cities, 2018

In Des Moines (U.S.), there are about

18 times

more parking spots than households[4]

Sharing parking spaces consists of aggregating the private parking offer of several property projects and results in the creation of common car park(s). In essence, the objective is to eliminate small parking areas specific to each property project, and aggregate them in a single location. This practice helps preserve land and optimise construction costs.

The principle of overlapping parking periods consists of "taking advantage of the fact that not all users of the same parking facility are always present simultaneously. Either because the same category of users is never 100% present at the same time (residents, workers, visitors), or because the parking times of user categories vary throughout the day (residents primarily at night, workers during the day, etc.) and can even be highly complementary".

The land and financial savings achieved exceed those of simple sharing, as implementing overlapping parking periods is akin to reducing the number of spaces needed in the car park. Functional diversity is a condition for benefiting from overlapping parking periods. The diversity of activities and therefore users present on site guarantees the difference in the temporality of uses.
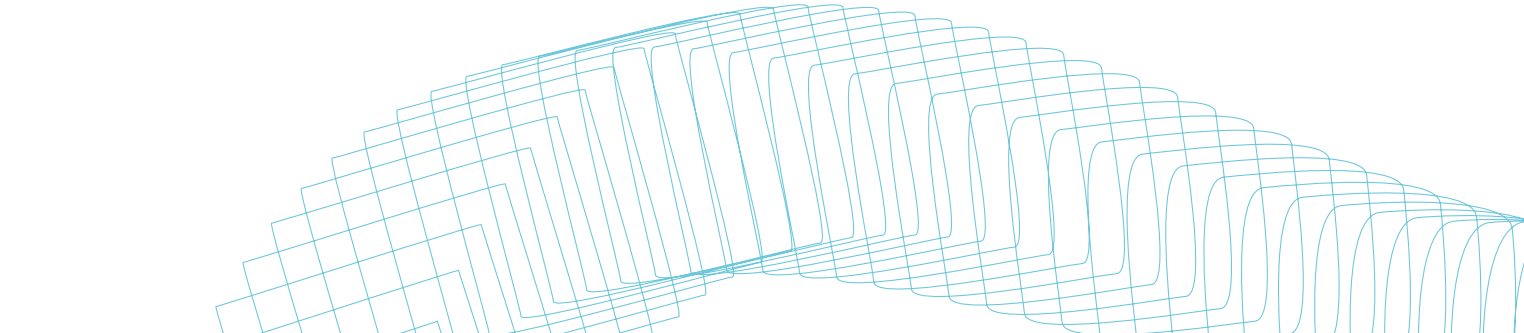
Hoenheim Car park

The car park of the Hoenheim town hall is used during the day by town hall users, and in the evening by the residents of the assisted housing units located nearby. This makes it possible to reduce the total number of spaces needed by aggregating these users with different needs.

MacDonald warehouse

The MacDonald warehouse, converted as part of the Paris Nord Est ZAC, is home to 2,000 jobs, 1,100 housing units, 32,500 m² of shops and 16,300 m² of facilities. The location of the project and the nature of the programmes generate significant flows of visitors and employees at various times of the day. The designers decided to make the most of this attractiveness and rotation by partly overlapping parking periods between residents and employees, while creating a section open to all.

OptiMove

Bouygues Construction solution

The OptiMove concept, which won a prize during Bouygues Construction's 2016 innovation competition, is based on the modelling of parking needs and the study of the hourly occupancy of car parks. This method is used to optimise the design of multi-use car parks (offices-housing units). By using input data from INSEE and the Household Travel Survey when available, complementarities are anticipated in terms of the hours at which the car parks of offices and housing units are used, and the number of parking spaces needed is reduced. This methodology was used on the La Maillerie project in Villeneuve d'Ascq and helped save more than one third of spaces compared with what was initially planned.

Zen Park

This platform, largely used in France and Belgium, proposes a shared parking system. The service includes the implementation of a system at car park entrances to control the opening of the car park via a pass directly available on the user's smartphone. It involves a broad range of partners: hotels, administrations, supermarkets, etc.

Sharing sports facilities

School and university sports facilities have sometimes been built within the establishments, which makes them inaccessible to other user profiles, while other sports facilities, such as private sports clubs, are not sufficiently used by school groups. Extending the use of these spaces to other groups requires the implementation of partnerships and agreements between the two entities and, where necessary, the external manager of the facility.

In Paris for example, the city's *Paris + sportive* sports policy stresses the need to optimise the occupation of existing facilities, and to create new forms of cooperation with school and academic communities.

Furthermore, the *Cité internationale universitaire de Paris* makes its tennis courts available to the general public, through telephone bookings, as well as sports associations of different kinds thanks to its partnership with the Paris Université Club (PUC) association.

In 2019, in Paris, cooperation between 201 sports associations and 18 school facilities allowed students to benefit from an additional

1,184 h

of sport per week outside teaching hours[5]

[5] *Paris + sportive* reference document, City of Paris, February 2019

Sharing workspace

Intensifying the use of office spaces may involve subletting to other businesses in need, during or outside standard working hours, e.g. in the evening or at weekends.

A stumbling block is added to those already identified: besides the fact that most office buildings are governed by the French Labour code and, as such, are unlikely to become accessible to the public, the difficulty in guaranteeing the confidentiality of the activities carried out therein may be off-putting to some users[1]. Coworking spaces address this challenge by focusing entirely on their external users, in different forms:

- **spaces dedicated to self-employed professionals,** e.g. coworking cafés;
- **stakeholders dedicated to businesses,** with a model similar to the subletting of offices with related services and shared spaces;
- **models relating to support for new undertakings,** such as enterprise centres or incubators;
- **lastly, a trend relating to the return of production activities to the city,** including for example fablabs. Still under-represented in terms of surface area, this approach can be enjoyed beyond the tertiary sector, and can involve other businesses and activities, not just office work.

In 2019, New York City and London alone accounted for

22%
of global coworking stock[2]

1.100 million sqm
of coworking spaces in London in 2019

In 2018, Vienna has had the strongest year to year growth in new coworking spaces:

+449%

Average price per workstation:

€330/month
in open-plan offices in Paris[3]

4
players share one quarter of the total area of coworking spaces:

- **Wework**
- **Morning** *coworking*
- **Wojo**
- **Spaces**

Anticafé

This company provides a different kind of coworking service, with no strings attached and accessible to all: teleworking employees and self-employed professionals with no fixed offices. Offering simple individual workspaces in a relaxed atmosphere, the idea is to pay an hourly, daily or monthly rate to access the sites and benefit from various services: coffee of course, but also beverages, printers and paperboards.

Wojo

The special feature of the coworking offered by Bouygues Immobilier and Accor is that it comes in several workspace formats: Wojo Corners offer a quiet workspace, whereas Wojo spots offer a lively atmosphere. In addition, the network proposes to rent meeting rooms, but also hotel rooms converted into enclosed offices. The installation of small coworking spaces directly within Accor group hotels enables Accor to make numerous locations available, widely spread across the territory.

Les Fabriques - ICI Marseille

Bouygues Construction reference

The *ICI Marseille* collaborative and inclusive factory is at the heart of the Fabriques urban project. It is an artisan production and shared knowledge site which illustrates the return of production activities to the city through the sharing of workshops among professionals, partly accessible to the general public.

Developers: LinkCity, Bouygues Immobilier. General contractor: Bouygues Bâtiment Sud-Est. Operator: Make ICI

Sharing spaces in housing units

In apartment buildings, the optimisation of spatial density gives rise for example to shared spare rooms, common laundry rooms or shared terraces and gardens: communal areas help reduce private spaces.

Which proportion of your home are you willing to share?

9 in 10 young people say they are willing to share part of their home or outdoor areas with their neighbours[4].
When sacrifices have to be made on the private portion of one's home to create vast shared spaces, careful consideration must be given to which spaces are best suited and desirable for communal use.

We asked 1,000 young people aged 15 to 25 about their vision of tomorrow's housing sector[4] and they find the following to be the best options as spaces to be shared:

- **Outdoor spaces:** vegetable garden, compost, terrace or garden...
- **Specialised services:** laundry room, gym, games room, library, swimming pool, space dedicated to the donation of unused items, etc.
- **Socialisation areas:** shared spare room, relaxation area, kitchen, sauna, etc.
- **Production places:** DIY, workspace, printers, etc.
- **Means of mobility,** such as shared vehicles for example.

Allure

With three communal living spaces managed by a concierge service, this building consisting of 120 housing units was designed to improve the life of its residents. A kitchen on the roof terrace of more than 100 m² can be privatised by the residents for any type of event. It is located near the shared guest room, which can accommodate friends or relatives for one night, host meetings or film screenings for example, and can also be booked by the residents of the building. On the ground floor, the shared laundry room is freely accessible.
Allure, Clichy-Batignolles ZAC
Developers: OGIC, Demathieu Bard Immobilier. Architects: ITAR Architectures, Fresh Architectures

Pinnacle @Duxton

The flagship of the social housing offer of Singapore's Housing Development Board (HDB), these seven towers are interconnected by wide sky bridges on the 26th and 50th floors. Thanks to these sky bridges, people can take a stroll in green spaces or exercise in the open air, and the terraces of the top floors can be booked for events.

The Pinnacle @Duxton, Singapour

Taking it further...

Bouygues Construction conducted a collaborative study on the role of sharing in social housing, summarised in the *Oser la mutualisation dans le logement social* trend book, available on the Bouygues Construction blog.

Infinity Home

This concept by architect Eric Cassar questions housing arrangements in an innovative manner. It is based on minimalist housing benefiting numerous shared spaces which can be booked via a mobile application or "digital compass". The project was awarded the "Smart Cities" top prize by Le Monde newspaper in 2017.

University Rooms

Created by an Oxford alumnus, the "University Rooms" service rents unused student rooms during school holidays on behalf of universities.
The service includes the cleaning and check-in/check-out of the rooms. This initiative convinced several universities worldwide.

Living and working with vast shared spaces

An increasing number of housing offers have embraced the concept of co-living.

With a wide variety of sizes (from a few beds to hundreds of bedrooms or studios) and involving multiple lengths of stay (from one night to one year depending on those involved, leases renewable every week or month, etc.), these spaces embrace, to some extent, the possibility of sharing vast communal areas at the cost of reduced individual spaces. In keeping with the principles of the functional economy, and embodying a service-based housing model, they generally provide a range of particularly vast shared spaces[1], often inspired by hotels or yourth hostels, for example:

- **Communal kitchens**
- **Shared workspaces**
- **Spaces dedicated to temporary events**
- **Bar and restaurant**
- **Gym**
- **Spa, swimming pool**
- **Games, screening rooms, cinema, etc.**
- **Outdoor areas**

Another benefit of co-living lies in the quality of the furnished spaces provided, largely emphasised by their operators in the form of photos and videos in targeted communications and advertisements. This is coupled with the reassuring presence of the operator, an external manager, preventing disputes typical of flat-shares. The resident of a unit managed by Colonies in Paris' 20th *arrondissement* states: "This is nothing like a flat-share. All arrangements are made online, and anything likely to create conflict between tenants is smoothed by the Colonies managers[2]". Lastly, these spaces often make it easier for newcomers to a city to access housing than the traditional housing sector, and offer more flexible departure conditions.

[1] Coliving insights study, Exploring coliving as an innovative housing solution, November 2019
[2] *À nous Paris*
[3] JAM / Bouygues Construction. *L'habitat du futur* survey of 1,000 young people aged 15 to 25 representative of the population, January-February 2020

Only

34 %
of young people say they are familiar with the term co-living

Once the concept has been explained to everyone,

43 %
of young people say they are interested in co-living[3]

Emblematic examples of co-living offers:

The largest network
Quarters

Located in Europe and the USA, this network is gradually expanding its model of medium-sized buildings (50 tenants) with small-scale shared spaces, focused on the kitchen and coworking.

The most intimate
Outsite

Outsite proposes small co-living spaces, not dissimilar to shared flats: 5 to 8 bedrooms.
Its opt-in model allows its members to access the network located on several continents.

The most ambitious
Common and hmlet

The Common group in the USA, and hmlet in Asia-Pacific, are both experiencing rapid growth by renovating existing buildings to adapt them to their co-living model with a minimum amount of shared places: kitchen, lounge, workspace and laundry room.

The most natural
Coconat

This isolated co-living space in a rural environment appeals to "workationers" by offering them a strong regional presence for short stays.

The most integrated
The Collective

This is one of the few players capable of both designing, developing and operating buildings from A to Z. It is characterised by large buildings (up to 500 tenants) with a very wide range of services and shared facilities.

The most exotic
Smena

Network of small co-living spaces in remote destinations (Montenegro, Sri Lanka, Bali, etc.), prioritising stays of less than two months, including events and excursions adapted to each location.

The most volcanic
Nine Coliving

Located in Tenerife in the Canary Islands, this space is ostensibly dedicated to digital nomads on the lookout for unique places so that they can travel while working on their laptop.

The most mountainous
Cloud Citadel

Located in former military lodgings in Briançon, in the French Alps, this place, also dedicated to international digital nomads, is a cross between a youth hostel and a coworking space, touting its easy access to outdoor activities.

The most communitarian
Embassy Network

Embassy Network is a network of co-living communities "with a mission", self-managed throughout the world, promoting a model based on shared responsibility between tenants rather than a service delivery model.

The most local
Venn

Focusing on certain targeted neighbourhoods in major cities, Venn proposes housing units in small-scale buildings close to each other and operating as a network. It aims at creating a sense of community and promoting local exchanges.

The most sustainable
Vitanovae

Vitanovae places emphasis on respect for the environment (choice of materials, objects, etc.) in a convivial setting accessible to as many people as possible. Its addresses are currently concentrated in two neighbourhoods, in Paris and Bordeaux.

Mixing Use of Space: Different Uses for the Same Group of Users

Diversifying the uses of a space often involves setting up a broader range of services for the users of this space. For example, an office worker who spends an entire day at their workplace may stay after work to enjoy the space converted into a function room or a gym. A student could set up their small studio as a workspace, of course, where they can sleep.

This aspect of chronotopy requires ensuring the following is in place:

- **Managing uses,** via a services operator, a platform or a contact person for example, in charge of managing the creation of user charters, price rates, hospitality, the allocation of resources, related services…

- **Organisation among stakeholders,** with a clarification of economic and financial contractual links, and a clear division of responsibilities.

- **Easy-to-use layout,** to enable the rapid conversion of the place, in terms of spatial design or the choice of furniture: involving light changes in layout (e.g. moving chairs), heavier transformations or specific features (see below page 82).

- **Technical features,** in particular to guarantee access control and security.

- **Multi-standard layout,** taking into account the requirements specific to PABs, offices and housing units.

- **Taking out appropriate insurance** covering multiple uses and user profiles.

- **More frequent cleaning system,** in response to the increasing occupation of the premises.

The users' daily rhythm is critical when it comes to the use of space. In 2017, according to a DARES study, 44% of employees in France (excluding Mayotte), i.e. 10.4 million people, worked atypical hours[1] at least once a month, primarily on Saturdays or in the evening. In office buildings, fixed working hours are the norm, with fixed lunch breaks for example. These spaces are often categorised by a main activity: meals taken in a company restaurant, or work in an office floor When this main activity is subject to a fixed schedule, it is easy to envisage another use of the same space, outside this main time slot.

In 2017, according to a DARES study,

44%

of employees in France (excluding Mayotte), i.e.

10.4 million

people, work atypical hours at least once a month, primarily on Saturdays or in the evening[1]

[1] Atypical hours, INSEE definition: "relate to people who claim they have worked on Saturdays, Sundays, in the evening (8pm to midnight) or at night (midnight to 5am), at least once in the four weeks preceding the interview".

Heldergroen

The removable desk system installed on the company's premises makes it possible, in the evening, to lift the desks up into the ceiling to turn the room into a gym or a function room for the employees.

Studio Heldergroen Droste silo Haarlem, Haarlem (Netherlands). Architects: Zecc Architecten

87 Richelieu company restaurant

Aware that the neighbourhood where its new premises are located was not lacking in food services, the company designed its restaurant as a modular space, used outside meal times as a meeting room or relaxation area.

Company restaurant of the Altarea head office Cogedim 87 rue de Richelieu, Paris 2th *arrondissement*. Architect: Wilmotte & Associés

---

Multiplying uses in a space dedicated to a single user category does not depend solely on the regularity of schedules and is not restricted to office buildings. This concept also applies to collective housing units equipped with common rooms which, by definition, are intended for the residents for a broad range of uses such as communal meals, entertainment or events for example.

Residence Machu Picchu

This residence with 53 collective social housing units is equipped with covered shared spaces on each floor. The residents are free to take possession of these spaces, for exhibitions, film screenings, parties or even to install libraries or workshops of any kind.

Machu Picchu residence, Fives neighbourhood (Lille).
Architect: Sophie Delhay.
Social housing provider: SIA Habitat

ZOKU

ZOKU is a cross between a hotel, an apartment and an office, and provides mobile professionals with spaces for short or medium-term periods. Lofts are for accommodation and work purposes, thanks to the innovative configuration of the room: stairs to access the bed on a retractable mezzanine, bed disappearing behind a panel. Like in a hotel, shared spaces consist of lounges, cafés-restaurants and event areas that can be booked. This solution will be implemented in the *Îlot Fertile* project in Paris.

The viewpoint of

Philippe Morel
Founding partner, Dynamic Workplace

In our audits of the quality of use of tertiary buildings in the Île-de-France region, we found (before any impact of COVID-19) that at least 25% of office space was unused, due in large part to changes in working practices over the past ten years.

For example, with the digital technology, the reduction in mail and paper consumption has rendered the vast majority of cabinets useless. In addition to this is the actual occupancy rate, which has declined sharply: it is now around 40% vs 60% in the early 2000s (number of employees present on site on average between 9am and 7pm, 5 days/week).

There has always been a considerable difference in asset valuation between an empty property and an fully occupied property. More importantly, a difference is emerging between a tertiary property leased to a full single lessee/single occupier and a fully occupied property leased to a single lessee/multi-occupiers (coworking space) as the risk is diluted. Workplaces are becoming living spaces which must be operated. This need, expressed by company employees, has kept growing over the past few years. Coworking stakeholders address these needs by providing employees with a high level of service, thereby contributing to reducing the occupancy rate of non-operated buildings.

80% of tertiary property assets are in urgent need of an upgrade. There is an urgent need for companies and owners to rapidly integrate new uses into their properties with a view to maintaining their appeal.

Enable a Flexible Use of Convertible Spaces

Easily convertible spaces are conducive to the intensification of their use.

For example, the integration of movable or modular furniture is a rapid solution that responds to this need for short-term spatial transformation. Certain cramped housing units can be transformed into different configurations. Housing units, hotels or tourist complexes can also be transformed to accommodate a different function, for example by creating remote workspaces.

Examples of solutions:
- removable partitions
- sliding doors
- fold-up beds, tables and benches built into walls or whanging off ceilings and easily unfolded
- convertible kitchens
- adjustable size furniture
- movable furniture

Working in the hotel

In 2020, the Japanese government encouraged teleworking space initiatives as part of a policy intended to revitalise tourist areas neglected during the health crisis. Hotels are turning rooms into workspaces, by removing beds and offering additional services: yoga mats and stretching bars are provided, bar promotions are made available to employees, rest areas and pool tables are freely accessible.

Never too small

Australian YouTube channel Never too small highlights projects relating to small apartments and studios with a limited footprint, thanks to smart and creative design. In the 24m² apartment designed by the Cairo studio, the kitchen unfolds and opens. When folded up, the space turns into a simple living room. Similarly, sliding doors serve as a bookcase or pantry, and help isolate the bed to create a space akin to a bedroom.

Architect: Nicholas Agius.
Design: Cairo Studio Never Too Small Australian YouTube channel

Flying Table

Practical for small spaces, a wooden board held by ropes and operated with a remote control comes down from the ceiling and serves as a table. The height of the table can be adjusted to its use: office for working in a standing position, table for eating. It even features retractable legs which can be unfolded.

Flying Table, JCPCDR Architecture

On-demand room

At the intersection of two housing units, the "on-demand room", created as part of the Rennes1 Foundation Chair with help from Bouygues' e-Lab, can be dynamically integrated into either housing unit. This room can be alternately privatised for housing unit A, for housing unit B, or shared by housing units A and B. This solution helps adapt to increasing changes in the make-up of families.

Yo! Home

Yo! Home is an apartment concept where a single room can take the form of a living room, bedroom or kitchen in a matter of seconds. Architect Simon Woodroofe uses ceilings, floors and walls for mounting furniture without losing any space. Yo! Home apartments are intended for upper-middle class families.

Different User Categories and Uses in Hybrid and Shared Places

If we really think through the idea of intensifying the use of space, we can envisage places used by different user profiles and for different activities. This very flexible approach needs to be carefully examined and managed to work effectively. Combined with extended opening hours of the space, this is how more can be done about intensifying the use of space.

Opening school and university facilities to other user categories

While schools and universities are dedicated first and foremost to educating their pupils and students, the user categories and uses permitted in these spaces are becoming more diversified. In some cases, this may contribute to dynamism of a neighbourhood or respond to more occasional needs, e.g. the locals residents' needs to organise a business seminar, or a community workshop. Sharing premises brings in additional revenue, thus consolidating the finances of facilities of public interest.

€210/half-day

rental rate of a classroom for less than 20 people at EIVP in 2020.

€60/half-day

price for renting the premises of the Saint-Benoît school (Versailles) on Wednesdays or at weekends, for family gatherings or children's birthday parties for example.

Mab'Lab

Inaugurated in September 2016, the Mab'Lab is a coworking space accessible to all with a very distinctive feature: it uses the premises of the Crous Mabillon university restaurant in Paris, outside meal times. This project was financed by the participatory budget of the City of Paris of 2014 and led to new forms of partnership.
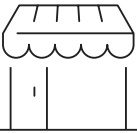
Ephemeral sales outlets

The emergence of pop-up stores, also known as ephemeral stores, reflects the appearance of a new time scale for new uses in terms of consumption, information and, more generally, our lifestyles. Their set-up is virtually instantaneous, thereby creating a rapid succession of uses and users.

In Europe alone, more than

360 pop-up store

operations were identified from 2008 to 2015[1]

In the same vein, the concept of corner-shop consists of temporarily installing a sales outlet for a chain in the sales area of another chain. The guest chains benefit from this practice: the corner-shop chain pays a commission for using the space which, as a result, pays for itself, and gains visibility. Some Carrefour hypermarkets, for example, have replaced their household appliances section with a Darty corner-shop.

Penguin Living

On International Women's Day, publishing company Penguin Random House opened a pop-up store in London, with books relevant to the topic of the day. The pop-up store also hosted workshops and meet-and-greet sessions with female authors. The proceeds of the sales of books and registrations for workshops were donated to an association providing support for female victims of domestic violence.

Street Store

Ephemeral places can also be free and in a non-traditional setting. The "Street Store" initiative is based on a clothing deposit and donation system for people in need. This give-away outdoor store encourages a new form of social interaction and enhances the dignity of these people.

[1] Study by the *Institut Français du Libre-Service du Commerce, Pop-up Store: le nouveau format vedette du retail,* 2015

Private spaces opening up to the city

The following examples show that spaces traditionally reserved for a given type of users (hotels, office buildings, universities) are innovating by opening up to the city and being given more diverse uses and users.

How can we convince stakeholders (investor, owner, tenant, etc.) and users of the positive externalities associated with a greater openness to the city?

This brings management complexity, but also benefits in terms of attractiveness and innovation.

EM Lyon

The purpose of the EM Lyon campus project is to open up to the city and its residents. To this end, the school's central building will be divided by a pedestrian street, home to a few shops as well as business spaces. This future hub will accommodate a variety of uses throughout the day, with a view to blurring the boundary between the school, businesses and local residents.

EM Lyon Business School (Lyon), Altarea Cogedim and PCA-STREAM consortium

Sways

The "Sways" (Smart Ways to Work) multi-use building project was born out of the desire to enhance the existing building, which was closed in on itself with a single entrance from the street. Sways will retain its primary use as offices but will be divided by a pedestrian street and will be more open to the city by creating more access points. The intensified use of the building will be insured through a broad range of services for the offices as well as the residents and employees of the neighbourhood: gym, restaurant, shops, etc.

Sways, Issy-les-Moulineaux
Project owner: Bouygues Immobilier.
Architects: A. Bechu & Associés

Magasins Généraux

Les Magasins Généraux de Pantin is a former industrial site in Pantin, converted into a work and creative space by advertising agency BETC. The very palpable cultural dimension is reflected in the number of events planned, which attract numerous artists. Workspaces are located in the upper floors while the ground floor is open to the general public, promoting synergy between employees, visitors and artists, like a small town.

Reception desk, Kiosk and exhibition areas

The lobby is located between the two buildings of the *Magasins Généraux*. It is open to employees and the general public as well as occasional visitors. Right next to it, the 1,000 m² *Grande Salle* hosts cultural events and its "raw" appearance enables a wide variety of uses, including a two-week dance workshop, inclusive fundraiser or photo exhibition. This space open to everyone is proud of its public space status, and its ambition is to provide local residents with cultural activities.

Le Dock B

On two levels on the ground floor of the *Magasins Généraux,* the Dock B space was designed by the Allo Floride association and Renaud Barillet, who is also the director of La Bellevilloise. Dock B combines cultural programming with food courts, where people can come and work in a convivial atmosphere.

La Cantine

On the 1st floor, the company restaurant of the *Magasins Généraux* uses digital technologies to place orders and pay, and buys local produce transported over short distances. The food court is open to employees outside lunchtime so that they can meet for work or over coffee, based on the model of a coworking space.

Workspaces

The upper floors make room for offices with unassigned desks and collective workspaces. Their specificity lies in the objects created by designers to furnish the space and propose different work methods: on stands, behind curtains, bar tables, telephone boxes, etc.

Diversifying the Uses of Public Space

The notion of chronotopy also applies to public spaces, insofar as they host a variety of uses over time.

Our urban lifestyles result in daily rhythms in our use of public spaces. For example, the temporal approach to urban planning requires making adjustments to public spaces, by pre-fitting them to give considerable freedom of uses. A classic example is the movable chairs of Paris' Jardin du Luxembourg, which was used in several parks worldwide, such as Bryant Park in New York.

Spaces adapt to changing uses: market, parade, concert, sporting event, in other words, alternating temporary uses.

In a more minimalist manner, certain large public spaces can also accommodate, due to their initially neutral layout, many successive uses. In the well known example of chronology in historic public spaces, in Siena, the medieval central square has a slightly curved shape and is home to a famous biannual horse race, which radically alters it use.

Quatorze Collectif

The organisation proposes ephemeral wooden architectural modules to create new spaces. The Matrioshka connected street furniture solution is used for example to temporarily transform a public space into a renewable energy micro-production and Internet access point.

Place de la République

Inaugurated in 2013, the new layout of Place de la République, in Paris, makes it the largest pedestrian square in the city and aims to be a "stage open to multiple urban uses". Every effort has been made to enable free appropriation with a multiplicity of uses.

Place de la République, Paris.
Architect: TVK. Project. Owner: City of Paris

Imagination Playground

Imagination Playground is an innovative playground solution conceived by architect David Rockwell. The concept consists of providing children with game kits in the form of blocks. Children build their ever-changing playground themselves. The originality of the solution lies in its ease of implementation, over space and time. Several spaces have adopted this solution: Burling Slip (Manhattan), Pop Up Park (Morgan Hill) or Betsy Head Park (Brooklyn).

Undefined Playground

BUS Architecture designs ephemeral sports facilities referred to as Undefined Playground. Installed in public spaces, they can be used to play Frisbee, football or basketball, thanks to removable panels which, depending on the layout selected, feature all major equipment of these sports such as football goals or baskets. Deployed in Seoul, this solution responds to the limited supply of sporting opportunities for local residents.

Sundance Square Plaza

This 5,000 m² public square which can be privatised hosts concerts as well as yoga classes or outdoor film screenings. The entire square can be rented, or just the central pavilion, via a booking platform.

Sundance Square Plaza, Fort Worth (Texas)

A scalable road

Roads and road edges can also adapt to varying uses over the course of a day. Mobility plays a major role in this space. This is why some cities have decided to reverse the direction of traffic in certain lanes during the day in order to ease the traffic flow, as is the case with Connecticut Avenue in Washington DC. In Los Angeles, certain 2-lane dual carriageways turn into 3-lane dual carriageways at peak times, to the detriment of parking lanes where parking is prohibited from 7am to 9am and from 4pm to 7pm. To go one step further, the place given to the different modes of transport could be adjusted over the course of the day or week based on the needs and objectives sought. Solutions are emerging to automate these processes, and even make them visible on the ground in the form of light signals. These approaches are consistent with time-based urban planning.

Pavement areas also take on a new significance: new mobility solutions such as self-service scooters, bicycles and electric scooters, chauffeur-driven cars and "last mile" delivery vehicles have a vital need to access the kerb[1]. In the USA, new players such as Remix or Coord are specialised in dynamic, real-time "kerb management". They bring supply and demand together in terms of access to the kerb for the benefit of the city.

Avenida Atlântica

In Rio de Janeiro, the city regulates the wide urban boulevards of Avenida Atlântica, along Copacabana beach, to adapt their configuration to mobility needs. In the morning, all vehicular traffic lanes are one-way towards the city centre, while in the evening they are directed towards residential neighbourhoods. During off-peak periods, half of the lanes are two-way. On Sundays, this entire coastal road is closed to cars to promote soft traffic and its other uses, as an extension of the beaches.

Flowell

This dynamic signage solution developed by Colas in conjunction with CEA Tech and CEREMA, responds to evolving space sharing needs, while making pedestrian movements and road traffic safer. Light panels integrated into the road come on to show users the difference between pedestrian and road spaces, the nature of parking spaces, hazards, etc. For example, road markings can indicate a parking space reserved for deliveries in the morning, which returns to its normal use the rest of the time.

Curb management

The Coord curb management platform is entrusted by the cities with the management of this space. Their services involve four tasks:

● **identify:** determine where the kerb is, what is on it, how it can be used and by whom;

● **allocate:** align the space allocated to the kerb with the city's priorities and inform stakeholders of any changes;

● **price:** combine the kerb inventory with the data on the use of this space to upgrade prices in real time with a view to achieving targets;

● **operate:** change motorists' driving patterns thanks to smart charging areas, traffic control and pricing adapted to demand.

FLOWELL
by COLAS

[1] Isabelle Baraud-Serfaty, *Le trottoir: nouvel actif stratégique*, Futuribles Revue, n°437, May 2020, pp.87-104

4 questions for

Isabelle Baraud-Serfaty
Lecturer at Sciences Po Paris, founder of Ibicity

> We need to have a debate on the use and pricing of public space, by focusing on the public interest and the end user.

Which drivers of change are affecting the approach to public space?

Just look at the pavement. What we see first of all are changes associated with mobility: increase in chauffeur-driven vehicles who drop off and pick up passengers; development of online shopping which boosts the parking needs of commercial vehicles; adoption of micro-mobility solutions, which clutter up the pavement; growth in shared mobility; development of the Internet of things, with parking sensors for example; or conversion of streets into pedestrian areas and cycle paths. The pavement has become a key resource for many mobility operators but also, more generally, for a multitude of urban operators: street furniture operators or entities in charge of limiting air pollution or cooling the city for example. Lastly, we have all experienced the emergence of new uses in the context of the pandemic: the pavement has become an open space on our doorstep during lockdown periods and, because of social distancing requirements, a waiting room for shops as well as an extension of restaurants.

What issues does this hustle and bustle around the pavement raise?

We have found that the pavement is becoming a key component of the business model of some private companies. Hosting multiple new uses in an area in short supply, it becomes rare, which gives it added value. It can even be considered the most valuable space in the city. We also find that an informational dimension is added to the physical dimension of the pavement (access to public space is increasingly reliant on access to information on public space). A growing number of stakeholders are involved in the value chain of the development and management of the curb, in a fragmented way. This entices local authorities to act differently, all the more so if their financial resources are dwindling under the effect of the crisis associated with the pandemic.

In light of these changes, which scenarios would you envisage?

One scenario would be an escalating number of use-related conflicts due to the scarcity of the kerb, unless severe constraints are imposed by local regulations. In another scenario, private stakeholders would take charge of the interface between pavement users and uses, as part of public space management concessions or independently of local authorities. Lastly, in my preferred scenario, local authorities would take over the management of the street curb like a strategic asset, which notably involves a paradigm shift and putting an end to fragmented management between several services.

You are in fact raising the issue of the business model of the street curb, which is currently somewhat neglected in French studies on public space.

I do believe that we must be mindful of public space developments, and recognise the changes that are taking place. In England for example, there are BIDs (Business Improvement Districts) and POPSs (Privately Owned Public Spaces), i.e. privately owned neighbourhoods with a strong commercial element, e.g. in Kings Cross or in the heart of Birmingham. If we want to avoid this radical privatisation in other countires, or a takeover by Tech Giants, we now need to have a debate on the use and pricing of public space, by focusing on the public interest and the end user.

3 questions for

Michaël Silly
Sociologist-urban planner, manager of the Ville Hybride agency

" *New urban trends are emerging in the urban fringe and on the edge of inner cities.* "

Which new practices and new uses have you observed in the territory, and more specifically the Greater Paris territory?

With Ville Hybride, I identified nearly 2,000 places in Greater Paris, on a number of topics relating to new uses, such as mobility, circular economy, crafts or urban farming, to name but a few. With regard to mobility, the need for speed will gradually take a back seat, in order to better serve the territories, as attested by ongoing discussions on the conversion of motorways and the ring road into urban boulevards, which represent potential urban and natural resources. On the issue of urban farming in the Ile-de-France region, the objective is not so much to supply food (it would require four times the size of the Ile-de-France region to feed the 12 million inhabitants) as to provide urban cooling and well-being. As for crafts, the question is how to transfer production and develop activities in densely populated areas. New hybrid models, such as productive third places, taken over by makers, are midway between the industry and the service sector.

How can we make sure those involved in urban development find out about these new uses, and how they are emerging?

The starting point must be the use and user experience via a bottom-up approach: this is why I organise, as part of Urbex by Ville Hybride, Le Grand Paris est à nous !, bike rides and hikes through the city. During bike rides for example, along with users,

specialist associations, local residents, elected officials, experts, we discuss existing cycling facilities, we describe the urban atmosphere into which they have been integrated, after which we make recommendations in terms of operational solutions (which we pass on to public policy-makers). These commonly shared experiences complement the practices of the *Ville Hybride Grand Paris* club, the members whose members primarily consist of urban development professionals. By cross-pollinating ideas between formal and informal urban development operators in a plain, neutral place, public and private players can speak more freely. This makes it possible to recreate an echelon between the building level and the street, neighbourhood, regional level.

Consequently, a sort of hybridisation is required in the organisation of stakeholders to translate emerging urban practices into planning projects. Which other forms of hybridisation transform the contemporary city?

The hybrid city is a concept involving the transformation of the existing, built-up city. New urban trends are emerging in the urban fringe and on the edge of inner cities. The hybrid city is, in effect, a central city regenerated by its social and physical outskirts. But it is also the overlap between the digital world and the physical world. There is currently a whole reality in the digital world which has no physical equivalent, like young people who meet virtually and take temporary possession of certain places. These digital practices have not yet been converted into urban development action. And yet the city is first and foremost a reflection of social and cultural practices. The rest comes later...

New ways to explore the many possibilities of public space

Urban hike

In August 2020, twelve consecutive days were dedicated to urban hikes along the future lines of *Grand Paris Express*[1].

This concept of metropolitan journey is currently spreading beyond Europe, in particular in Boston with the "Boston Metropolitan Trail" created by anthropologist Pascal Menoret in 2019, with a view to revealing perspectives in the colonial identity of the city and its inner suburbs. The experience of the (re)discovery of the territory on foot is recounted in the *L'Art des Sentiers métropolitains* exhibition in the Pavillon de l'Arsenal[2].

Urban shepherds

For the past few years, sheep have made their homes in the La Courneuve's Georges Valbon Park[3].

They regularly graze at the bottom of buildings in the Seine-Saint-Denis department, and it is not uncommon to see a flock on the streets. This social and agricultural experimentation, conducted in a dense urban environment by the Clinamen association, is original and innovative and marks a new way of taking possession of public spaces while re-examining the city's landscape.

Sports to take possession of the public space

In street skateboarding, the skater uses street furniture found in the public space to practice his/her sport.

The principle is the same for Parkour, a physical activity that uses public space elements (ground markings, guardrails, benches, fountains, roofs, etc.) for racing, jumping, or acrobatics. This playful way of using the public space is not new, but is "growing rapidly", according to the French Parkour Federation. New places, intended for other uses, are taken over, one after the other.

Community gardening

Originating in New York in the 1970s, the "Guerilla gardening" activist movement, which spread to France and Europe in the 2000s, promotes, among other things, the revegetation of urban spaces by community organisations, in particular on neglected sites.

Initially clandestine, this principle has been transposed into the political arena, for example with the "gardening permits" issued in Paris from 2015 (1,719 projects completed in July 2020) or the "Green Visa" in Marseille, which regulate the temporary occupation of the public domain.

[1] https://www.enlargeyourparis.fr/culture/de-boston-a-paris-les-sentiers-metropolitains-font-naitre-une-generation-de-randonneurs-urbains
[2] https://www.pavillon-arsenal.com/en/expositions/11755-lart-des-sentiers-metropolitains.html
[3] https://www.enlargeyourparis.fr/artdevivre/devenez-berger-benevole-dans-le-parc-de-la-courneuve-70-ha-plus-grand-que-central-park

3
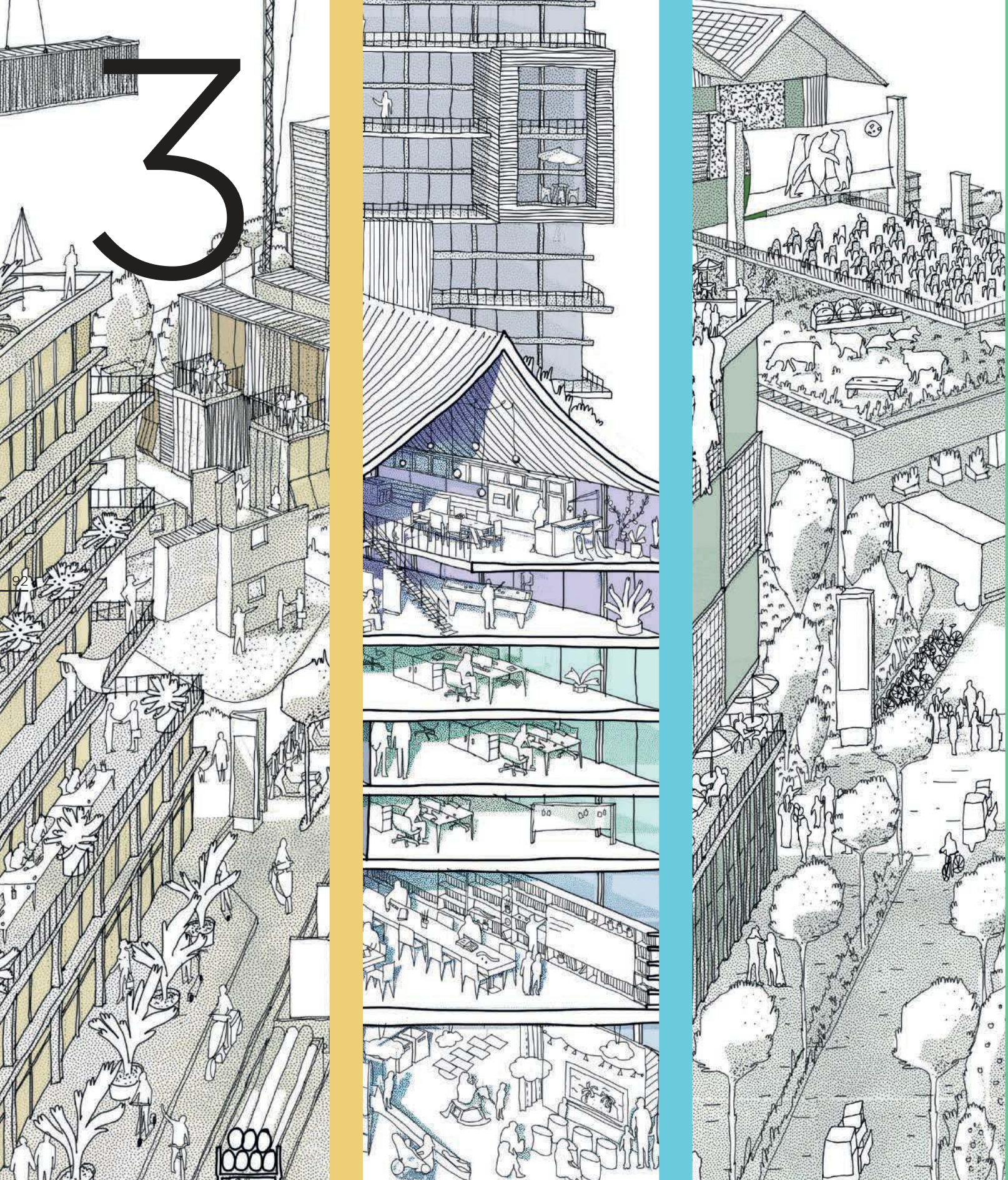
Looking to the Future
Three Scenarios
for the City of Tomorrow

We reviewed current initiatives aimed at improving the use of our spaces - buildings, public spaces, urban projects urban - today. But what about in 2035?

How will the four drivers examined - transformation, reversibility, diversity and chronotopy - transform our cities in the next fifteen years?

The answer is up to us: our cities will be what we collectively make of them. To help us in our choices, we can however imagine several radical future visions that current dynamics could lead us to. Let's embrace uncertainty with three unusual narratives, three scenarios combining the adaptation and intensification of the use of built-up areas in a different way.

1 EVOLVING CITIES

Evolving cities constantly adapt to new needs and uses through minor transformations, thus benefiting from the massive adoption of reversible construction approaches.

2 SHARED CITIES

Shared cities, where all types of space can be booked via platforms, provide everyone with unique and bespoke life experiences, while guaranteeing the use of each space is maximised.

3 AUTONOMOUS CITIES

Autonomous cities, where a better use of existing structures supports an ambitious transition to a more responsible urban metabolism. The reduced mobility of people and goods is combined with local production to reduce the carbon footprint.

EVOLVING CITIES

Twenty-four hours in the evolving city of 2035

Jean-Marc
60 years old - Florist
Father of two teenagers aged 13 and 17

Seven in the morning: I take a walk in the neighbourhood in the cool, early morning and visit the bakery. I like being outside so early; the streets are quiet. A freight tram carrying removable partitions is being unloaded. Three houses have appeared on the roofs of this apartment block since I was here last! And here's a concert stage being assembled. I'll have to tell my kids about it, they'll be happy. I walk past the store of my new competitor, this florist who arrived two weeks ago and is attracting customers.

It is now eight o'clock, I am back home, I have breakfast with the kids and I open my shop. Because it's fairly quiet, I should do something before all my customers disappear. What should I do? I could move again and go into a more dynamic market, the formalities are increasingly simple and quick. I arrived two years ago with the children and I don't really feel like leaving. Perhaps I should reinvent my model? I could organise floral decoration workshops, or turn to ephemeral floral arrangements. It's so easy these days to terminate a lease and modify the company's activity in order to adapt!

I go shopping at lunchtime. I turn on the GPS application which gives me an updated personalised route, as the street layout changes often, and it's easy to lose your bearings. Today, this pedestrian street is far more pleasant than yesterday when it was full of delivery trucks. I get round massive planters that I recently noticed on another street. A large timber-framed building is being dismantled, bit by bit. On my way back from the shop, I walk through a huge street party: everybody's dancing, such a great atmosphere!

At five o'clock, I hear the children come back from the *collège* and *lycée* on their borrowed free-floating vehicles. My eldest, in final year, tells me about today's classes, which is completely identical to what my niece, who is also in final year, told me on the telephone at the other end of the country. The education programme has become fairly rigid to provide everyone with a common benchmark and facilitate learning continuity despite family relocations and continual changes in our living spaces. The kids love our apartment: I have to say that it was designed and converted with our specific requirements in mind when we arrived.

At seven o'clock, the neighbourhood contact person drops by and tells me about the latest local opportunities. He mentions in particular the educational fablab for teenagers, recently installed in our basement, and also tells me that interior refurbishment work is underway to set up a restaurant on the floor above us. The quality of the reversible building is so good that I hadn't noticed anything! It's the same thing for the kindergarten on the floor below, that we haven't heard for eight months. I suggest that we decorate a street with an ephemeral flowered ceiling during an upcoming event. He is keen and will put me in touch with the organisers.

At around nine, as the children have gone to a fablab event, I receive a notification on my smartphone. I have been given automatic refund as the delivery space outside my shop has been reserved for another purpose for six hours tomorrow. Good, that will liven up the place!

How did we get here?

2025
The PCSA (Planning permission with no specified purpose) is introduced

2026
The measurements of data on the uses of various urban spaces are improving. Broadly summarised, it raises general awareness of the fact that existing structures are ill-suited to current uses

2027
A light, modular partitioning system becomes the standard and is introduced in new buildings, making for minor and economical subsequent work

2028
The French urban planning code is fundamentally reformed to simplify the procedures governing the change of purpose of spaces and exempt them from taxes

2029
For the first time, a major national construction company offers an unlimited "architectural after-sales" package, to convert the use of a building they designed beforehand, as soon as necessary

2030
Several major cities impose the reversible construction of offices/housing units

2032
The duration of commercial, residential leases and other services becomes freely determined by the contracting parties, resulting in more flexibility in property transactions

2035
The evolving city

Benefits of evolving cities

● **Individuals and professionals enjoy greater freedom in their choice of location.**

● **The conversions of existing structures are simplified, accelerated and at a reduced cost, making it easier for various stakeholders to embark on projects.**

● **Spaces are tailored to uses and needs, ensuring a level of comfort, in terms of housing, work, creation and leisure, not seen before.**

● **Flexibility facilitates major decisions in life as well as big changes for businesses.**

Vigilance points

● **A sense of loss of bearings must be avoided if transformations and relocations are too fast.**

● **Accelerating transformation requires constantly reducing work site nuisances, and needs to go hand in hand with the improved reuse of components and materials.**

● **Systems must be put in place to ensure a fair rotation of stakeholders across the territory, to prevent the appearance of disenfranchised neighbourhoods.**

EVOLVING CITIES

" The kids love our apartment! I have to say that it was designed and converted with our specific requirements in mind. "
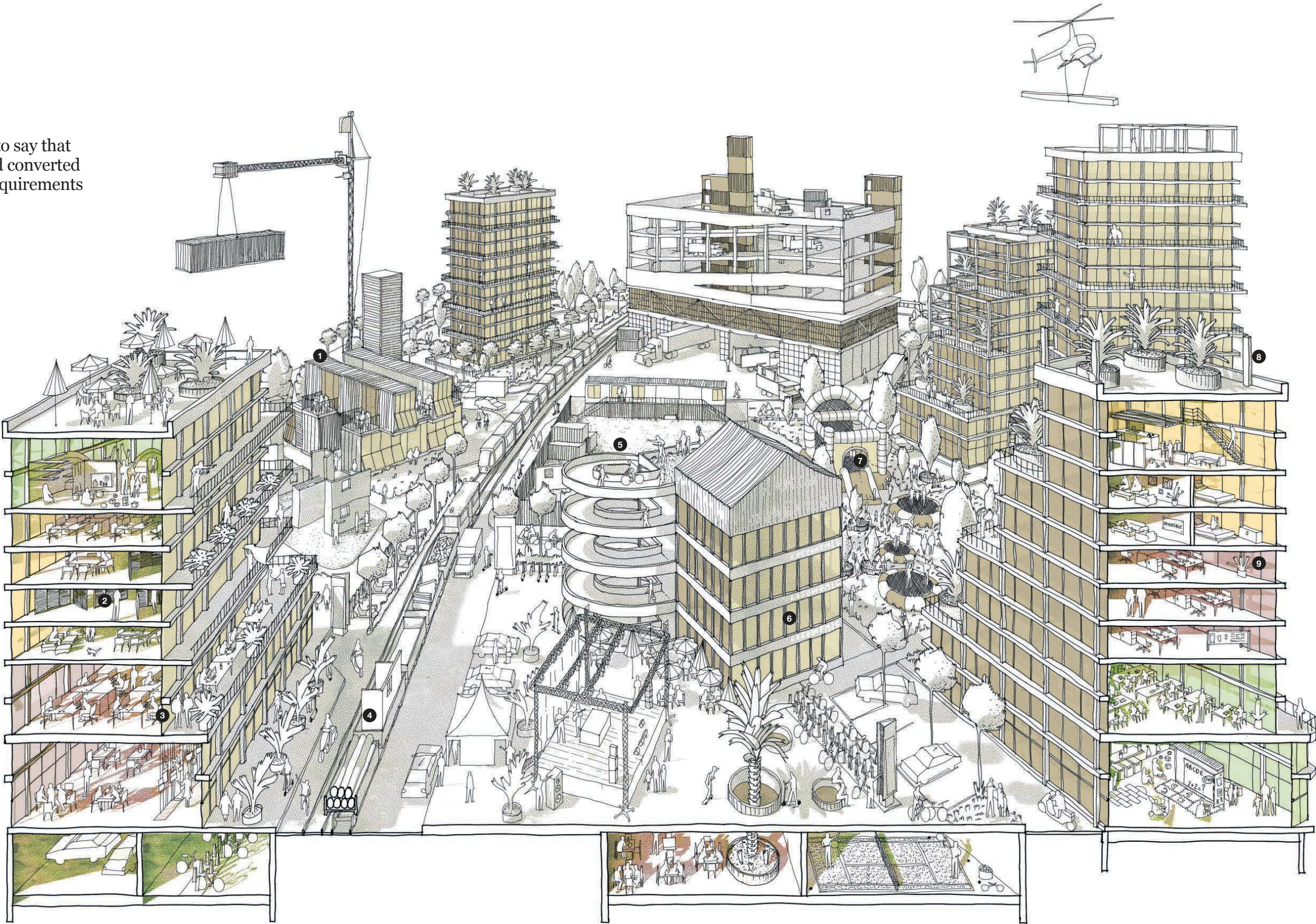
1 Adaptation to uncertain and unforeseen situations is facilitated by agility in the conversion of existing structures, thereby contributing to territorial resilience.

2 The standardisation of interior refurbishment elements, combined with structural grids, helps personalise the layout at a reduced cost to each newcomer.

3 The uses of each floor extends to outdoor areas, regardless of the purpose: office, housing unit, facility, etc.

4 Standardisation facilitates the reuse of architectural and structural elements, which helps save resources and materials.

5 Frequent changes in the neighbourhood create a lively atmosphere for the resident population, and improve the city's attractiveness.

6 A sustainable community centre brings together the various stakeholders in the neighbourhood, provides information on ongoing transformations and events.

7 Temporary facilities in public spaces allow for scalable uses, adapted to the changing seasons.

8 The buildings' technical and architectural parameters are designed to facilitate extensions and raised structures.

9 Thanks to structural grids with large floors, the building can be used indiscriminately as offices or housing units, thus promoting diversity and making it easier for various stakeholders to embark on projects.

SHARED CITIES

Twenty-four hours
in the shared city of 2035

Léa
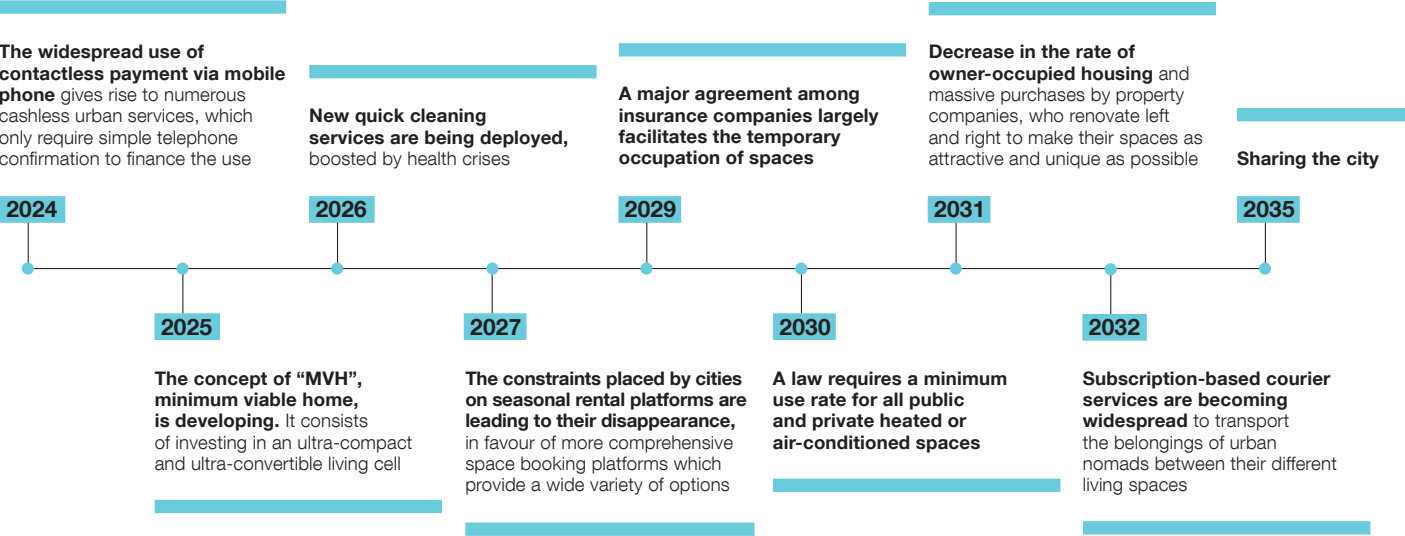**34 years old**
Night nurse - Mother of a 7-year-old son

It's six in the morning. I have just completed an exhausting shift at the hospital. I'm worn out. To catch a few winks, I book a place to rest my head: Five minutes from the hospital and highly rated, a student who is away for a few days has let out their studio apartment. When I get there, the doors and access hatch unlock and I can settle in. It's clean, it matches the description, it's exactly what I'm looking for even though I've never been there. I lie down: the sheets smell nice. The cleaner was probably here recently, I guess they work nights like me. I call Louis, my son, who is getting ready for school: hearing his voice comforts me. I make sure his route to school is programmed. I just have time to wolf down my favourite snack, that I ordered online and was waiting for me on the apartment table, before I fall asleep.

Two o'clock, the alarm goes off. I go back to sleep for a few minutes but the notifications for my yoga class which starts in thirty minutes nearby definitively drag me out of bed. With the warm weather, the class has been relocated to a roof terrace in the open air. That was a good idea! A wake-up class, in the fresh air and with a view of the city: it's bound to be relaxing. A vehicle picks me up later to take me to meet my son after school. We walk back to the "burrow", our small home, our meeting point where we like to get together for a snack. My stuff was sent there by courier in the meantime.

I feel like having a nice, big meal tonight, and enjoying my family. Of course, our tiny home is not suitable, but there is no shortage of places where we can meet. Some of the parents from schools told me about this spacious kitchen that is well-equipped and surrounded by greenery. I booked it immediately. Once we have settled down in this bright place, Louis is very happy. Soon, our shopping is delivered and my partner meets us there. He joyfully tells us about his afternoon, when he booked a panoramic booth to exchange with a client.

It's ten o'clock in the evening: I usually put my son to bed and have a rest before I start my shift at the hospital. But today is Friday and I'm off! Friends are waiting for me on a balcony they rented from an individual for the evening. I kiss Louis and my partner and set off to meet my friends. On the way, I reply to a survey: which atmosphere would you like tonight? The vote is unanimous: a wine bar! When I get there, the providers are already setting up the decorative barrels, glasses and strings of light on the balcony. What a night! It is late when I return to my family, who have set up camp for the weekend in a charming, exotic and very central guesthouse, on the green roof of an office building.

How did we get here?

The widespread use of contactless payment via mobile phone gives rise to numerous cashless urban services, which only require simple telephone confirmation to finance the use

New quick cleaning services are being deployed, boosted by health crises

A major agreement among insurance companies largely facilitates the temporary occupation of spaces

Decrease in the rate of owner-occupied housing and massive purchases by property companies, who renovate left and right to make their spaces as attractive and unique as possible

Sharing the city

2024 **2026** **2029** **2031** **2035**

2025 **2027** **2030** **2032**

The concept of "MVH", minimum viable home, is developing. It consists of investing in an ultra-compact and ultra-convertible living cell

The constraints placed by cities on seasonal rental platforms are leading to their disappearance, in favour of more comprehensive space booking platforms which provide a wide variety of options

A law requires a minimum use rate for all public and private heated or air-conditioned spaces

Subscription-based courier services are becoming widespread to transport the belongings of urban nomads between their different living spaces

Benefits of the shared city

● **Optimising the use of existing places helps improve the use rate of spaces, and therefore reduce usage costs in terms of resources, carbon and capital.**

● **The diversity of places available for use ensures a multiplicity of valuable, bespoke life experiences, giving a sense of freedom.**

● **The quality of the proposed spaces is driven upwards by competition between providers; their constant desire to increase attractiveness creates exceptional sites.**

● **The supply is so extensive and ubiquitous that life plans can be readjusted in real time according to everyone's desires, means and needs.**

Vigilance points

● **The city is becoming increasingly reliant on space booking platforms, increasing the predominance of these players, as well as the potential impact of a malfunction or hacking.**

● **The possibility of booking urban places, including public spaces, should not affect social relations or result in limited access to public spaces, extreme individualism or loss of bearings.**

SHARING THE CITY

> " I return to my family, who have set up camp for the weekend in a charming guesthouse on the green roof of an office building! My stuff was sent there by courier. "
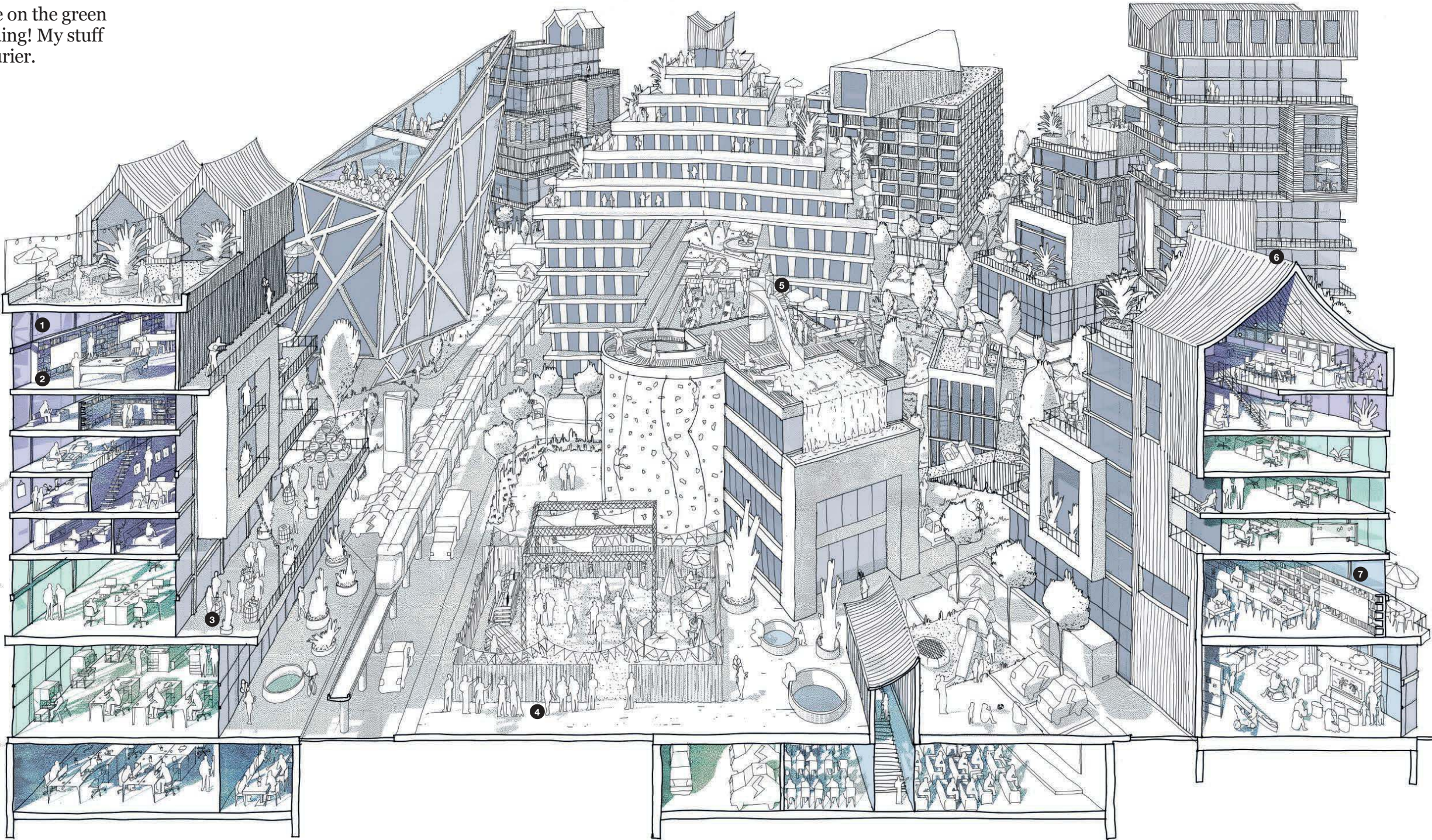
1. Everyone can avail of a variety of highly specialised spaces by booking them on a platform when needed.

2. Access to various spaces via a platform helps optimise their use rate, while providing environmental and economic benefits associated with the intensification of uses.

3. Hybrid spaces, a cross between "home" and "collective" spaces, are emerging.

4. Portions of public space can be booked for a limited period, which helps create a lively atmosphere while providing the community with additional economic resources.

5. The conversion of existing structures create exceptional mixed urban forms by combining various uses.

6. The quality of built-up areas is driven upwards by the needs of every provider to increase attractiveness.

7. Various types of third-places respond to the needs and preferences of everyone, young and old.

AUTONOMOUS CITIES

Zoé
25 years old
Self-employed – Lives in a shared accomodation

Twenty-four hours in the autonomous city of 2035

Eight o'clock, I wake up. I have strawberries for breakfast! I picked them in the shared garden on the roof of my building last night. They are extremely juicy and sweet. As I leave the apartment, I leave my compost at the bottom of the building and walk across the central square. A large group of children have been dropped off by their parents in the middle of the square and play while waiting for the organisers to start the walking tour of a neighbouring area, which will take the rest of the morning. This afternoon, they will be in school, unlike other classes who will be out on a trip. I sit down for a moment on a bench in the square, which is relatively quiet except for the children shouting: a small delivery vehicle makes its way through the procession of cyclists and pedestrians.
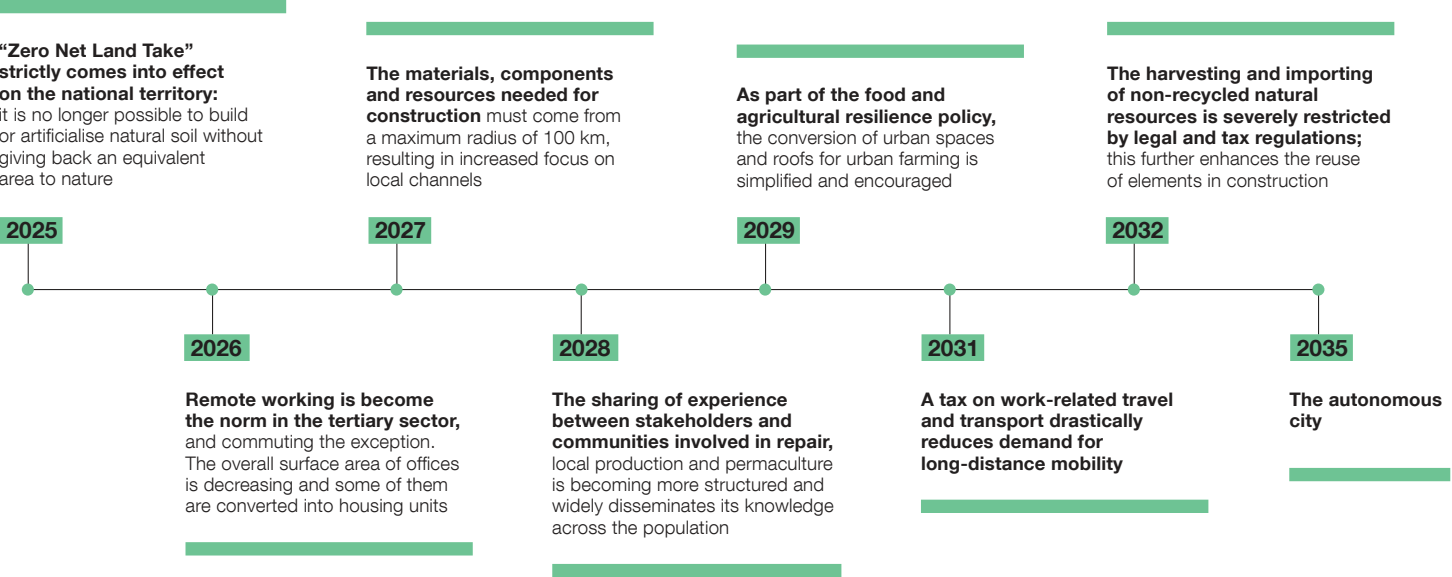
It is nine o'clock, I go down to a community production site to meet a cabinetmaker who is teaching me and other local residents how to repair storage units. I am familiar with this space in the heart of the neighbourhood; I like it and I end up staying there all morning. It's a former car park that has been converted and equipped with skylights.

For lunch, I walk across the square towards the food co-op, where I have been a member since I turned twenty-two. Yesterday, I took part in the distribution of food and on Monday I will help in the kitchen. Today, I simply enjoy my lunch with my friends at one of the large shared tables. We discuss our upcoming weekend when we visit a new collective project of rural educational farm, just outside our city, which we can travel to by bike!

At two o'clock, I walk across the central square again and stop: a group of citizens is gathered in a circle, and I stay back a little bit. It's a working group discussing how to choose representatives. As I continue, I admire the façade of a building under construction. It seems that the woodwork is 100% reused, resulting in a fairly disparate and unique effect. I go up to the coworking space for the afternoon.

At nine o'clock, I go to the local school to meet my community singing and music group. I bump into adults coming out of a night class on the advances of permaculture, feedback and best practices. It is almost midnight when I get home and walk across the central square with my friends for the last time today. The square has turned into a large, busy night food market. A big banner announcing the events of the week catches our attention. The neighbourhood Olympics will kick off soon!
I make a mental note to participate and I go home.

How did we get here?

"Zero Net Land Take" strictly comes into effect on the national territory: it is no longer possible to build or artificialise natural soil without giving back an equivalent area to nature

2025

2026
Remote working is become the norm in the tertiary sector, and commuting the exception. The overall surface area of offices is decreasing and some of them are converted into housing units

The materials, components and resources needed for construction must come from a maximum radius of 100 km, resulting in increased focus on local channels

2027

2028
The sharing of experience between stakeholders and communities involved in repair, local production and permaculture is becoming more structured and widely disseminates its knowledge across the population

As part of the food and agricultural resilience policy, the conversion of urban spaces and roofs for urban farming is simplified and encouraged

2029

2031
A tax on work-related travel and transport drastically reduces demand for long-distance mobility

The harvesting and importing of non-recycled natural resources is severely restricted by legal and tax regulations; this further enhances the reuse of elements in construction

2032

2035
The autonomous city

Benefits of the autonomous city

● **The more local structure of exchanges and the development of the circular economy contribute to reducing the environmental impact of the territory, both in terms of carbon impact and resource consumption.**

● **Everyone benefits from the proximity and use of urban production sites, which are also places where knowledge is exchanged: urban farming, fablabs, school, workshops.**

● **Society is structured at local level through shared initiatives, ensuring quality of life and a sense of collective responsibility for everyone.**

Vigilance points

● **Producing locally does not mean being cut off from the territory: on the contrary, a city is nothing without its hinterland, and urban farming initiatives alone are not enough to feed the population.**

● **Making this scenario a reality would require the active engagement of all stakeholders, combined with a significant transformation effort.**

AUTONOMOUS CITIES

" I am meeting with a cabinetmaker in a former car park converted into a shared production site. He teaches me and other local residents how to repair furniture! "
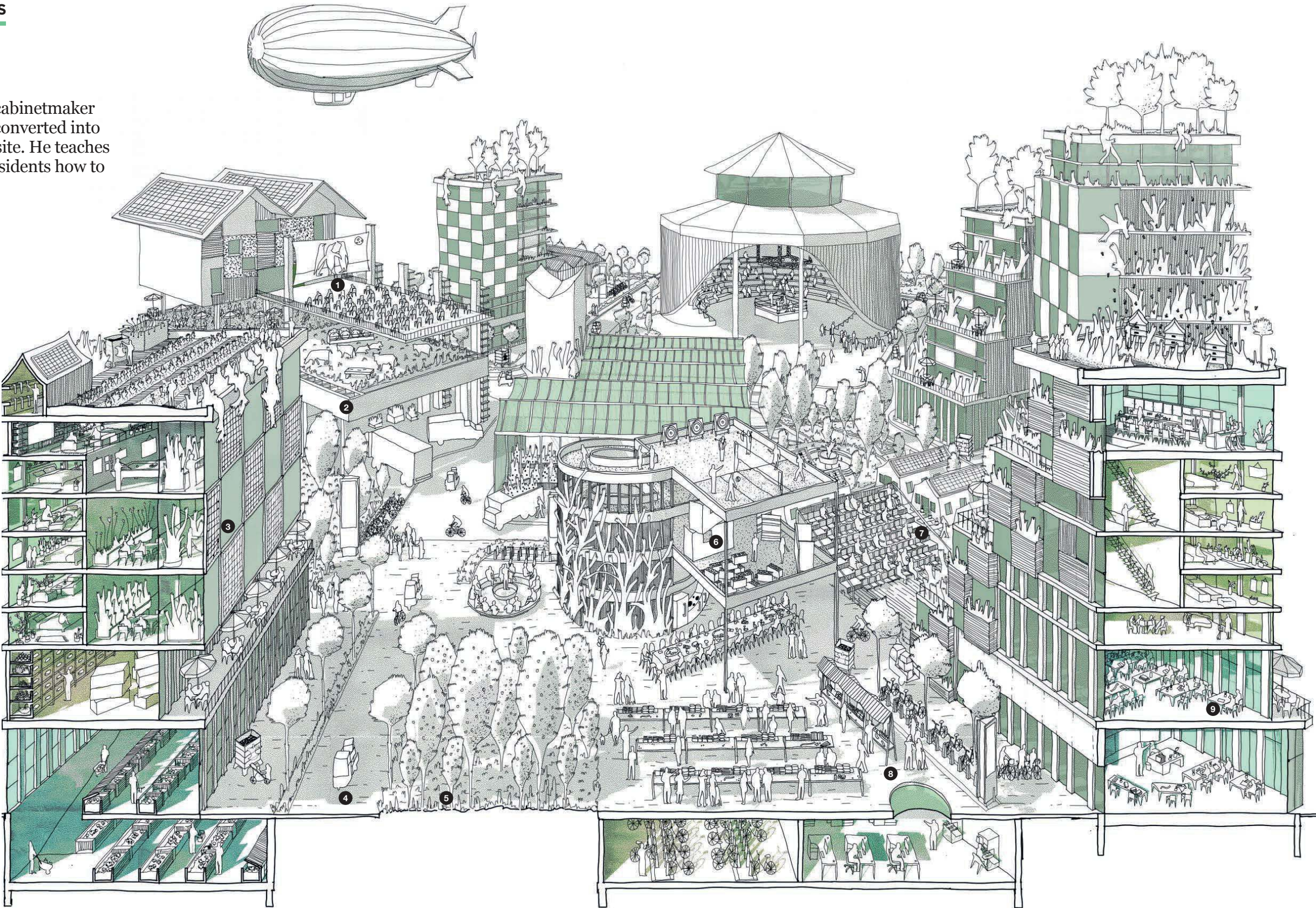
1 Roof terraces and public spaces are used for social and cultural activities, or for local production, in particular agricultural.

2 Exchanges with the outside world are streamlined and shared within local logistics platforms, so as to drastically limit movements.

3 All new constructions utilise reused elements, and are designed to enable future dismantling.

4 Roads are intended for shared uses between soft mobility modes.

5 The "renaturation" of previously artificial plots helps improve biodiversity and soil permeability.

6 The materials and elements recovered from the deconstruction of existing structures are reintegrated into the loop to be used in renovation and local construction.

7 The design of the premises promotes dialogue between residents and other local stakeholders, encouraging collective forms of organisation of shared places.

8 Priority to local supply chains: the markets sell local products, which helps reduce the need for heavy transport.

9 The sharing of knowledge is not just for children: classrooms are used in the evening and at weekends for continuing education and the sharing of knowledge.

ACKNOWLEDGEMENTS

Speakers

- **Lauren Andres,** Bartlett School of Planning, University College London
- **Damien Antoni,** SYVIL
- **Benjamin Aubry,** Iudo
- **Fabrice Bonnifet,** Bouygues SA
- **Isabelle Baraud-Serfaty,** Ibicity
- **Erwan Bonduelle,** Iudo
- **Pierre des Courtis,** MVRDV
- **Areski Dehloum,** BETC Digital
- **Xavier Gauvin,** Ideas Lab, Bouygues Construction
- **Sylvain Grisot,** dixit.net, University of Nantes
- **Luc Gwiazdzinski,** ENSA Toulouse
- **Lou Marzloff,** BETC Places
- **Philippe Morel,** Dynamic Workplace
- **Benjamin Pradel,** Kaléido'Scop, Intermède
- **Patrick Rubin,** Canal Architecture
- **Sonia Samadi,** Sogaris
- **Michaël Silly,** Ville Hybride

Workshops contributors

- **Mathilde Arondel,** ID&AL Groupe
- **Pierre-Alban Baudy,** Frey
- **Céline Bellanger,** La Belle Friche
- **Johana Castel,** Cap Digital
- **Raphaëlle Chateigner,** L'effet Urbain
- **Céline Chaverot,** Advanced Workplace Associates
- **Bertil De Fos,** Chronos
- **Pierre-Mathieu Degruel,** Espaces Compris
- **Areski Dehloum,** BETC Digital
- **Isabelle Detroy,** NODI
- **Céline Di Mercurio,** Union Sociale pour l'Habitat
- **Loubna El Amrani,** Wojo
- **Jérôme Garnier,** GRECAM
- **Cédric Geeraert,** Tangram Architecture
- **Virginie Grueber,** Lidl France Promotion
- **Saena Guillon,** Construct Lab
- **Stéphanie Hansford,** Groupama
- **Charlotte Hemery,** La Belle Friche
- **Philippe Labro,** Ecologie Urbaine & Citoyenne
- **Sigrid Lassen,** Ville de Paris

- **Lucile Leyer,** Ylé Architectes
- **Sylvain Leyssieux,** L'Effet Urbain
- **Paul Marchesseau,** Emilieu Studio
- **Aude Masboungi,** La Belle Friche
- **Nassim Moussi,** Independant
- **Catherine Nguyen,** Arp-Astrance
- **Tanamiranga Ralaindimby,** OuiShare
- **Ava Roghanian,** Architect
- **Damien Roussat,** OuiShare
- **Clémence Vanneste,** NODI
- **Jean-Christophe Visier,** CSTB

Bouygues Construction contributors

- **Virginie Allain,** Bouygues Construction
- **Lionel Amann,** LinkCity Nord-Est
- **Stéphanie Asuyawa,** Bouygues Asia
- **Stéphanie Barrault,** Bouygues Bâtiment Grand Ouest
- **Sébastien Bessière,** Bouygues Construction
- **Clémence Chastan,** LinkCity Sud-Est
- **Noémie Colleu Muret,** Elan
- **Xavier Blanc,** Losinger Marazzi
- **Marie Bonvalet,** LinkCity Nord-Est
- **Frédéric Delabie,** LinkCity Centre Sud-Ouest
- **Antoine Desarbres,** Habitat Social
- **Elsa Favreau,** Bouygues Construction
- **Laurent Ferson,** LinkCity Sud-Est
- **Alexandre Garcin,** Bouygues Bâtiment Nord Est
- **Camille Gautier,** Elan
- **Xavier Gauvin,** Bouygues Construction
- **Benoît Gérardin,** LinkCity Nord-Est
- **Christine Grèzes,** LinkCity
- **Elsa Kieken,** LinkCity Nord-Est
- **Jean-Baptiste Leclerc,** Bouygues Energie et Services
- **Quentin Legrand,** LinkCity
- **Noélie Lopes,** Bouygues Bâtiment Nord-Est
- **Pierre Mustière,** Bouygues Asia
- **Maxime Nadé,** Elan
- **Arthur Pasquier,** Elan
- **Fabrice Poline,** Bouygues Construction
- **Antoine Ribaud,** Bouygues Asia
- **Timothée Rosset,** LinkCity
- **Julien Schmid,** Bouygues Construction

- **Rémi Teyssot,** Bouygues Bâtiment Nord-Est
- **Geoffroy de Verneuil,** LinkCity Grand Ouest
- **Laurent Warnier,** LinkCity
- **Alice Plessis,** Bouygues Construction
- **Alexandra Dunley,** BYES Solutions UK
- **Kelly MacKenzie,** BYES Solutions UK
- **Finnin Harris,** BYES Solutions UK
- **Amy Burnett,** Bouygues UK
- **Laura Shemeld,** BYES Solutions UK
- **Harry Ellis,** BYES Solutions UK

Workshops coordinators

- **Tanamiranga Ralaindimby,** OuiShare
- **Damien Roussat,** OuiShare
- **Nina Llado,** Chronos
- **Anastasia Tymen,** Chronos
- **Nicolas Bouby,** Bouygues Construction

Credits

Managing editor
Virginie Alonzi

Editorial coordinator
Nicolas Bouby

Editorial team
- **Mathilde Soulé,** Bouygues Construction
- **Nicolas Bouby,** Bouygues Construction
- **Nina Llado,** Chronos
- **Anne Rumin,** Chronos
- **Anastasia Tymen,** Chronos

Scenario illustrations
Félix Roudier © felix-illustra

Design and production
Heidi www.agence-heidi.fr

Printing
Papier offset certifié FSC

February 2021

Photo credits
Adobe Stock
Bouygues Construction
Gettyimages
Nilton Almeida
Agathe Perrier
Sophie Delhay
Zoku
David Foessel
PCA Stream
A.Bechu
Philippe Garcia
Magasins Généraux
Pierre l'Excellent
Daniel Avila
Kyung Roh
Florence Joubert
Jean-Fabien Leclanche
Classmap
Le Zèbre
Adria Goula
Tank Architectes
Suyin Chia
Fenwick Iribarren Architects
Willy Berré Photographer
Galerie Patrick Segui
Vincent Rustuel
Veronica Echeverri
Jacques Leroy
100architects
Nicolas Bouby
Canal Architecture
Jean-Baptiste Gurliat
Sebastian Wahlhuetter
Yann Hamey
Teddy Verneuil, Lezbroz
Joséphine Brueder
Rasmus Hjortshøj
Association Espace
Sogaris
Dennis Gilbert
Duval Architectures
David Chipperfield
Querkraft
Luc Boegly
MVRDV
David Sundberg
Chris Cooper

Trend books

Shared **innovation**

Linkcity

www.linkcity.com
@LinkCity

Bouygues
Energies & Services

www.bouygues-es.fr
@Bouygues_ES

Bouygues Construction

1, avenue Eugène Freyssinet - Guyancourt
78061 - Saint-Quentin-en-Yvelines Cedex - France
Tél : +33 (0)1 30 60 33 00

www.bouygues-construction.com
www.blog.bouygues-construction.com
@Bouygues_C