



To make and to live the city of the anthropocene

**Transitions & Smart City
Egis x Usbek & Rica**



To make and to live the city of the anthropocene

The Anthropocene is our present geological time, but also our future. It is characterized by the advent of humans as the main force for change on Earth, surpassing geophysical forces. This is the age when we are more in control of our own destinies than ever.

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Our cities, tomorrow and beyond

Let's face it: cities have two or three reasons to blame themselves regarding the ongoing climate crisis, starting with their participation in global greenhouse gas emissions, up to 70 %. And the prospects are worrying, with all that it implies in terms of new infrastructure, considering that the world's urban population will double by 2050. At the same time, and paradoxically – or ambitiously, it turns out – many cities around the world are pledging to reduce their emissions. At the end of 2020, from Los Angeles to Kinshasa via London and Oslo, around 100 cities signed the Paris Declaration aimed at achieving carbon neutrality by the middle of the century.

The emergency is not only climatic, it is also environmental and human. Because cities, as we can already witness, are also particularly sensitive to heat waves, floods and other climatic disasters which are only intensifying. Resilience and self-reliance are not just buzzwords: they are now about survival, literally. The Covid pandemic which is shaking the planet shows it well, the growing complexity of urban systems feeds a vulnerability in which the great social and psychological distress observed in times of confinement as well as the shortage of chicken in Great Britain at the end of the summer due to the health crisis and Brexit (among other examples) are most likely just the first upheavals.

Adapt or die: the evolutionist maxim has arguably never been more apt than in the time of the Anthropocene. Faced with the ecological emergency, cities will have to reinvent themselves, adjust, and anticipate. The challenge is immense, but attempts are already swarming around the world. Rotterdam and its huge urban basins collecting rainwater to avoid flooding; the suburb of San José (capital of Costa Rica) which granted citizenship to its plants and pollinators; Totnes in the UK, a pioneer city in the global network of cities in transition...

From the eco-construction of buildings to the reintroduction of the living into the streets, we will need all possible avenues to guarantee a future for these places of hyper-concentration on which our civilization has been built. The stakes are too high to be satisfied with micro-adaptations. It is now a question of thinking in the long term and of rethinking in depth our way of 'building the city' and of interacting with our environment to ensure our essential functions – moving, eating, working, housing... – while deploying a more pleasant living environment. In short, an eminently ecological question.

Egis × Usbek & Rica

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Figures that speak

Shaken by the Covid-19 pandemic and the intensification of climate change, metropolises around the world are revealing their often contrasting flaws. Heatwaves, overcrowding, torrential rains, uncertain access to essential services: the threats to cities in the age of the Anthropocene are intensifying as urbanisation accelerates.

3 days

In the event of a breakdown in supply chains, Paris has only 3 days of reserves. In question: its very low degree of food autonomy (1.27%), similar to that of Hong Kong (1.82%), but far below a city like Shanghai which produces 90% of green vegetables consumed by its inhabitants, in part thanks to its proximity to the agricultural island of Chongming.

410 m²

Awarded in 2018 as the greenest city in the world, Reykjavik, the Icelandic capital, totals 4413,2 square feet of green space per capita. Dense and little known for its vegetation, Paris reaches only 107 square feet. Always better than Tokyo with its 43 small square feet per inhabitant...

+6,1°C

In 2050, the Parisian climate will resemble that of Canberra today, with an increase in annual temperatures of + 1.4 °C, and 6.1 °C during the hottest month (to reach around 29 °C). A similar development awaits the city of New York (+ 2.9 °C on average over the year), Casablanca (+ 1.7 °C) and Beijing (+ 2.1 °C).

720 mm

2021, the summer of all records. In Canada, the village of Lytton recorded 49.5 °C at the end of June, and Vancouver temperatures above 30 °C – well above normal temperatures hovering around 20 °C this season. Germany and China will have been marked by torrential rains: on July 14, 162 millimeters of water fell in Cologne (the equivalent of two months of rain in 12 hours), then from July 17 to 21. 720 millimeters took to the streets of Zhengzhou (more than its annual average of 641 millimeters).

711 km² | 60 %

Urban sprawl is eating away green spaces at high speed. In France, the equivalent of a department the size of the Drôme disappears under concrete every ten years. On a European scale, 711 km² of land become urban each year.

+38 %

The world's largest city, Tokyo peaked in 2018 with 37.5 million inhabitants before seeing its population begin to decline: in 2030, it is expected to drop to 36.6 million. Second in the ranking, Delhi should instead see its number of inhabitants climb between 2021 and 2035, from 31.2 to 43.3 million inhabitants (+ 38 %). Same trend for Shanghai, the third largest megalopolis in the world today, whose population is expected to increase by 23 % during the same period, to reach 34.3 million inhabitants (d'habitants.)

In Delhi, the Indian capital, 17 % of households do not have access to drinking water at home. This proportion reaches around 60 % in Lagos, Nigeria, where the water supply is more than three times lower than the demand. A situation that is likely to worsen on a global scale when we know that by 2050, the demand for water in cities will increase by 80 %, exposing more than a hundred of the world's metropolises to serious shortages.

4 to 6 h

This is the amount of time that residents of Dhaka, the capital of Bangladesh, spend each year without access to electricity, due in part to poor infrastructure. In New York, the average time is around 2 hours, compared to only 15 minutes in Paris.

Cities and dependencies: guaranteeing access to the essential

The global movement of metropolisation and globalisation is increasing the interconnection of technical networks and the complexity of supply chains, weakening access to vital services. Autonomy and simplicity tend to stand out as the antidotes to this situation of generalised interdependence.



The intensification of extreme weather events that regions around the world have witnessed throughout the summer of 2021, from the 49.5 °C measured in Canada to massive flooding in Germany, proves it: the climate crisis is now a reality with very serious consequences. Now is not just the time to reduce greenhouse gas emissions, but also to protect populations. 'After a year of the pandemic crisis, climate change remains at the heart of the concerns of French people, of which more than 80 % think that the country's territory will be forced to take important measures to adapt to the new climatic conditions' underlined the last report of the High Council for the Climate published in June. Same statement with the UN, whose Secretary-General António Guterres, in response to the latest IPCC report on August 9, called to stop making funding for adaptation and resilience 'the neglected half of the climate equation'.

(Eco) systemic risks: the case of floods

De facto, the systemic risks (environmental, social, technological, etc.) that threaten critical infrastructures in urban areas will only increase in the decades to come, with varying intensities depending on the typologies. Galloping urbanization in some metropolises is increasing the phenomenon: thereby Jakarta sinks by one meter every ten years due to the pressure of skyscrapers and the overexploitation of water tables to meet the needs of producing drinking water for the population, exposing it to significant flooding.

This risk is now generalised: in addition to the potential threat of floods or marine submersion, cities around the world must also face the risk of thunderstorms and long periods of rains that accumulate due to the artificialisation of soils. To address this, some municipalities have adopted the concept of the 'sponge city' – popularised by a national program launched in China in 2014 – ➔

aimed at improving urban resilience in the face of the frequent torrential floods that threaten the vast majority of Chinese metropolises, while securing their water supply by reusing the rainwater collected. How? By building porous and therefore permeable road surfaces, or even rain gardens which are kinds of plant beds designed to capture rainwater and allow it to infiltrate the ground. After its success in China, this model is exported to metropolises over-exposed to this type of risk, from Berlin to New York.

Idols with feet of clay

In terms of infrastructure, it is the entanglement of risks that creates vulnerability, underlines Bruno Barroca, senior lecturer in urban engineering at the University of Paris-Est. When speaking of 'high complication' of urban systems: 'When we study a system, we are not so much interested in its components as we are in the relationships between them, and the chain reactions that a disturbance can generate. The interdependence of technical systems is a vulnerability factor: the slightest disturbance disrupts our entire system' In 2019, New York City experienced a blackout lasting multiple hours that shut down Manhattan's subway system, blocked elevators, and extinguished traffic lights. French cities are not immune to this type of risk either, with potentially dramatic consequences, as illustrated by the computer failure that paralyzed the Pasteur 2 hospital in Nice at the start of 2021. Another recent example: last October, Lebanon was deprived of electricity due to the exhaustion of its stocks of fuel used to supply power stations.

This vulnerability also jeopardises access to essential resources, especially food. During the health crisis, the straining of the supply chains of certain products such as flour highlighted a glaring lack of self-sufficiency. As explained in a report from the Urgence Transformation Agricole et Alimentaire (UTAA) think tank, the disruptions observed were linked to logistical problems – the global transport networks being greatly slowed down, all the way to the containers –, associated in France to a lack of strategic stocks.

In Île-de-France (Paris region), this dependence is particularly present. Unveiled in September 2020, the regional strategy in favor of the circular economy refers to a region 'which consumes a lot of resources, mainly non-renewable, and very dependent on the outside for its operation' (up to 80%). A situation which 'generates several risks' and 'raises the question of the long-term sustainability of our supply', one can read in this report, especial-

ly since 'this dependence strongly exposes Île-de-France to potential shocks on resources and the volatility of commodity prices.'

Global resilience strategy

To improve the resilience of cities, it seems urgent to 'isolate the systems and give them a level of autonomy,' argues Bruno Barroca. It is very likely that our adaptation will require less dependency on these large technical systems. Relocation, short circuits, local shops or even energy autonomy are part of this broader trend towards reducing the complexity of cities. 'We must be prepared to limit the distance and speed of transport. We will go back to cities and mobility structures that are simpler and more compact,' advocates the Momentum Institute. In a scenario 'Île-de-France, a resilient bioregion in 2050?' published in 2017, the think tank imagines a new vision of the region's territory, where human activities and natural ecosystems coexist harmoniously and in a self-sufficient manner. The objective: to reduce as much as possible external dependencies by relocating the production of energy and the food chains, so as to 'establish the goods to be produced and their quantity in relation to environmental and territorial resources.'

For ecologist Brian Walker, former director of the international interdisciplinary research network Resilience Alliance¹, it is crucial to tackle 'general resilience' (which concerns the system as a whole in the face of any type of shock) and not only to 'specific resilience', oriented towards a specific type of risk such as a flood or an earthquake. To achieve this, he explains in a 2011 article entitled 'Perspectives on Resilience to Disasters across Sectors and Cultures', that it is necessary that the vital components of the system are sufficiently diversified, that reserves for critical needs exist (drinking water, food, electricity...), or furthermore that the sub-components of the system are sufficiently autonomous to avoid the chain reaction and propagation of shocks. A culture of risk that is also being built on cooperation and on the basis of the exchange of good practices: thus the Fab City project, initiated in Barcelona in 2011, has created a global network of interconnected cities, all aiming for self-sufficiency by 2054. ●

1. Created in 1999, this scientific association focuses on the resilience of so-called 'socio-ecological' systems including human societies and their environment, studying how these can adapt to global changes.

Forests, gardens, vertical farms and green corridors: the essential return of life

In the Anthropocene, nature in the city is way more than just scenery: it's a vital necessity. From rooftop vegetable gardens to ecological corridors, let's zoom in on five emblematic projects of this essential return of life in global metropolises.

For many city dwellers, the Covid-19 pandemic will have had the effect of an electric shock, revealing the vital need for nature. A desire motivated by the quest for a more pleasant living environment, especially in highly mineralised neighborhoods, but which also has tangible effects on psychological and physical health. Now science has proven that being in nature boosts immunity, reduces stress and depression, improves our mood, and lowers the risk of developing cardiovascular diseases. One more argument, if necessary, to integrate the living into town planning policies, is to ensure the adaptation of urban environments to the very real consequences of climate change: multiplication of heat wave episodes reinforced by the phenomenon of heat islands, aggravated flooding due to the artificialisation of soils.

Faced with the collapse of biodiversity on the one hand, and the challenges of ensuring the livability of cities, on the other hand, the services provided by nature take on new importance: green roofs to facilitate urban cooling and collection of rainwater, air purification by plants, regulation of invasive species, soil renaturation to facilitate water absorption and limit the extent of flooding, reconstitution of marine biodiversity for coastal towns. If many cities are betting

on afforestation (170,000 additional trees in Paris by 2026, 100,000 in Toulouse by 2030, etc.), the return of the living cannot be limited to that.

Towards multi-species cities?

In the age of the Anthropocene, biodiversity is increasingly establishing itself as a vital component of a fragile ecosystem of which we, as humans, are a part of.

What if we radically change our perspective on the place of living things in an urban environment? This is what the philosopher Joëlle Zask proposes in her book *Zoocities* (Premier Parallèle, 2020), in which she evokes the emergence of a 'multi-species' city where humans coexist harmoniously with wild animals: the bees that forage on Parisian balconies, foxes that roam London gardens, kangaroos that occupy the streets of Canberra... 'The city as we know it was historically designed against wild animals and, more generally, against nature. Welcoming these animals among us seems unthinkable', she notes, convinced that cohabitation is possible provided that 'the right distance' is established. Especially when we know that proximity to wildlife can transmit diseases.

An ecosystemic vision

Ultimately, it is time for humans to think with nature and not against it, inventing new relationships based on symbiosis and openness rather than predation and control. A paradigm shift that is based on an ecosystemic vision capable of taking into account the complex set of interactions of living things at the risk, otherwise, of leading to counterproductive effects. The example of urban beehives speaks volumes: as a scientific study revealed in 2019, overpopulation of honey bees has ended up encroaching on wild pollinators.

The challenge is therefore to create the conditions for integrating living things in the best possible conditions, so as to ensure the sustainability of ecosystems. This is precisely the role of the green and blue networks, intended to ensure ecological continuity of green spaces or wetlands, and in this way preserve the species that live there. Another major lever: the fight against light pollution which disorients nocturnal animals and affects the efficiency of visual communications and reproductive behavior.

From vertical farms to shared rooftop gardens and ecological corridors, it is up to us to welcome living things into our cities.



1 The bee highway, Oslo

A green corridor dedicated to pollinating insects was created in the Norwegian capital in 2015. The Bybi company behind this pioneering project intends to protect them by allowing them, in the long term, to cross the city from end to end via food stations and green spaces. Businesses, associations and residents are invited to participate in this effort by planting flowers, for example, then posting their contribution on an interactive map.

2 Jade Eco Park, Taichung

A 70-hectare ecological park was created in 2020 on the former site of this Taiwanese airport under the leadership of architect Philippe Rahm. Known for his practice of 'meteorological architecture' consisting in taking into account the wind, the sun and the air circulation, he has endeavored to intensify certain naturally present microclimates (where it is cooler and less wet) by planting trees in certain places or by taking advantage of the albedo with white installations.

3 Sunqiao Urban Agricultural District, Shanghai

In twenty years, China has seen 123,000 km² of cultivable land disappear. The country is now seeking to put in place innovative solutions to feed its population, like this giant vertical farm in the heart of Shanghai. With around one hundred hectares to cultivate, this project led by the American company Sasaki, still under construction, blurs the line between urban and rural world through developments that invite discovery.

4 Green Riyadh

Led by Egis, this major project plans to plant more than ten million trees in the Saudi capital by 2030. A major challenge in this country with high water stress which will be based, among other things, on the reuse of wastewater effluents and a fine selection of species adapted to arid climates, such as acacias. In total, 210 boroughs and 3,000 urban parks are affected by this initiative, which will change the face of the metropolis by increasing the rate of plant cover from 1.5% to 9.1% over the course of the decade.



Photo credits (sent by the company): © ByBi/Mattew Bryce



Photo credits : Taichung Central Park, Taichung, Taiwan, 2012-2020 / Philippe Rahm architectes, Mosbach paysagistes, Ricky Liu & Associates
Photo : Courtesy Philippe Rahm architectes

5 Brooklyn Grange, New York

The world leader in rooftop agriculture, Brooklyn Grange occupies three rooftop farms in New York (about two hectares in total), producing some 45 tons of organic fruit and vegetables per year. A concept that has many environmental virtues (absorption of rainwater, attenuation of the heat island effect, etc.) but also challenges linked to the management of shallow soils which tend to dry out quickly and to be exposed to gusts of wind.



Courtesy of Sasaki



<https://www.egis.fr/convictions/cadre-de-vie/green-riyadh-un-horizon-vert-pour-2030>, © 2019 Riyadh Green



<https://www.brooklyngrangefarm.com/about-brooklyn-grange-1>,
© Anastasia Cole Plakias, Brooklyn Grange Rooftop Farm

Predictions

2031

The world now has 10,000 'Resilient Cities'

Established in 2025, the 'Resilient Cities' label is awarded to cities that have implemented policies aimed at reducing disaster risk. This includes adapting the architecture, revegetation and reduction of concrete to combat heat waves, or the drainability and unwaterproofing of soils to limit the risk of flooding.

2032

Can the Cape flu generate a new pandemic?

Spotted for the first time in South Africa, the virus continues to be widely discussed and to worry healthcare professionals. If it seemed to be geolocalized to the south of the African continent only since its appearance, new cases were spotted this weekend in Tangier, New York, London, Budapest, Tokyo and Singapore, raising the risk of a spreading of the epidemic. Slightly deadlier and above all more contagious than its predecessor, the notorious Covid-19, it can generate a new pandemic, according to the WHO president. Many countries have started to recommend the wearing of masks and the respect of barrier gestures, while temperature controls are being set up in public places.

2033

The city of Paris captures 2 million tons of CO2 per year

Up and running since last year, the Yann-Arthus Bertrand plant, built by the Swiss company Climeworks, is now operating at full capacity and has captured nearly 2 million tonnes of CO₂ directly from the atmosphere this year. This device supports the efforts of the municipality to reduce its carbon footprint, which now stands at 15 million tons of CO₂, compared to 22.7 million in 2018.

2036

Île-de-France receives the maximum score from AFCVE for its coverage in electric charging stations

Since 2030, the French Association of Electric Vehicle Drivers has given each region a score from 1 to 10, indicating the level of charging stations coverage, in order to limit the famous range anxiety that all electric vehicles drivers fear. Inspired by German legislation, the Paris region has been forcing service stations to offer charging stations since last year, benefiting from an unprecedented network this year.

2038

Leipzig achieves energy and food self-sufficiency

The German city has just fallen to 6 on the Robinson indicator, which goes from 1 to 8 and measures the degree of autonomy of a city in terms of energy and food. Beyond 5, the city is considered capable of supporting itself. The city's significant investments in solar panels, urban wind turbines, urban farms and partnerships with its inhabitants have enabled it to exceed this threshold for the first time this year.

2040

Chicago now has one surveillance camera for every ten inhabitants

The Big Brother coefficient, which compares the number of cameras in a city to the number of its residents, ranks Chicago as the top US city in density in surveillance cameras. The municipality justifies its policy by arguing that these cameras, and the processing of their images by artificial intelligence, have reduced the number of attacks by 90 % over the past ten years. But many associations are outraged by the threat they pose to the privacy of the habitants and call for a moratorium on their installation, or even their outright ban.

2042

The UN passes a resolution to ban cryptocurrency mining

Crypto-currencies have for years been singled out by environmental NGOs for their heavy carbon impact: the mining of the Bitcoin Blockchain alone consumes more energy than Germany. This is why the UN has made a landmark decision, urging member states to ban cryptocurrency mining. The next practice to fall under the wrath of the international organisation may well be space tourism, which, while booming, is also being denounced for its exorbitant ecological cost.

2050

The first nuclear fusion reactor enters regular service at the Cadarache site

Much water has flowed under the bridges since the signing of the final agreement on the construction of ITER (International Thermonuclear Experimental Reactor) at the Elysée Palace on November 21, 2006. The culmination of this titanic program, to date the largest global science project, is a big step in the fight against global warming. Coupled with renewable energies, the proliferation of nuclear fusion reactors indeed offers a real opportunity to massively decarbonise the economy and limit the rise in temperatures to 1.5 °C in comparison to the pre-industrial era by the end of the century.



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From real time to urban planning

Between public policies and the uses of inhabitants, short-term adaptations and major structuring schemes, urban planning must deal with different time scales. As a Geographer and a teacher-researcher at the University of Grenoble, Luc Gwiazdzinski advocates for a better management of the temporal dimension in urban planning.



Why is it important to integrate the temporal dimension into urban planning?

For a long time, the notion of temporality was poorly integrated into the organisation of cities. When we did it, it was with the objective to gain time by organising space with high speed trains, highways and so forth. Today, we realise that we have wasted space and we have let cities spread out. I believe it is interesting to think together about the relationship between space and time, in terms of rhythms, in order to reduce undergone travels and improve quality of life

The uses of cities have changed a lot since the beginning of the current health crisis. Are they changing faster than ever?

It is true that cities have had to adapt rapidly during the health

crisis. Some of them have taken advantage of the situation to deploy temporary lay-outs such as ephemeral outdoor terraces or new cycle paths that in the end have ended up staying in effect. Thoughts have also emerged regarding traffic jams: instead of building additional infrastructure to relieve road and public transport congestions, some companies have spread out working hours, following a time-based approach to town planning.

How do we make cities' uses evolve? Slowly but surely or with long-term based structural planning?

Today there is a need to react quickly, by developing cities' capacities for malleability and reversibility. Contrary to the logic of the Athens Convention which consisted in attributing a function to a space [life, work, leisure and transport infrastructure, editor's note], it is now a matter of bringing together several functions or activities in a same place (such as offices that can accommodate homeless people during the night, for example) in order to promote urban intensity and achieve high temporal quality, in other words spaces that use all time slots, annual and seasonal. But there is also a need to rethink our policies on a long-term basis when it comes to spatial planning and urban organisation, even as the political calen-

dar is subject to the dictatorship of emergency. We were told that the future was in the metropolises, but today we can see a renewed attraction for medium-sized cities, made more attractive due in particular to the increase in teleworking. We must ensure that this demand for relocation and proximity can be sustained over time and not simply be a fad linked to the crisis.

What are the tools used to link these different times and make them work together?

Time is a transversal dimension that impacts everyone and conditions the entire organisation of cities. We must therefore be able to think about it systemically. This is the goal of the time offices [dedicated to the temporal organisation of the territory, for example by shifting the hours of arrival at the office to decongest public transport, editor's note], which in my opinion act as localized accelerators to make all the players involved (elected officials, associations, companies, residents, etc.) aware of the issue of time. These offices or even the Night councils working for a harmonious organisation of the various nighttime activities made it possible to react quickly when the curfew was put in place. More broadly, their priority is to reconcile individual and collective rhythms, not just to slow down as we often hear, but to regain control over time.

Slowing down to better discover

From the large airports' perspective, it's a free fall: in June 2021, movements recorded at Paris-Charles de Gaulle airport had fallen by 57 % compared to 2019, according to figures from the Ministry of Ecological Transition. Health restrictions have also reduced the scope of flights: in the summer of 2021, with some exceptions, the French had to limit themselves to the European continent. An unprecedented crisis for the aviation sector and international tourism which could mark a new beginning, driven by a profound redefinition of our relationship to travel.

Flygskam and sleeper cars

The plane crystallizes this paradigm shift: While the industry doesn't expect a return to normal until 2023, the *flygskam*, the shame of taking the plane, is spreading from Sweden like wildfire. In a 2019 study by Swiss bank UBS, in the United States, Germany, France and the United Kingdom, 22 % of those surveyed said they had reduced their number of flights for environmental reasons. This trend partly explains the rebirth of train travel that we have witnessed since the pandemic, encouraged by certain regions through operations such as 'eTER in Hauts-de-France'. This is also one of the goals of the France Relance plan, which reopened the night train from Paris to Nice last May.

Professor-researcher at the University of Perpignan and specialist on the subject, Bernard Schéou nevertheless relativises the observation of a generalised ecological awareness in this field: 'The trends observed during the pandemic are largely due to external constraints: many dream nothing more than to be able to fly again to the other end of the planet.' Hence the need, according to him, to put in place more ambitious public policies: 'We can be pleased that the Climate law has banned domestic flights lasting less than 2 hours and 30 minutes in the event of an available alternative by train. At the same time, we can only regret that the threshold of 4 hours proposed by the Citizens' Convention was not retained'.

Flow redistribution

The fact remains that for many travelers accustomed to long-haul flights, the pandemic will have been an opportunity to get away from it all in a different way. The future will tell us whether certain habits acquired under duress will settle in the long term, like the renewed attraction for the great outdoors: in France, on Airbnb, the proportion of rural stays has gone from 24 % in the summer of 2019 to 45 % two years later. Micro-adventures near home, hiking and bivouac are on the rise, as is bicycle-tourism, boat rental between individuals or even van trips. An appetite for nature breaks which still involves risks, as illustrated by the overcrowding of the Calanques park, near Marseille, forced to set up gauges to fight against erosion.

The pandemic will not necessarily be the death sentence for mass tourism, but the period is conducive to reshuffling the cards, as the geographer Rémy Knafo believes: 'After the pandemic, the places of 'under-tourism', much more numerous than the places of 'over tourism', and that tourists have often discovered under the constraint of health necessity and mileage or state limitations, will have a card to play in the redistribution of part of the flows' he wrote in a column for *Le Monde*. Enough to open up the horizons of tourism, finally.

A quarter of an hour to make it all possible

The concept of the quarter-hour city sacralised the ideal of a local city, where everything is close and accessible on foot or by bike: utopia or real solution for ecological and societal transitions?

Offices, gyms, health facilities, supermarkets and stores, what if all the essential needs were within reach of everyone within fifteen minutes? From Paris and Copenhagen to Melbourne and Ottawa, a handful of metropolises have adopted the concept of the quarter-hour city to rethink their model of organisation and development according to a principle of hyper-proximity. Theorized in 2016 by the Franco-Colombian researcher Carlos Moreno, the idea found an unprecedented echo during the health crisis by emphasizing the importance of meeting vital needs in a very limited area and by strengthening the desire to live in cities 'on a Human scale'.

Multifunctional places

Fundamentally ecological, the quarter-hour city takes the opposite of the paradigm of 'always faster and always further' accompanying urban spreading, for the benefit of a reduction in pollution but also a better quality of life. 'Rediscovering local urban life means leaving the endured mobility for the chosen mobility,' writes Carlos Moreno in his book *Urban life and proximity at the time of the Covid-19* (ed. De l'Observatoire, 2020). It is about transforming the still

strongly monofunctional urban space, with the city-center and its different specialisations towards a polycentric city. Meshed, connected, reconciled with nature, refreshed, peaceful and benefiting from real public spaces for all, in order to offer this quality of life in short distances'.

To guarantee access for all residents to these essential services, the idea is not to systematically build new facilities, but rather to make the existing places multi-functional: transforming nightclubs into sports halls during the day, setting up markets in schoolyards on weekends, offering language workshops in cinemas, transforming surface car parkings into terraces or meeting places.

Reclaiming the city

It is up to each city to adapt, according to its typology and constraints, to optimize its space and guarantee this range of services promoted by the quarter-hour city. Asphyxiated by its lack of space (only 2.7 square meters of public space per person), Hong Kong, for example, relies on underground spaces, not to house residents but for parking lots, wastewater treatment plants, storage data etc. Enough to free up space on the surface outdoors and reorganise its space.

Because the idea behind Carlos Moreno's concept is also to fundamentally rethink the role of public spaces to make them, above all, spaces for sharing.



© Egis, AdobeStock

Signed last June by the City of Paris, the Charter for temporary occupation projects intends to promote 'local and civic reappropriation of spaces' by offering 'an essential field of experimentation for the creation of urban projects that meet the challenges of ecological and social transition'. The creation of green and refreshed spaces is an integral part of this philosophy: still in Paris, the 'Oasis plan' launched in 2018 aims to make dozens of schoolyards accessible to residents outside of school hours.

An inclusive concept?

Despite its attractive aspects, this popular urban concept is also causing skeptics. Is it realistic for every city? Some metropolises, such as Tokyo, which are already polycentric in structure, seem to be more suited for this model than others. Its implementation indeed seems more difficult in the monocentric scheme that prevails in France, in particular with regard to access to employment. According to a study by the Terra Nova think tank in 2016, the central cities of large French urban areas are home to around a quarter of the population of these areas while concentrating 50 to 60% of job vacancies. But, of course, the accelerated deployment of teleworking could solve the problem of certain home to work commutes, but let's remember that this mainly applies to tertiary executives.

We can therefore fear that the creation of dense and walkable urban centers will reinforce gentrification to the detriment of the peripheries which would be excluded from it. If it is limited to intramural Paris, isn't the quarter-hour city likely to create new ruptures between the center and the outskirts? Why not make this promising concept a vehicle for rebalancing the agglomeration as a whole, to reintroduce services and equipment where they are lacking, for example?

Ultimately, it is about integrating the issues of social justice and environmental justice into urban planning, as the British economist Kate Raworth advocates in particular through her 'donut theory'. The principle: aim for moderation by remaining above the small circle which defines our essential social needs, but below the large circle which endangers our existence (depletion of resources, pollution, etc...). In Amsterdam, the city's public policies are inspired by this idea to revive the economy after the health crisis, while providing better services to its inhabitants and respecting the environment. On the new island which should emerge from the ground next to the Dutch capital in 2025, 40% of the 80,000 housing units will be social housing, built with low carbon footprint materials. ●



Situations

Sarah **tailor in Ouagadougou**

It's the middle of summer, and the day is shaping up to be scorching hot once again as Sarah heads to her tailor shop. Fortunately, in the face of rising temperatures, the municipality has implemented over the past ten years improvements that aim to fight against urban heat islands, and make everyday life more bearable. It is therefore a shady path that allows Sarah to reach her shop, thanks to the many trees that have been planted. Her workshop is also located in a recently constructed building with thick adobe walls, an ancestral technique from the Mediterranean basin which is experiencing a strong comeback, and thanks to which we obtain very insulating walls. Enough to allow her to work in a cool place.

Fahad **transport operator in Dubai**

The sun has just risen over Dubai and Fahad settles into his workstation. He is responsible for ensuring the proper functioning of the electric and autonomous transport modules of the city of Dubai, giant cubes transporting about ten people each and fitting together with other cubes to form larger modules. While autonomous driving is safe, even computers can run into unexpected situations, and Fahad is tasked with taking back control remotely at the slightest failure. Operated by the public transport agency, these hybrid modules, between taxis and buses, work in synergy with the metro to ensure last mile journeys. They are part of a city-initiated public transport investment program to relieve road congestion and reduce carbon emissions.

Pierre **digital nomad in Singapore**

Like every morning, Pierre only has to open his computer to get to work. As an independent developer based in Singapore, he works exclusively from home. His furnished apartment, equipped with an excellent internet connection, also serves as his office. He rents it through WorldWork, a company that caters to young digital nomads and offers them flexible rental contracts. Through his window, he has a view over the sea, and the rows of mangroves that the government has deployed, in combination with artificial dams, to hold back the rising waters. They are part of a massive investment plan of more than 100 billion dollars that the city-state has put in place to guard against climate change.

Elsa **director of a makerspace in Cape Town**

Giving a second life to digital devices is the mission of the makerspace that Elsa founded in the city of Cape Town. It has a dual ambition: ecological, by fighting against planned obsolescence, on the one hand, and social, by giving underprivileged populations access to products that they cannot acquire otherwise. Due to droughts, Elsa places great importance on her water consumption at home and at work, using smart sensors that warn her when she is approaching a daily limit set by local authorities.

Chloé **senior manager of the resilience of the city of Paris**

In order to make the French capital more resilient in regards to the environmental crisis and its consequences, Chloé relies on a large network of drones and flying tethered balloons that her teams have deployed over the past two years. They collect large amounts of data in order to anticipate pollution peaks, heat waves, flood risks and other potential disasters. Her major project at the moment consists of an ambitious program aimed at prioritising the energy renovation of the city's buildings, by orienting insulation work and structural adaptations capable of mitigating the effects of global warming.

Ali **delivery man in Berlin**

Originally from Afghanistan, Ali has lived in Berlin for the past five years, where he works as a delivery man for a ready-to-eat delivery platform. Although his income is not very high, the flexibility of the hours allows him to pursue his studies, which he resumed in parallel, as his engineering degree was not recognized in Germany. Living frugally, he manages to send a small part of his salary each month to his family back in Afghanistan.

Émilie **executive in Bordeaux**

Emilie has never really gotten used to teleconference meetings, and prefers to interact with her teams face to face. Otherwise, she enjoys the quiet of her home when she needs to concentrate on complex tasks. Partial teleworking allows her to benefit from the best of both worlds, while reducing her weekly transport time. Two years ago she left the center of Bordeaux, where her office is located, in favor of a residential suburb where she particularly appreciates the shaded garden at the back of her house. On the days when she goes to work, a unique mobility application set up by the metropolis allows her to take the metro and finish her trip by taxi or shared bicycle.

Zyad **first year student at the Faculty of Medicine of Rabat**

As a medical student, Zyad is aware of the challenges that await his country in the medical sector in the years to come. Global warming makes heat waves longer and more intense, while an aging population means more Moroccans are vulnerable to heat waves. Faced with this challenge, he plans to specialize in gerontology and aims to influence public policies. He believes it is essential to promote the construction of housing resistant to heat, drawing inspiration from traditional architecture, such as badguir, which provides natural ventilation in buildings. He also wishes to explore the uses of telemedicine and robotics to ensure the well-being of seniors from a distance. ●



Making a good use of urban data

If the imaginary of the smart city is usually filled with gadgets and autonomous robots, its future lies in the relevant collection of data at the service of the population. On condition however of maintaining anonymity, a valuable contribution from the urban environment.

Beware of those who park in an unauthorised parking space, throw their cigarette butts in the street or annoy passers-by: they risk a severe call to order from Xavier. The video of this robot tasked with patrolling the streets of Singapore to spot incivility has recently made the buzz on social networks. We must admit that it echoes our imagination of the city of tomorrow, which, from autonomous cars to delivery drones, through self-regulating traffic and fully automated ports, is populated by machines that work by themselves. Thanks to the processing of data by artificial intelligence. A world which, if it tends to want more efficiency, would also be somewhat dehumanising. However, the real challenge of the smart city could well be found elsewhere, according to Michel Cassini, expert in digital and energy transitions. 'The goal of the smart city is not to replace our functions, but rather to enable us to acquire information with which we can predict and act'.

The democratisation of sensors and other

connected objects is thus opening the door to applications that could only be imagined before, the most obvious being in the water and energy sectors. 'Thanks to the proliferation in France of 'Linky' meters, for example, we are becoming able to detect faults or breakdowns more quickly, and therefore isolate them more quickly, it takes less time to repair them, and the indirect cost linked associated to the downtime is lower,' summarises Michel Cassini.

The digital twin at the service of the city

This myriad of data collected by the Internet of Things can then feed into the creation of a digital twin, a virtual program nourished by information collected in the real world. It allows predictions to be taken further using realistic simulations powered by artificial intelligence. 'Let's say that a municipality wants to launch a major energy rehabilitation campaign to be carbon neutral by 2050. Where to start? Which buildings consume the most energy? What happens if I ban a certain area from cars? The digital twin makes it possible to answer these questions →

and thus to make more informed choices.’

Singapore has therefore acquired a digital twin fed with data on temperature, the size of buildings, roof surfaces, energy consumption, and even the level of sunshine. It allows the city to identify the buildings on which it is most interesting to install solar panels, based on the collected information.

Since February 2020, the city of Sydney has had a virtual double that allows residents to view public transport options in real time, check their schedules and their occupancy rate. The optimization of travel is also one of the big challenges of the smart city. Some, like Dubai, are installing sensors of all kinds to prepare for the advent of autonomous taxis. Others, such as the city of Seoul, are combining sensors and 5G in the service of V2X technology, which allows vehicles to interact with their environment to make traffic more fluid and limit the risk of collisions.

The benefits of open data

Tomorrow, open data, and its processing by artificial intelligence, could make it possible to push

this type of solution even further, according to Stéphane Dumarty, transport and mobility expert. ‘We could, for example, analyse the movements of electric vehicles (journeys, necessary autonomy, etc.) over a given geographical area to deduce a global recharging strategy (positioning of terminals, charging algorithms, time slots, level of charge, etc.) making it possible to optimise energy needs linked to recharging needs.’

Open data will facilitate the emergence of an ecosystem of practical solutions for smart cities. Consequently, if the location data of electric charging stations were in turn made public in the form of a programming interface, any developer could create their application allowing drivers to easily locate the nearest stations, which would facilitate the adoption of electric vehicles and reduce carbon emissions... It is the type of concrete uses that start from the needs of the public, which have every chance of shaping the smart city of tomorrow. Much more than a vision giving priority to the machine over the human.

Anonymity, an endangered urban virtue?

With the rise of the rural exodus during the nineteenth century in Western societies, a growing part of the population has experienced a notion that was previously unknown to them: anonymity, and the exhilarating sensation of freedom that it entails. In his essay *The City*, sociologist Max Weber establishes a link between urbanization and the rise of modernity, democracy and liberalism in the West.

But in the era of the Internet of Things, surveillance cameras and the processing of massive amounts of data, does the city still rhyme with anonymity? If we follow the logic defended by Max Weber, can liberal democracy survive in the age of new technologies that threaten to spell the end of privacy in large cities? The Chinese government’s heavy use of cutting-edge techniques combining massive data collection and artificial intelligence algorithms to control its population gives us reasons to believe so. What if the truly smart city was the one that made sure to preserve the anonymity of its inhabitants at all costs in the digital age?

***Hubs, Maas
and territories:
reconnecting with
networks***

Between innovations, new public expectations and the climate challenge, mobility issues are becoming richer and more complex, requiring us to think holistically. Transport policies and regional planning policies are thus entering the era of networks.

In the past, defining a mobility policy was easier. It involved building public transport infrastructure, metro, tram or bus lines, mobilising significant technical and financial capacities, while knowing that we were investing in the (very) long term. And if we sought to meet a need for travel, we also assumed that the supply would create its own demand and that users would inevitably end up using the new infrastructure.

But in the age of Uber, shared bikes and e-scooters, everything changed. The organising authority no longer has all the cards in hand. It must therefore, on the one hand, deal with a certain number of external actors with their own solutions and their rules of the game and this implies reasoning in a more systemic manner. On the other hand, it must also take into consideration the needs and uses of travelers, who have many more options than before. 'We now think less in terms of infrastructure, but more in terms of possibilities for travel, within the framework of a vast ecosystem centered on the user,' says Jérémie Simon, urban mobility expert. 'This ecosystem includes of course traditional infrastructures, but also walking, cycling, micro mobility options, services like Uber...'

A new political scale

Expanding the realm of possibilities also implies changing the level at which mobility policies are decided. Managing travels on a metropolitan scale is no longer sufficient, the organisation must also be done at the regional level, a logic that is clearly reflected in the French mobility orientation law, promulgated on December 26, 2019.

'This law gives more weight to the regions in the organisation of mobility, which is crucial, because the perimeter of the agglomeration is too restrictive. If we take the case of Lyon, for example, every day 200,000 people converge on the metropolis to work there. Rethinking mobility within the city therefore also implies considering these people, who mostly travel by car.

What alternative solutions can we offer users to limit single-car driving? Can we set up carpooling lanes, facilitate their access to local TER stations by making sure that they can find parking spaces...? Are they allowed to get to these stations by on-demand transport, which can quickly get expensive...?' asks Jérémie Simon.

Communicating vessels

A transport ecosystem is characterised by its complexity: the elements that make up the system are interdependent, and rethinking the place of one of them therefore also involves re-articulating that of all the others. Thus, the establishment of low-emission zones, with the exclusion of certain excessively polluting vehicles, requires rethinking the operation of the entire transport network, at the risk of creating legions of unhappy users.

'It is imperative to speak to the people concerned and offer them alternatives, the possibility of parking their vehicle in the right place, of easily obtaining a transport ticket and of quickly reaching a metro station. And this should not only be offered to people who move around the city every day, but also to tourists and foreigners passing through...'

MaaS or the great clockmaker

In this large architecture, Mobility as a Service (MaaS), appears more and more as a way of bringing

harmony into disorder, of offering a central point of control within a complex ecosystem. MaaS makes it possible to have a complete vision of the mobility offer and to move around it in a fluid way, by offering a single point of entry, often through a mobile application, which makes it possible to synthesize all the possibilities available to the user for a given trip.

It also allows you to choose different types of parameters to orient your journey: you may want to arrive as quickly as possible at your destination, but also choose the least expensive option, the one offering the lowest carbon footprint. But MaaS is not a miracle solution, and it in turn creates new questions. 'We must break even more silos to ensure that the various transport options are integrated, go see each operator, embed them in a computerised API and a pricing policy, without forgetting to also address people who don't have a smartphone...', summarises Jérémie Simon. In short, we must think, once again, in terms of networks.



Demobility: an impossible horizon?

From trains to cars, including bicycles and trams, the revolutions in transport modes have always had one goal: to allow people to move around more. However, today, faced with the environmental issue, there is an opposite imperative, namely to limit travel, or even to question the need for mobility.

It is in this context that concepts such as the quarter-hour city emerge. Theorized by the Franco-Colombian urbanist Carlos Moreno, it aims to ensure that all essential services are accessible on foot or bicycle, in order to limit travel needs. It would be a fundamental anthropological rupture that would lead for the first time to reducing our geographical area of interactions, where we have always sought to extend it.

Some believe that to bring about this change in mentality, the incentives will not be enough, and go as far as to imagine a coercive system with individual kilometer quotas and/or CO2 emissions to limit travel. Willful or constraint demobility? The future will tell...

'The Grand Paris Express can play an inducing role in the environmental transformation'



With its four new metro lines, the extension of an existing line, and three million travelers traveling on its 200 kilometers of metro lines by 2030, the Grand Paris Express (GPE) promises to have a profound impact on the future of the territorial lay-out of France's capital region. An impact at the service of environmental and societal transformation in which Jean-François Monteils, Chairman of the Management Board of Société du Grand Paris believes.

What challenges does the Grand Paris Express project address?

It is clear that the overall energy balance of large metropolises is not satisfactory, and is combined with the fact that they are not perceived as a pleasant environment for many of their inhabitants. Today, we spend an enormous amount of time in public or private transports which pollute, are impractical, and which are not adapted to the aspirations of citizens for the future. The law which established the Société du Grand Paris conveys the idea that we need an overhaul. With the transport network, the ambition is to provide a powerful answer to the question of how the metropolitan cities function in the era of the Anthropocene.

The Grand Paris Express faces many uncertainties – including the rapidly evolving changes of office buildings under the impact of the health crisis. How do you deal with what cannot be planned?

Today, when carrying out a large infrastructure project, the fight against time is an extremely sensitive issue. In a democratic system, you cannot reduce the minimum time to run a large infrastructure project under a deadline. And within the time imparted, the conditions can certainly change significantly. The challenge is to ensure that the design of the project is flexible and adaptable enough to avoid ending up with an obsolete system. GPE's initial design has already proven to be well thought out. Today the notion of adaptability is well integrated by communities and major planners.

What consequence does the concern for adaptability have on the daily management of the project?

It seems clear today that the answer lies in giving out incentive and bonuses to encourage quality. We are starting to be fairly certain that office buildings which are far from major transport networks, dated and of insufficient quality, will disappear. The buildings and services with the best quality will remain. In the same perspective, the Grand Paris Express is part of this context of high-quality research. Both in civil engineering – earthworks, tunnels, tracks, train stations – but also in systems that we see little of, or not at all, such as rails, catenaries, automation or passenger information. Yet, in this area, we are at the forefront of the best practices to be able to better anticipate. The advanced automation in the process of being designed should allow the operator to send his train 'on demand' from his control room. Today, metro line 14 is able to do this for specific events. Tomorrow, it will be possible to do this in real time.

How can we succeed in anticipating what will be the uses of the different modes of transport in the regions connected to the Grand Paris Express network?

The starting point is that we ask ourselves whether we have done enough, how we should adapt to new demands, at what cost, etc. The adaptation process is permanent. We advance on the basis that technical subjects or problems allow us to find answers. From the perspective of the environmental transition, this is a very important point for me. I believe that point separates two approaches to today's ecological thinking, between the idea that you need an absolute radicalism that stops things, and the idea that you need an ecology of governance that finds solutions. It is

with the goal to find solutions that entire teams are working on changes to the traveler's journey. We ask them to go as far as possible in the prospective. Must tomorrow's infrastructure be adapted to a system where you will book from your smartphone a ticket from Sainte-Eulalie [near Bordeaux] to Saint-Denis with a ticket integrating every option? We must find the technical answers, and arbitrate. If we consider that this scenario is possible, but that we are six months behind at Saint-Denis Pleyel station because we have to find space for a bicycle rack, for example, you have to find the right balance of arbitration, in a collegial manner.

To what extent does the Grand Paris Express project anticipate climate projections, which predict more intense and long episodes of heat waves and precipitation in the metropolis?

On this point, changes in standards and norms provide us with guarantees. Significant events in the recent past – the 1999 storm, the 2003 heat wave – have boosted the ability to anticipate a climatic episode. I would add that we operate in an area – the digging of deep tunnels, in particular – where experts and technicians know that we must be particularly vigilant. In addition, today we are clearly influenced and determined by the fire in the Mont-Blanc tunnel, after which the standards require the construction of an ancillary structure every 800 meters. In an urban environment, it can be very complicated – but solutions have to be found.

What happens to the very large volumes of excavated earth? Can the Grand Paris Express be part of the new idea of circular urbanism? →

The policy followed by the Société of Grand Paris from the beginning with regard to excavated soil is very demanding; we have set up a traceability system which anticipates the normative texts in preparation. An example: in Bagneux, a company is working on solutions for manufacturing street and urban furniture or bricks from excavated soil. We are in the process of signing the conventions and finding the means to promote this initiative. I am sure that we have good margins for progress, and that innovations in the circular use of our waste will multiply.

GPE funding is based on an innovative mechanism: green bonds. Why is that?

The first pillar of GPE's strategy is environmental excellence. The issue of funding is part of this strategic vision. The choice to use green bonds was made and implemented in a remarkable way by my immediate predecessor. The reason for debt financing is clear: we are currently building something for our children and our grandchildren. As for green bonds, these are bond securities with the purpose of financing projects with the lowest carbon footprint possible, employ methods that minimize the environmental impact, etc. The 'green' quality of our bond is attested by certification entities.

What does the success of financing by 'green bonds' say about a structuring project such as the Grand Paris Express?

For a time, the Société du Grand Paris was, in terms of volume, the world's leading issuer of 'green bonds'. This success is due to the resolutely 'green' character of the project as well as the public guarantee. Above all, I believe

that behind this great interest of investors in green bonds, we must see the interest in projects that authentically contribute to the environmental transition, through their structuring dimension. In this sense, the GPE acts as a demonstrator, an inducer of transformation. We have the ability to demonstrate that a major public infrastructure project can make a city more pleasant, more fluid, more ecological, more sustainable. This demonstration is done on a large scale. We are now at a key phase of the environmental transition, and we are moving from speech to action.

How do you analyze the opposition generated by the deployment of the project?

For those who hold the thesis that we are heading towards disaster and that everything must be stopped, it is unbearable to have a demonstration that in reality, we can build a sustainable world, where citizens will live well, including in metropolitan areas, by using constructive methods that emit very little carbon through sustainable mobility solutions. However, I am convinced that the ecology of solutions is possible. I would also like to point out that opposition to the project sometimes emerges where we do not expect it. They do not necessarily come from affluent neighborhoods in the west of Paris, which could fear the diversity and the unclogging allowed by the GPE. The rejection sometimes nests in much more unexpected places, where populations, very happy with their life in their residential neighborhoods, do not want their territory to accommodate collective housing. The protesters can then endorse the arguments of ecology, and make it play the role of a useful idiot of conservatism.

Is the Grand Paris Express project reconnecting with a certain idea of progress?

The Grand Paris Express is unimaginably complex. Unsurprisingly, many countries are breaking their teeth today on how to conduct this type of project in a democratic system. We have the ambition to show that we are going to get there and in a good way, that our country has this capacity to astonish the world by making a success of the Grand Paris Express on time, by respecting the democratic process and by encouraging acceptance to make a metropolis that will function better and make many new neighborhoods of 'good cities'.



Conclusion



Building today, the infrastructure of tomorrow, in a context of uncertainty and major upheaval is undoubtedly one of the most difficult challenges facing cities presently. While democracy in cities is often limited to the necessarily short mandate of a mayor or the president of a metropolis, their decisions relating to the construction of new infrastructure will have very serious consequences over several decades. The case of the Grand Paris Express illustrates this challenge well, by embodying in a sense the full extent of the change that such structures must and can bring, from the fluidification of transport and the reduction of driving to the emergence of new carbon neutral districts.

The city in the time of the Anthropocene will need to know how to anticipate these developments in order to build solid foundations that can meet the needs of the inhabitants of the future. Now we have the tools to do it better than ever before, thanks to demographic data of course, but also to new technologies like digital twins. These digital replicas of a district or an entire city make it possible to explore different possible scenarios for the future by simulating the impacts on the environment, the nuisances, but also the improvement of the quality of service before even starting the projects. A pioneer in France, Rennes Métropoles used it in particular to renovate its train station. This is a fundamental point, since it allows the various actors and stakeholders – local elected officials, companies, architects, citizens, etc. – to debate on the basis of objective data rather than having theoretical discussions, and thus to anticipate challenges without being subjected to them.

These trends put people back at the center of decisions taken on city facilities, thereby strengthening the dialogue between local elected officials and their citizens. Increasingly, infrastructures cannot be decided without a public debate and without the participation of local residents in the decision. This phenomenon is very new, and has the advantage of putting democracy and the agora back at the heart of the city.

More broadly, technologies will play a fundamental role in improving living conditions in urban areas. Through the data that we generate and use to optimize our travel and energy consumption, our ways of interacting with the city have not finished evolving.

Laurent Germain
CEO of Egis

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