

PULSE

ACCOMPLISH

**A BREATH OF FRESH AIR!
THE GLOBAL FIGHT AGAINST
AIR POLLUTION**

ENLIGHTEN

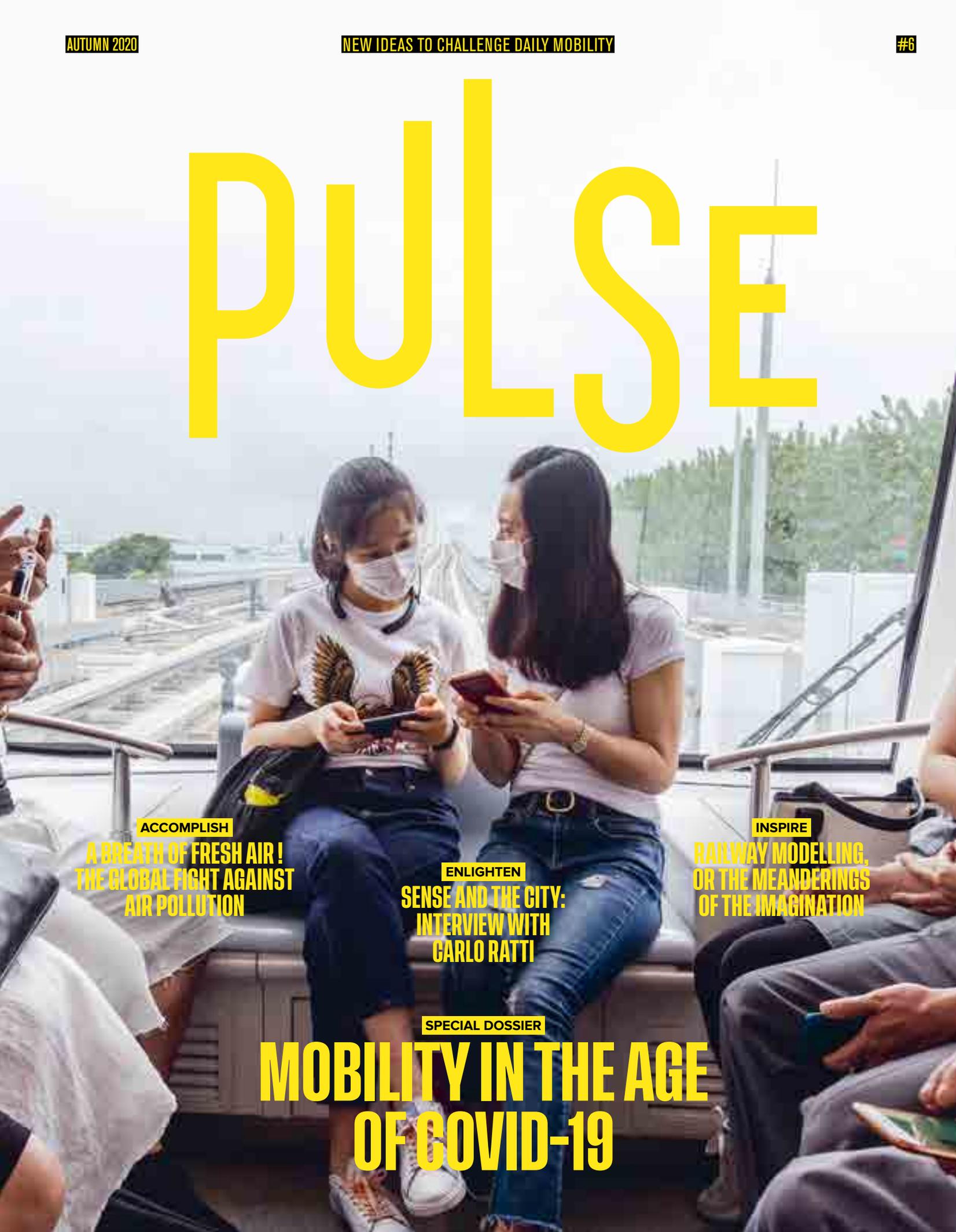
**SENSE AND THE CITY:
INTERVIEW WITH
CARLO RATTI**

INSPIRE

**RAILWAY MODELLING,
OR THE MEANDERINGS
OF THE IMAGINATION**

SPECIAL DOSSIER

**MOBILITY IN THE AGE
OF COVID-19**





Pulse is intended for all stakeholders, decision-makers and opinion leaders involved in everyday mobility. A Keolis-led initiative, this biannual magazine aims to fuel debate and generate discussion about the trends and challenges that are shaping our sector.

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From public transport authorities and operators to industry suppliers and startups, mobility like so many other sectors has seen all its players faced with unprecedented challenges in recent months, compelling us to rethink our established approaches and ways of working.

Yet at the same time, the ongoing crisis has made clear the crucial role played by shared mobility in communities around the world. Keolis teams on the ground have made vital contributions, just like healthcare staff, cleaners and supermarket workers. As I settle into my role at the helm of Keolis, I am very proud to be joining a global team of professionals dedicated to fulfilling our mission as a public service provider.

We've set ourselves the substantial challenge of building a more sustainable and fairer world. As a mobility provider, we'll be playing a central role in tackling the economic, social, regional and environmental issues facing us today. And we must begin by restoring passenger confidence in public transport. We'll achieve this not just by scrupulously applying the strictest hygiene and safety measures, but also by innovating. In this regard, the public health crisis has allowed us to showcase our added value and expertise and to reinvent our business.

Published at a very particular juncture, this issue of *Pulse* includes a special report on the impact of Covid-19 on the mobility sector, featuring views from diverse stakeholders focused on effective responses.

Here's wishing you a thought-provoking read.

MARIE-ANGE DEBON
Keolis Group Executive Chairwoman

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Carlo Ratti

Director of the MIT SENSEable City Lab

Trained as an engineer and architect, Carlo Ratti teaches at Massachusetts Institute of Technology (MIT). There he directs the MIT SENSEable City Lab, a research group that studies how digital technology and data are changing the way we describe, design and occupy cities. He shares with *Pulse* his vision of the ideal city and highlights the opportunities offered by data collection and analysis for making cities more liveable and their mobility systems more efficient. He is also a founding partner of the international innovation and design firm Carlo Ratti Associati, which was set up in Turin, Italy, in 2004 and has since opened an office in New York. ●



Nathalie Ortar

Anthropologist and ethnologist

Nathalie Ortar is senior researcher in social anthropology at the ENTPE engineering school's Transport, Urban Planning and Economics Laboratory (LAET) in Lyon, France, where she teaches a course on the sociology of mobility. Her research focuses on the "anthropology of living" and the relationship between family, housing and day-to-day mobility. She also looks at geographic, residential and professional mobility from a more sociological perspective. In this edition of *Pulse*, she presents her vision of mobility in a post-Covid world and the pandemic's long-term impacts on the way we live, work and get around. ●



Mohamed Mezghani

Secretary General of the International Association of Public Transport (UITP)

Mohamed Mezghani has more than 30 years of experience in the public transport sector. Prior to his appointment in January 2018 as UITP Secretary General, he worked on a variety of urban mobility projects in Europe, Africa and the Middle East. His fields of expertise include urban mobility policies, innovation in public transport, sustainable mobility and relationships between public transport stakeholders. In an interview with *Pulse*, he discusses the lessons learnt by the mobility sector from the health crisis and emphasises the importance of the Green Deal in getting the European economy back on its feet. ●



Sonia Lavadinho

Researcher specialised in urban walking

A geographer by training, with a background in sociology and anthropology, Sonia Lavadinho looks at mobility challenges from a multidisciplinary perspective. Her research with the École Polytechnique Fédérale de Lausanne (Switzerland), the École Normale Supérieure de Lyon (France) and the University of Geneva (Switzerland) has notably made her an expert in urban walking. In 2012, she founded her own consulting company, Bfluid, which specialises in sustainable urban planning and mobility. She gives us her take on the ability of cities to promote and facilitate active forms of mobility, such as walking and cycling, particularly during a health crisis. ●



Bronwen Thornton

CEO of Walk21

Recognised walking expert, trainer and enthusiast, Bronwen Thornton is the Chief Executive Officer of the Walk21 Foundation, which promotes the right to walk and the opportunity to enjoy it internationally. She works with communities and professionals around the world to develop and deliver innovative and practical projects, resources and tools to help cities encourage people to walk more. Interviewed by *Pulse*, she sees the pandemic as an opportunity to give fresh impetus to the concept of "walkable cities". ●

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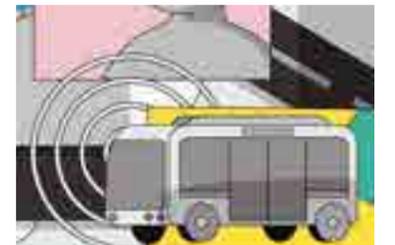
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A BREATH OF FRESH AIR!



By Julien Thèves
Illustrations: Anna Wanda Gogusey

2020 saw estimates of pollution-related deaths revised upward, fears of a resurgence of car use due to the pandemic and the EU reprimanding member states for failing to act more decisively. This year has been marked by an intensification of expectations in terms of air quality. But there are positive signs: numerous cities and even an entire country are pushing ahead with practical measures and making mobility a powerful driver of change.

WAGING WAR ON PRIVATE CAR USE

OSLO STEPS UP DISSUASIVE MEASURES

To reduce CO₂ emissions by 95% between now and 2030, the Oslo greater urban area (population: 680,000) took further steps to curb single use in 2019. The goal is to reduce the number of cars on the road by one-third compared to 2015 levels, restrict traffic to low-emission vehicles only, invest in public transport, increase the number of cycle lanes and pedestrianise more streets.

Europe's Green Capital of 2019, Oslo has implemented a raft of dissuasive measures in recent years, such as removing 760 on-street parking spaces, introducing zoning, which makes it impossible to cross the city centre by car, and increasing its urban toll fees.

times was reduced by 12%. The number of cars and SUVs was up by 25% and 8% respectively and CO₂ emissions were cut by 18%. And Ghent didn't stop there. In 2020, its inner city became a Low Emission Zone (LEZ). Only vehicles meeting specific conditions, based on Euro standards and fuel type, may enter.

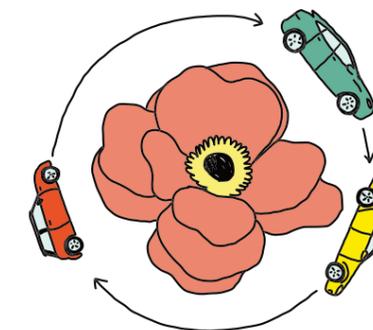


LONDON FOCUSES ON EMISSIONS CHARGING

In late 2018, London metropolitan area (population: 9 million) set a target of being carbon neutral by 2050 in line with the Paris climate agreement, which aims to keep global temperature rise below 1.5°C. To achieve this, the city revised its transport policy the same year. One measure is to increase the daily charge on older, more polluting vehicles as part of a scheme in force since the 2000s.

In 2003, London introduced the first congestion charge, which was initially set at £5.00 a day (€5.50) and applied to private cars within the central charge zone on weekdays. This was gradually increased to £11.50 a day (€12.60). From 2021, it will be further raised to £15.00 a day (€16.50) and extended to weekends.

London has also introduced the world's first Ultra Low Emission Zones (ULEZ) covering central parts of the capital. From April 2020, vehicles not meeting the city's emissions standards will be liable to a daily charge from £12.50 (€13.75) to £100 (€110), seven days a week. By 2022, the ULEZ is expected to reduce emissions in Central London by about 45%.



GHENT GETS TOUGH ON TRAFFIC

First battle won! To limit private car use, the Ghent municipality (population: 250,000) in Belgium adopted an especially stringent traffic plan in 2017.

It divided the city into six districts, which can only be reached via the ring road, not by driving across the city. The results are encouraging: in the scheme's first year, the number of cars at peak



PUBLIC TRANSPORT GAINS MOMENTUM

The Metro Vision 2028 Strategic Plan is expected to inject **\$120 billion** of transport funds into the region and includes a wide range of initiatives, from a new metro line and underground tramway to extended metro and tram lines, not to mention an overhaul of the  network to raise average speeds by **30%**. It's a revolution for the city, where 89% of journeys are made by .

At the same time, LA Cleantech Incubator, the city's official clean technology business incubator, has set three targets for achieving a **25%** cut in greenhouse emissions by 2028. First, **80%** of new vehicles sold must be electric, equivalent to **30%** of vehicles currently on the road. Second, **20%** of single-person journeys must be sustainable (zero-emissions public transport, , etc.). And third, State Route 170, which crosses the city, will become America's first zero-emissions highway for freight in 2028.

🇩🇰 COPENHAGEN GIVES BICYCLES A NEW BOOST

— A pioneer in efforts to combat emissions, Copenhagen (population: 600,000 in the Copenhagen Municipality) has led the way in promoting . From the 1970s, when the city was hard hit by the oil crisis, it encouraged people to leave their  at home and take to two wheels.  use continued to increase, and by late 2016 there were more  than  on the streets. Today, **41%** of daily commutes to school or work are by .

But the city, which aims to become the first carbon-neutral capital by 2025, has set a new goal of **50%** of all journeys by  by 2025. If it hits this target, its carbon emissions — already down **100,000** tonnes a year — will be cut by a further **10,000** to **20,000** tonnes.

🇺🇸 LOS ANGELES REINVENTS ITSELF

— Ahead of the 2028 Summer Olympics, Metro — the Los Angeles County Public Transport Authority — implemented an unprecedented transformation plan in 2018. The goal is to drastically improve quality of life in the city (population: 4 million), which is well-known for its congestion and air pollution.

🇦🇹 AUSTRIA PROVIDES MOBILITY TO ALL

— In early 2020, the Austrian government set out its environment protection vision for the country (population: 8.85 million). Its goal is to be carbon neutral by 2040. To achieve this, the environment minister unveiled an unprecedented plan in June to promote public transport and make it unlimited and accessible to everyone, for a capped flat-rate fare of €3 a day. So, how will it work? The new **'Ticket 1-2-3'** will cost €1 a day for travel within a single state, €2 between two states and €3 for the entire country.

The government aims to have the system up and running within two years. The €240 million needed to fund it has already been earmarked.



CARPOOLING GAINS TRACTION

🇫🇷 RENNES MAKES CARPOOLING FREE FOR PASSENGERS

— In 2018, before the French mobility bill was adopted in 2019, the Rennes metropolitan area (population: 447,000) incorporated carpooling into the mobility mix of its Keolis-operated network.

To encourage uptake, the city made journeys entirely free for carpool passengers. This has proved to be an effective incentive for people hesitant about sharing a ride with someone they don't know. Drivers earn loyalty points, which can be redeemed for gifts or vouchers for use in the city transport network's store.



By September 2019, one year after it went live, the app was logging **3,800** journeys a week, equivalent to **760** weekday commutes. After this initial success, the Rennes carpooling model was adapted and extended to the entire Brittany region via a dedicated website, Ouestgo.fr. In early 2020, a further scheme was approved under the new Rennes urban mobility plan, with the provision of separate lanes for carpoolers,  and  on eight roads in and out of the city and on the bypass. This is expected to prompt people to carpool at least **one day a week**.

The city authorities are hoping a bit of civic-mindedness will stop other drivers from using these lanes, but they've also installed cameras able to count the number of vehicle occupants.

🇫🇷 PARIS ADDRESSES POLLUTION PEAKS

— Already tested during public transport strikes, free carpooling has been offered since July 2018 whenever pollution levels peak in the Greater Paris metropolitan area (population: 7 million). Drivers make their vehicles available by signing up to **one of three** partner carpooling apps and are reimbursed for each ride. Passengers book via a dedicated app.

The result is a significant drop in pollution on poor air quality days and a longer-term shift in habits. Some **16 million**  journeys are made every day in the Greater Paris area, with an average of just **1.1** people per vehicle. By raising this figure to **2**, congestion would be halved!

🇮🇳 NEW DELHI TESTS ALTERNATE-DAY TRAVEL

— In September 2019, the government in the Indian capital (population: 21.75 million), the world's most polluted city, set out a new plan to combat its peaks in pollution. It focuses on **alternate-day travel**, already trialled **twice** in 2016.

The idea is to push people to use public transport and carpooling apps. French carpooling platform BlaBlaCar has been operating in India since 2015, along with Uber (and its UberPools) and Ola Cabs, the leader in the local ride-hailing market, with its Ola Share service.

When only half the  are allowed on the road, demand goes up on these apps, which let several passengers share rides on the same route. It's a first step towards curbing New Delhi's catastrophic pollution levels, and it could be extended to many other cities.



BEYOND MOBILITY... OTHER GAME-CHANGING INNOVATIONS

🇨🇭 ZÜRICH REVOLUTIONISES FREIGHT

— Like passenger transport, moving goods from A to B creates pollution and adds to congestion. Around the world, initiatives are taking shape to reduce its impacts. In Switzerland, the **Cargo Sous Terrain** (underground freight) project is a planned underground rail system that will initially link Zürich (population: 402,000) to the municipality of Härkingen, 70 km (43 mi) to the west. So, how will it work?



Containers will be conveyed through an underground tunnel at a speed of 30 km/h (18.6 mph) by automated vehicles powered by renewable electricity. Near their destination, usually in a city, goods will be unloaded in an underground hub then delivered to each address by light electrically powered vehicles, some of them driverless. The schedule and route for each delivery round will be calculated to ensure optimal efficiency.

The CST project will reduce delivery traffic in cities by **30%** and noise by **50%**. In 2020, the Swiss Federal Council approved the concept in principle. The Zurich – Härkingen link will open in 2030 and be extended to other parts of the country through to 2050. The total investment is estimated at over CHF30 billion (€28.15bn).



🇸🇬 SINGAPORE GREENS ITS WALLS... AND BUSES!

— In the Asian citystate (population: 5.63 million),  traffic is highly regulated and public transport especially efficient. But Singapore – one of the planet's most densely populated cities – is also known for its greening policy and aims to become the world's leafiest city by 2030.

Today, Singapore already has **18** nature reserves, with one tree for every two people. To bring more nature to the city and become even more sustainable, it has been focusing on **'vertical forests'** in the last few years, with plants springing up on more and more buildings. The Tree House holds the record for the world's largest vertical garden, with **2,288 sq.m.** (over 24,600 sq ft) of greenery, while the Oasia Hotel has plants covering its entire 207 metre (680 ft) high façade, providing natural shade. The building thus uses less electricity for air conditioning. The vegetation also cuts background noise and absorbs CO₂ from the atmosphere.

So, since it works on buildings, why not try it on vehicles? From May to July 2019, 10  on Singapore's public transport network had two 3 sq.m. (32 sq ft) planters fitted on their roofs. These mobile gardens were planted with hardy species resistant to dry, windy conditions. The purpose of the **Garden on the Move** initiative was to test whether greenery lowers the temperature inside , so that they use less fuel to power the air conditioning. ●

ELECTRIC RETROFIT

ANYTHING BUT RETRO!

By Adeline Tissier

Converting a diesel  to electric drive rather than replacing the entire vehicle is an attractive idea for cities keen to speed up their ecological transition. Around the world, electric retrofit initiatives of diesel  are taking shape. And while this technology is developing unevenly, it could be a real opportunity to reduce  fleets' carbon footprints.

INNOVATIVE ENTHUSIASTS

The concept of electric retrofit first emerged in California  in the 1970s, when classic  enthusiasts began toying with it. What started as a niche trend soon spread. Today, all kinds of vehicles can be retrofitted – from private  to trains, tractors and heavy machinery. More recently, it has attracted growing interest from cities wanting to run zero-emissions  without the expense of buying new-build vehicles.



THE FINE ART OF TRANSFORMATION

The idea is simple. Take a diesel  that's halfway through its service life – typically eight to ten years. Swap its combustion engine for a new drivetrain with electric motor. Add batteries and a charging port. Maybe make a few upgrades to the coachwork and internal fittings. And hey presto, you now have a 'retrofitted' electric , which is eco-friendly, super quiet and ready for another six to eight years of service!

TICKING ALL THE LOW-CARBON BOXES

For transport authorities keen to embrace the circular economy model, it's a great way forward. A retrofitted diesel  reduces your carbon footprint on at least two levels: not only are exhaust pipe emissions eliminated, but so are all the industrial ones involved in making a new vehicle. Each existing  converted to electric is one less new electric  to be built!

FAVOURABLE REGULATIONS



The technology is moving forward apace, but it still needs a bit of stimulus. First, legislation could encourage or require cities to transition to clean  – as in California , where it will be impossible to buy polluting vehicles after 2029. Specific guidelines also need to be set for converting existing vehicles. That's what Germany  and Italy  have done, as well as France  more recently with a government decree issued on 13 March 2020. Another effective lever is subsidies.



HOW MUCH DOES IT COST?



Electric retrofit also needs a viable business model. For now, the overall cost of retrofitting a diesel  is about the same as the price of a new electric . The combined expense of a retrofit is still higher than the savings in maintenance and fuel over the 'electric phase' of a bus's service life. A battery pack costs about €250,000. It then has to be installed, complete with charging ports. Plus there's the purchase price of the original  and maintenance and operation for the first eight to ten years, typically another €250,000. Going forward, the emergence of specialist companies to create an effective industry ecosystem will be vital for making this approach economically attractive.

23 The number of countries worldwide that allow retrofit.
Source: AIRE (electric retrofit industry association)

3,000
The number of charge/discharge cycles for a battery on a retrofitted  over its six to seven years of service.

 **Gas-powered  can also be retrofitted to electric, but it's easier to convert them to hydrogen.**

 **MAKE OLD NEW AGAIN**
After a successful trial in 2018, the city of Boulder, Colorado, is planning to retrofit nine diesel  to electric drive. The decision was largely influenced by the much shorter delivery timeframe of six months, compared to two years for new-builds. A similar project is going ahead in Lane County, Oregon.

 **A FIRST IN OXFORD**
For the first time, Oxford has retrofitted a diesel open-top sightseeing  to electric (March 2020). Four others will be converted soon.

 **EUROPEAN COMMISSION SUPPORT**
A €107 million subsidy was granted to Germany in late 2018 to fund the conversion of 7,000 diesel  to electric in almost 90 municipalities. A real boost!

SMARTER

AND
THE
CITY

Here at *Pulse*, we wanted to know what the 'ideal' city would look like. How can we change cities for the better, what new technologies could help drive that change, and where does sustainable mobility fit in? So, we spoke to internationally renowned architect, engineer and inventor Carlo Ratti, a professor at the Massachusetts Institute of Technology where he's at the helm of the MIT SENSEable City Lab — a research group advocating for a city that senses and responds, where the interaction between inhabitants and their urban environment is fostered through technology.

Interview
by Stela Karabina



MIT SENSEable City Lab
The MIT SENSEable City Laboratory aims to investigate and anticipate how digital technologies are transforming cities and urban lifestyles. Part of the MIT Media Lab at the Massachusetts Institute of Technology, the Lab's mission is to creatively intervene and investigate the interface between people, technologies and the city.

INTERVIEW

Italian architect, engineer, inventor and educator, **Carlo Ratti** is a professor at the Massachusetts Institute of Technology, where he directs the MIT SENSEable City Lab, a research group exploring how new technologies are changing the way we understand, design and ultimately live in cities. Ratti is also a founding partner of the international design and innovation office CRA-Carlo Ratti Associati, which he established in 2004 in Torino, Italy, and now has a branch in New York City.



— CARLO RATTI, WHAT IS THE 'IDEAL' CITY?

Carlo Ratti: Shakespeare asks: "What is a city but the people?" Today, like 400 years ago, I'd say that to understand a city we need to start from the community of its citizens — and how they live happy, healthy lives. If the question is more about my personal pick of an 'ideal' city, then I'd take inspiration from Georges Perec and his book *Espaces d'espaces*. Here, he dreams of an apartment where each room faces a different arrondissement of Paris. My ideal city would have Cape Town's climate, Prague's lay of the land, Manhattan's skyline, Sydney's fusion cuisine — and

Rio de Janeiro's nightlife! We'll need a bit of Rio spirit when the Covid crisis is over!

— YOU ALSO TAKE INSPIRATION FROM AMERICAN HISTORIAN LEWIS MUMFORD WHOM YOU QUOTED SAYING CITIES CAN BE BOTH HEAVEN AND HELL. HOW CAN WE MAKE THEM MORE 'HEAVEN' AND LESS 'HELL'?
C. R.: Again, I'd start from people and their aspirations, not technology. In fact, the same technology can

less congestion, shorter travel times and lower environmental impact.

However, the same technology could equally lead to a very different scenario. The cost of travelling a mile might drop so much that people abandon public transport in favour of autonomous cars. That would lead to a rise in the number of cars and gridlock.

Where we end up, somewhere between these two scenarios, will depend on government policies. City authorities must

— To understand cities, to make them more livable and pleasant, we need to start from people and their aspirations, not technology.

take us in very different directions. A good example is a technology that's about to hit the ground: self-driving cars. Autonomous cars can enable car-sharing and ride-sharing. In the near future, we can imagine a scenario where 'your' car takes you to work in the morning and then, rather than sitting idle, gives a lift to someone else in your family. Or indeed, to anyone else in your neighbourhood or social media community. It could also be used by people on different rides at the same time. The combination of car-sharing and ride-sharing could drastically reduce the number of cars in a city. That would bring benefits like

put the right incentives in place — from congestion charging to free mass transit — to achieve what citizens want.

— SO WHAT YOU'RE SAYING IS TECHNOLOGY IS NOT WHERE TO START FROM WHEN TRYING TO IMPROVE CITIES, BUT IT CAN CERTAINLY HELP ALONG THE WAY, AS YOUR WORK AT THE MIT SENSEABLE CITY LAB SHOWS.
C. R.: Absolutely. In his seminal book *The Five Bases of the General Theory of Urbanization*, published in 1859, urbanist Ildefonso Cerda envisaged city planning as a science. "The building of cities," he wrote, "if it is not so already, will soon become

INTERVIEW TO BE CONTINUED PAGE 18

Trash Track

With this initiative, the SENSEable City Lab traced the final destinations of waste objects from households and schools in the Seattle metropolitan area. By attaching GPS sensors to each object, it was possible to uncover the hidden dynamics of the 'disposal chain'. For instance, hazardous electronic and household waste was dumped to specialised facilities in other states. With some objects travelling as much as 6,152 km, the project effectively influenced some participants' consumption choices, who gave up drinking plastic bottled water when they learned the container's final destination.



The Copenhagen Wheel

To encourage behavioural change and lower our carbon footprint, the SENSEable City Lab teamed with the Municipality of Copenhagen in 2009 to develop an electric motor for bicycles, in the form of an easy-to-mount rear wheel. This project later spawned a startup called Superpedestrian, which is now developing the Copenhagen Wheel. It regenerates energy as riders brake, helping them cover longer distances and ease through the slopes. Using sensors, it also performs social and environmental functions, from tracking the bike's trajectory to detecting the rider's friends nearby and collecting air pollution data.



Here are some of the projects led by Carlo Ratti Associati and the MIT SENSEable City Lab.



Roboats

Roboats are self-driving boats designed for Amsterdam's canals. This invention co-created by MIT and the Amsterdam Institute for Advanced Metropolitan Solutions is a flat floating platform with GPS, automatic identification system and other technology to give it a complete picture of the waterway and enable it to plot the best path for transporting people and goods. Obstacles up ahead are identified so it can avoid collision. For special events, multiple Roboats can be joined together to form bridges and stages.

Global Mobility Index

Working with the World Economic Forum and TomTom, the MIT SENSEable City Lab developed the Global Mobility Index as a part of its research on mobility to measure how the population in 100 cities navigates the road network, with the goal of congestion relief. It focuses on key barometers of urban mobility like congestion levels and commute time. Since car-sharing is a key factor in sustainable mobility and pollution reduction, the index also projects the percentage of trips made by people sharing a car. The next phase will include even more transport modes.

New Deal

By 2050, urban mobility is likely to be taken over by electric and autonomous vehicles. A main upshot might be a dramatic fall in the number of vehicles needed to meet mobility demand. Carlo Ratti Associati was part of the curatorial team with SEURA Architectes, Jornet Llop Pastor Arquitectes and other designers to launch New Deal, a 2019 exhibition imagining a future Paris where some of the roads are repurposed in line with a fall in demand. Sections of the famous Boulevard Périphérique would become a reconfigurable playground or green residential buildings. The A6 autoroute would also shrink in size, replaced by greenhouses or solar energy plants.



a genuine science calling for major and profound research in every branch of human knowledge and, most especially, in social science.”

Over 150 years later, data is making Cerdà's vision a reality. It's helping us better understand cities and make them the subject of scientific inquiry. For instance, data can be used to propose changes to how a city operates. With the HubCab project, which we started at the MIT SENSEable City Lab in 2013, we analysed data from over 170 million taxi trips in New York City to reveal mobility patterns and understand how to build a more efficient system where people share

— **Sensors in our phones, cars, buildings, generate data. We must share and use it to shape our behaviours and transform cities.**

rides — bringing down the cost of each trip and reducing its environmental impact.

However, we must never forget to critically examine the use of data. As we enter a world that's more and more like a 'dataville' — a city based on data — we should keep asking two key questions: who has access to the data? And what's it used for? With this in mind, we've been working extensively at

MIT on the ethical issues around big data. In 2013, we launched an initiative called Engaging Data, which involves key figures from government, privacy rights groups, academia and business. I believe it's critical to have an open, frank discussion.

— HOW CAN SENSORS FURTHER HELP US DEVELOP MORE LIVEABLE CITIES ?

C. R.: We have sensors in our phones, 📱, buildings, etc. Sensors generate data, which must be shared and used to shape our behaviours and help build more liveable cities. It's the first step to

better understanding and then transforming a city.

I'd add another dimension of how data can enact behavioural change and hence have an enduring impact on city life. Here's an example. With the Trash Track project in Seattle, we added tags to urban waste items and followed them through the city's 'disposal chain'. One of the many things we learned is that information

sharing through simple visualisations can promote behavioural change.

Those involved in the project followed items they had disposed of, with some objects travelling as much as 6,152 km. Using questionnaires, we found that this knowledge had prompted some of them, and others, to rethink and make different choices.

After Trash Track was rolled out, one person said: "I used to drink water from plastic bottles. I'd throw them away and never think about them again. However, I now know they go to landfill a few miles away and will stay there forever. As a result, I've stopped drinking bottled water."

— WHAT ABOUT SUSTAINABLE MOBILITY? HOW COULD IT BE ENHANCED?

C. R.: We need to provide people with as many public transport and mobility choices as possible — from minibuses to scooters and 🛵 with new form factors. With this 'transportation portfolio' available, we'll be able to choose the best mobility option in real time, through what we might call a 'Moving Web'.

I'm thinking about a single platform to share and choose mobility services across all public transport providers, with one point of payment. This will let people plan a trip more easily and efficiently. It's not just about knowing how long each segment would take, but being able to grab that option in real time. Implementing the Moving Web will require an integrating platform, similar to what happened in the airline industry a few decades ago, with systems like Amadeus

for comparing options from multiple airlines.

— IN THE CURRENT CRISIS, WHAT ARE THE GREATEST CHALLENGES FOR CITIES, NOW AND GOING FORWARD?

C. R.: The challenges are always the same. They're linked to the most obvious feature of cities: their density. That's what makes cities exciting, but it also causes issues like traffic, pollution and unaffordable housing.

Density is also what has made cities vulnerable to pandemics in the past and Covid-19 today. Fortunately, data can help here! We've all heard about contact tracing apps, which help experts understand people's encounters and in turn the spread of the disease. Similarly, we can source data from urban sewage to monitor the virus's spread. In the last five years, our SENSEable City Lab led the Underworlds project, an MIT-wide research initiative to monitor human health at neighbourhood level by deploying small robotic sampling devices into the sewer system. We showed we can detect many viruses and bacteria in sewage. One outcome was a startup called Biobot, which is now collaborating with various cities in the United States to collect samples from wastewater treatment facilities to test for Covid-19. ●



FIND OUT MORE ABOUT THE MIT SENSEABLE CITY LAB AT: [HTTP://SENSEABLE.MIT.EDU](http://senseable.mit.edu)

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SPECIAL DOSSIER

MOBILITY IN THE AGE OF COVID-19

More than any other, the Covid-19 crisis has shown how vulnerable we are, whilst at the same time underlining our remarkable ability to pull together for the common good. It has also sparked a rethink about the kind of future we want, with aspirations emerging for a more responsible, less consumption-driven society in which shared mobility will inevitably play a crucial role. But one thing is sure: the crisis has had a far-reaching impact on mobility. Ensuring people can move around safely, winning back passenger trust, changing perceptions of space, a widespread return to active transport, the impact on the energy transition — we've taken this opportunity at *Pulse* to bring you a special dossier exploring some of these key issues.

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OUR CHANGING PERCEPTIONS OF SPACE AND TIME

Have attitudes to mobility changed since the outbreak of the pandemic? WILL THERE BE A LASTING IMPACT ON THE RELATIONSHIP BETWEEN HOME, WORK AND TRAVEL? To find out the answers to these questions and more, *Pulse* spoke to Nathalie Ortar, a senior researcher in social anthropology with the Transport, Urban Planning and Economics Laboratory (LAET).

By Adeline Tissier
Illustration: Dionne Kitching



INTERVIEW



Nathalie Ortar is a social anthropologist and the senior researcher at the ENTPE engineering school's Transport, Urban Planning and Economics Laboratory (LAET) in Lyon. Her work focuses on the connections and relationships between families, lifestyles, and day-to-day and professional mobility.

HOW WERE PEOPLE AFFECTED BY THE RESTRICTIONS ON MOVEMENT IMPOSED DURING LOCKDOWN?

N. O.: People reacted very differently to lockdown depending on their personal situation – for example whether they live alone or with others – their work situation – for example whether they have a stable job or not – and their living conditions such as home size and availability of creature comforts. **The pandemic exposed and exacerbated all sorts of inequalities.**

And yet, people were most affected not by the restrictions on movement but by the lack of social interaction. For people who couldn't work or were working from home, not being able to get around actually turned out to be a non-issue. Freed from their daily commute, which is often perceived as an additional burden and a waste of time, many people responded to the lack of mobility with a sigh of relief.

HAS THE WHOLE COVID EXPERIENCE CHANGED PEOPLE'S MOBILITY EXPECTATIONS?

N. O.: I wouldn't say it's changed their expectations, but it has amplified a trend that was already under way. People are increasingly attracted to mobility

solutions that are cleaner, quieter and more enjoyable. The pandemic revealed both **the desire and the need to take more decisive action** in this regard.

But let's be clear. People are not rejecting mobility; they're simply aspiring to a different kind of mobility. Minimising travel time is no longer the main priority. Today, people are willing to spend more time in transit provided they get something else out of their journey, whether that be additional comfort or peace of mind, a smoother journey, a nice view or just a heightened sense of well-being.

SO, THERE'S BEEN A CHANGE IN PEOPLE'S PERCEPTION OF BOTH SPACE AND TIME?

N. O.: Yes, a radical change. Restrictions on movement have altered the way people view their home and their workplace and, by extension, the way they see space and time. Space has been reduced and time extended.

Obviously, things were very different for key workers – healthcare staff and people working in essential shops and services – because they still had to travel to and from work. Their concerns about the spread of the virus often centred around those journeys.

DOES ALL THIS CALL INTO QUESTION THE MOBILITY MODEL WE KNOW TODAY?

N. O.: People are now weighing up the necessity of each journey and are willing to travel less than before. So the model is certainly evolving. This is perfectly illustrated by the fact that part of the population has embraced a life without  – a concept that has become a viable possibility people are slowly coming to accept. But it can also be seen in the growing popularity of walking and . Associated with a negative social image for many years,  has been particularly neglected by certain categories of the population, such as women, young people, manual labourers and the working classes. Today, its image is changing.

And the  market is booming all over the world, including in **France** .

the UK , Germany  and the United States .

BUT IT'S NOT ONLY MOBILITY THAT'S BEING CALLED INTO QUESTION, IS IT?

N. O.: No, certainly not. In the interviews I conducted during and after lockdown, it was clear that almost everyone was questioning the way we live today. People are searching for simplicity in all areas. Consumers are attracted to shorter supply chains, employees want more seamless work practices, and citizens are calling for reductions in energy use. We can therefore expect major organisational changes, in homes, businesses and cities.

WHAT QUESTIONS HAS THE CRISIS RAISED FOR CITIES?

N. O.: The pandemic has confirmed the viability of new work methods, forcing public authorities and businesses to rethink the balance between workplace and living space. I believe that the trend will ultimately be to bring them closer together, even if that takes years.

The current climate is also putting pressure on cities to speed up their transition to cleaner energy solutions, as citizens continue to express their environmental concerns in no uncertain terms. The apparent origin of the virus has also played a part. In fact, in this regard, the pandemic may well serve as a driving force for positive change. ●

Nathalie Ortar contributed to three studies during the health crisis.

1. What "living" means in a pandemic
2. The emergence during the crisis of temporary cycle paths in France and Europe
3. Rural mobility during lockdown

Find out more at: <https://hal.archives-ouvertes.fr/hal-02865034/>

THE PANDEMIC TIMELINE

[DECEMBER 2019] Start of the Covid-19 epidemic in Wuhan, 800 km from Shanghai.

[20 JANUARY 2020] Chinese president Xi Jinping calls for “resolute efforts” to curb the spread of the virus.

[21 JANUARY] In response to a request from the authorities and of its own initiative, Shanghai Keolis implements measures to protect its metro and tram staff.

[24 JANUARY] Official start of the Chinese New Year holiday. Reduced service on tram and metro lines.

[LATE JANUARY] Implementation of protective measures for passengers. Systematic disinfection of compartments.

[FEBRUARY] Transport services slowly return to normal and ridership starts to pick up very gradually (20% of normal levels on the Pujiang metro line and 14% on the Songjiang tram network).

[9 FEBRUARY] End of the Chinese New Year holiday. People in China gradually return to work.

[EARLY MARCH] Bars and restaurants reopen. Service frequency and ridership continue to gradually increase.

[MARCH] Shanghai Keolis communicates to reassure passengers. Ridership is at 60% of the normal level on the Pujiang metro line and 39% on the Songjiang tram network.

[END OF APRIL] Schools start to reopen. Ridership increases to 80% of the normal level on the Pujiang metro line and 58% on the Songjiang tram network.

[MAY] Most Covid-related restrictions are lifted. Ridership remains at **80%** of the normal level on the Pujiang metro line and rises to **67%** on the Songjiang tram network.

LESSONS FROM SHANGHAI

By Julien Thèves
Photos: Mathias Guillin

Last winter, public transport in China's economic capital was hit by a major crisis that went on to affect cities around the world. Today, as its passengers return and its projects resume, SHANGHAI KEOLIS shares the valuable lessons learned during this challenging time.

In January 2020, just as the Chinese New Year was drawing near and millions of people were preparing to travel to meet up with family and friends, a dark cloud gathered above China and cast its shadow over the world. On 25 January, records showed 1,300 cases of infection and 41 deaths due to Covid-19, primarily in Wuhan, 800 km west of Shanghai. Chinese president Xi Jinping declared the situation “grave” and warned that the epidemic was “accelerating”. From that moment on, every effort was made to stop the spread of the virus both in Shanghai – a mega-city with a population of 24 million – and throughout the country. “Particularly impacted by the SARS epidemic in 2002, China already

had plenty of face masks, so we immediately equipped our staff,” says Bertrand Laude, Managing Director of Shanghai Keolis. “We also introduced temperature checks for our employees and put an end to communal meals and face-to-face handovers. Instead, at the end of each shift, outgoing employees would disinfect their workstation and note down any observations on paper for their incoming colleagues. Thanks to our regular public health emergency drills, we were able to respond swiftly to the crisis. The most challenging aspect was having to coordinate our response remotely, since many of our team members were on leave for Chinese New Year or at home because of lockdown measures.”



SERVICE REDUCTIONS AND SHIFT TO CARS

To contain the epidemic, the week-long Chinese New Year holiday was extended by the government for an extra week. Shanghai Keolis reduced service frequency on its three lines by 25% and continued to implement protective measures. **“Back then, in early February, we didn’t know exactly how the virus was spread, and people were very scared,”** says Bertrand Laude. **“To reassure our employees, we communicated with them constantly.”** When the national holiday was over, transport networks continued to operate on reduced timetables and certain businesses and government agencies remained closed. Public transport ridership was five times lower than normal. The Songjiang tram and the Pujiang metro were each carrying 5,000 passengers per day, instead of the usual 35,000. And the cancellation of international flights saw ridership of the airport shuttle drop to 25,000 passengers per day, compared to its customary average of 100,000. Nonetheless, given how uncommon remote working is in Shanghai, residents were starting to return to the office. Most chose to travel by car to avoid public transport. As a result, traffic jams were clogging the roads once again within days with morning traffic close to 90% of its normal level by late February and tram-car collisions becoming an issue. **“We liaised with the police to address the matter of drivers not giving priority to trams at intersections, which was already a problem before the crisis,”** says the Managing Director.



EXTENSIVE DISINFECTION

In a city that would ultimately remain relatively untouched by the virus (fewer than 400 cases according to official figures), Shanghai Keolis continued to step up its health and safety efforts. **“In addition to the protective measures being implemented by our teams, we began extensive disinfection of our trains,”** says Laude. **“In agreement with our local partners and in line with the rest of the city’s transport network, we also introduced systematic temperature screening to identify sick passengers requiring isolation and quarantine. Despite high demand, we were able to procure forehead thermometers early on, thanks to our majority partner Shentong.”** These measures were also accompanied by increased ventilation in trains, stations, tunnels and offices, as well as abundant signage and regular announcements reminding passengers that they must wear a face mask and maintain a safe distance from others. Since China was the first country to be hit by the pandemic, Shanghai Keolis became a pioneer in the deployment of these measures, many of which were later replicated by transport networks worldwide. The company was even invited by the International Association of Public Transport (UITP) to share its best practices with other operators. **“Not once were we required to interrupt our services,”** adds the Managing Director with pride.



DISINFECTING THE AIR INSIDE TRAMS WITH UV-C LAMPS

The Alstom Citadis trams running on the Songjiang network all have short-wave ultraviolet (UV-C) lamps in their air conditioning units, which are volume-produced in China. Thanks to these lamps, the air entering the trams is automatically disinfected. The system has been operating throughout the Songjiang network since the outbreak of the pandemic.

WINNING BACK PASSENGERS

In March, Shanghai Keolis launched a communications campaign to promote its services and reassure passengers. The channel chosen was TikTok, a video-sharing app that offered the advantage of being able to target users by location, enabling the company to focus on people close to its metro and tram lines. “Passengers who don’t have a travel pass must buy a single-journey card that gets recycled, so we created short videos explaining how those cards are completely disinfected,” says Laude. “We needed to remind users that our lines are efficient and safe.” Because even in spring, the city was still gripped by fear. “And yet, according to a customer satisfaction survey, 99% of our users thought that disinfecting the compartments and taking passengers’ temperature were effective or even very effective measures. And the figures were similar for the cleanliness of our stations, the helpfulness of our staff and the adequacy of our signage.” In April, as the epidemic started to subside, service frequency picked up again. Ridership followed suit, coming close to pre-crisis levels on the Pujiang metro line with 80% of normal ridership in May and, to a lesser extent, on the Songjiang tram network with 67% of normal ridership in May.



CONTACT TRACING VIA QR CODE
 Each compartment has been fitted with a sticker that features a unique QR code. Passengers are invited to scan the code to register their presence in that particular compartment on that particular date. If a passenger present on the same day subsequently becomes a confirmed Covid case, the other passengers are alerted by text message and invited to get tested free of charge. A survey has shown that more than 80% of the passengers on the Pujiang metro line do scan the QR code each time they travel.



PROJECTS BACK ON TRACK

By then, the team at Shanghai Keolis was buzzing with ideas on how to make the tram and metro even more appealing. They started looking into a partnership with bank consortium China UnionPay to offer tickets for the very low price of ¥0.1 (€0.013) instead of the usual price of ¥2. Shanghai Keolis also made plans to increase the average speed of its trams from 17 km/h to 23 km/h. By June, the company was resuming its development projects. “We’re thinking, for example, of operating a tram in Jiaxing, one of Shanghai’s neighbouring cities,” confides Laude. Despite Covid-19, China is still China, and meeting the country’s vast mobility needs remains a major challenge. ●

ABOUT SHANGHAI KEOLIS
 Founded in 2014, Shanghai Keolis is a joint venture between Keolis (49%) and Chinese operator Shentong Metro Group (51%). Shanghai Keolis operates the fully-automated Pujiang metro line featuring six elevated stations and 6.7 km of track in the south of the city, the Songjiang tram network featuring 46 stations and 31 km of track in the south west of the city and the automated Shanghai Pudong International Airport metro, which serves four terminals via 7.8 km of track. The company has 400 employees and carries around 4 million passengers per month.

READ MORE ON SHANGHAI KEOLIS ON KEOLIS.FR

SHARED MOBILITY REBOOTED

We've seen a radical shift in travel habits in recent months due to the Covid-19 pandemic and the lockdown that ensued. Cities around the world have been exploring new avenues in response to stricter hygiene requirements and the need to rebuild passenger confidence. Here's a look at five inspiring trends that have shaped up.

1 →

A HELPING HAND

Transport networks of every type and size pulled out all the stops to lend a helping hand to key workers and vulnerable members of the community, adding a new dimension to the public service they provide.

"Society of care": an idea that emerged in the United States in the 1980s to promote mutual aid and caring for others – values rekindled by the pandemic.

Bike-share operator Lyft offered free and discounted passes in New York City, Boston and Chicago for frontline workers.

MONTREAL

STM converted six buses into mobile walk-in screening facilities in May for deployment around the city, which was hit hard by the virus. Stopped after the first wave of Covid-19, the service may be restarted if necessary.

UNITED STATES

DID YOU KNOW? At the height of the outbreak, critical care doctors in the Pays-de-la-Loire region (west of France) came up with the idea of equipping high-speed trains to transport patients critically ill with the coronavirus from Paris to cities in that region with more capacity. The idea was rapidly approved by all parties and implemented in March and April.

SOUTH AFRICA

After criss-crossing the country for the past 25 years to bring primary health services to remote rural communities, the Phelephepa trains have been re-purposed as part of South Africa's fight against the coronavirus. The so-called "trains of hope" are now dedicated to Covid-19 screening, testing and awareness.

FRANCE

Under the impetus of critical care doctors, medically equipped TGV high-speed trains transferred more than **200 Covid-19 patients** in March and April.

UNITED STATES

2 →

SOBRIETY

The pandemic and ensuing lockdown have changed people's way of life and their aspirations for the future. Cities, businesses and networks have pulled together to alleviate urban saturation and manage changes in flows.

#GUARDIANSOEMOBILITY This is the hashtag launched by the International Association of Public Transport (UITP) to spotlight initiatives taken by the sector during the crisis.

FRANCE

53% of people in France are in favour of transport rationing to help tackle the climate crisis. Source: Obsoco/Forum Vies Mobiles survey, April 2020.

18% of people in France who'd planned to buy a new car before lockdown now say they're less likely to. Source: Ipsos study on the automotive industry, May 2020.

LYON

"Since lockdown measures were eased on 11 May, it's not the morning rush hour that's the busiest but the evening peak. Calls for people to work from home and the introduction of staggered work patterns have clearly been effective."

Pascal Jacquesson, Managing Director, Keolis Lyon, Lyon Capital, 5 June 2020

BEIJING

10 minutes is the time slot passengers had to book in advance online to be able to use the Beijing metro (system trialled at two stations in March).

PARIS REGION

STIVO: this is the text message passengers can send to the 93100 hotline to purchase a bus ticket in the Greater Paris region, helping reduce contact between drivers and passengers.

MANCHESTER

In June, Transport for Greater Manchester and Humanising Autonomy, a predictive AI startup, began analysing passenger behaviour on public transport to measure the effectiveness of physical distancing and improve passenger safety.

HONG KONG

To avoid exposing cleaning staff to the virus, 'vaporised hydrogen peroxide' robots have been deployed to disinfect trains. It now takes just seven minutes to clean each carriage!

ROME

TECHNOLOGY In a frenzy to safeguard passengers, public transport operators have rolled out a host of innovative, tech-driven solutions. Spawned by the coronavirus crisis, many of these best practices are likely to be retained in the future.

ROME

"No restrictions on operating hours will be imposed on retailers who see peaks in customer numbers at certain times of the day."

Virginia Raggi, Mayor of Rome, on the topic of changes to shop opening hours, which were in place until 30 June 2020.

ROME

"Instead of defining cities in terms of mobility, a more effective approach is to ask what type of mobility is actually required of communities we want to live in."

Bruno Marzloff, sociologist, Decideurs magazine, June 2020.

4 →

BERLIN

Is a basic thermal camera the key to detecting people with Covid-19 symptoms? A full-scale trial was conducted at the Alexanderplatz station in the Berlin metro in March.

BARCELONA

To avoid passengers having to touch door handles or buttons, all tram, train and bus doors in the TMB network open automatically at every stop.

BARCELONA

Many taxis and ride-hailing operators have installed protective screens in their vehicles. CaoCao, a newcomer to the Paris ride-hailing market, has kept the original plexiglass dividers in its vehicles, which are all former London black cabs.

BARCELONA

Jugad: this Hindi word describes an improvised or makeshift solution using scarce resources. It reflects India's ingenious and resilient approach to life, but it's also a way of overcoming constraints through creative thinking – a concept increasingly being taken up by transport networks worldwide.

Nudge: a visual technique to influence people's behaviour. Many have been deployed since the onset of the crisis, such as floor markings in the Paris metro, similar to those used on motorways, to encourage passengers to take the safest route.

5 ↓

BOGOTA

80 km is the total length of pop-up cycle lanes created by the city. The emergency bike routes help curb congestion, ease the strain on public transport and allow people to commute while socially distancing.

BOGOTA

CYCLING Following the long lockdown period, people are continuing to work from home. City authorities and employers have put their heads together to help spread commuter peaks, while public transport operators are focusing on reducing network saturation.

FRANCE

Since 10 May, bus and taxi lanes on the A1 and A6a motorways in the north and south of Paris can be used by people car sharing (with the passenger required to sit in the rear).

SEOUL

Ddareungi (like the sound of the bicycle bell!) is how locals refer to Seoul Bike, the city's bike-sharing system, which saw a 67% hike in usage in spring 2020 (compared with the same period the previous year).

FRANCE

FRUGAL INNOVATION Sometimes the simplest solutions are the best. The transport sector has also been inspired by "common sense" innovation to improve passenger safety.

FRANCE

"Corona-pistes" are pop-up cycle lanes introduced in cities around France in response to the Covid crisis. Some of them are set to become permanent fixtures.

“THE GREEN DEAL MUST GUIDE OUR STRATEGY TO GET THE ECONOMY BACK ON ITS FEET”



In light of the Covid crisis, public transport authorities need to DEVELOP A NEW STRATEGY FACILITATING A MODAL SHIFT IN MOBILITY SOLUTIONS. According to UITP General Secretary Mohamed Mezghani, this is a prerequisite to the success of Europe's Green Deal, which aims to achieve carbon neutrality for all EU countries by 2050.

INTERVIEW

Mohamed Mezghani has more than 30 years of experience in the public transport sector. In January 2018, he was elected Secretary General of the International Association of Public Transport (UITP). Prior to his appointment, he held several other senior positions at UITP, including that of Deputy Secretary General. He also worked as an independent consultant and adviser to UITP on a variety of projects in Africa and the Middle East. His main fields of expertise include relationships between public transport stakeholders, public transport system operations and sustainable mobility policies.

IN YOUR OPINION, WHAT LESSONS CAN THE MOBILITY SECTOR LEARN FROM THE PERIOD WE'VE JUST BEEN THROUGH?

The first impact of this unprecedented crisis has been a dramatic reduction in travel. During lockdown, transport networks saw a drop of almost 90% in ridership. As streets around the world emptied, we came to realise how much of city space is taken up by cars - and how cities have been built to accommodate them. With the easing of lockdown, many people chose to travel by bike, forcing the authorities to

temporarily expand cycle lanes. Pedestrians, meanwhile, took to walking along the streets to avoid squeezing past one another on crowded pavements. What's more, in countries where lockdown has been completely lifted, new consumer behaviours and patterns have emerged. People are opting to continue working from home, staggered hours have been introduced in both the public and private sectors and home deliveries of groceries have increased as shoppers steer clear of supermarkets. All this has impacted day-to-day travel and changes in the modal split, with roads reworked to accommodate more , pedestrians and public transport. It will take time – at least two years, in my opinion – for us to establish a new balance.

THE LIFTING OF LOCKDOWN RAISED MANY CHALLENGES FOR PUBLIC TRANSPORT. WHAT'S BEING DONE TO REASSURE PASSENGERS WORRIED ABOUT CONTRACTING CORONAVIRUS?

People are concerned and it's only natural. But the risk of catching the virus is slightly lower in public transport than in other public places according to recent public health studies. All the same, we must address these perceptions and work to restore public confidence through enhanced cleaning and disinfection regimes. In **Seoul** , for example, the metro is disinfected 14 times a day. But it's not enough to perform these procedures; they must also be visible to the travelling public – even if it means carrying them out while people are onboard or during stops at stations. It's important to step up communications about network cleanliness.

Promotional campaigns will likely be needed to make public transport a more attractive option. And we've got everything to gain from reminding people about the benefits of public transport by highlighting our key role in providing public services, which were maintained throughout the crisis, despite the risks.

CAN YOU GIVE US A RECAP OF THE BENEFITS?

To start with, public transport is a safe way to travel. The risk of an accident is ten times lower than in a . Public transport is also cheaper for users and better for the environment, as it consumes four times less energy per passenger carried. Surface public transport networks make more efficient use of street space. And with fares that cater for all budgets, public transport contributes to social inclusion.

HOW IS PHYSICAL DISTANCING BEING ENFORCED?

In most cases, public transport is synonymous with mass transportation, making it incompatible with physical distancing. This kind of measure can only be implemented on an exceptional basis. In parts of Asia, such as **Hong Kong**  and **Seoul** , social distancing doesn't exist. It's never been imposed and 99% of passengers wear masks, even though this isn't mandatory. Yet the same virus is involved. It seems that there's less chance of transmission if people don't talk to each other. Commuters in **Japan**  and **Singapore** 

are therefore advised not to speak to one another during their journey. In neither of these countries, nor in **France** , for that matter, have clusters arisen in public transport networks. So, operators can have confidence in the protective measures they've taken. We shouldn't let the public health crisis turn into a crisis of confidence in public transport.

WHAT ARE THE UITP'S PRIORITIES?

First, the crisis has compelled us to be more responsive and inclusive and to aim for greater impact. By holding meetings remotely, we've been able to include more members than at our face-to-face gatherings, which are mostly attended by **Europeans** . A sharp and heightened sense of community has also become increasingly apparent. Before the pandemic, we'd set five priorities: reduce the carbon footprint of mobility, drive the digital transformation both in how transport companies operate and in customer relationship management, prepare the workforce of the future, develop new revenue streams and support cities in growing their public transport offer. These topics are just as crucial today. If anything, the crisis has illustrated how essential public transport jobs are to society and the economy, with  drivers especially emerging as key workers. The pandemic has also revealed new issues concerning healthcare and crisis management. **Singapore** , for instance, was better equipped to contain the coronavirus pandemic, thanks to plans it had developed in the wake of the SARS outbreak in 2003.

“THE WORLD HEALTH ORGANIZATION HAS SHOWN THAT THE VIRUS SPREADS FASTER IN POLLUTED AIR. THIS IS ANOTHER REASON WHY WE MUST PUSH TO RAISE AWARENESS.”

LOCKDOWN LED TO SIGNIFICANT AND IMMEDIATE REDUCTIONS IN AIR POLLUTION. HOW CAN WE NOW STEP UP THE SHIFT TOWARDS GREENER ENERGY SYSTEMS?

I think there's a risk of focusing on getting through the public health crisis but overlooking environmental issues. The car industry is lobbying for impending green regulations to be deferred or watered down. This is unacceptable and dangerous. The World Health Organization (WHO) has clearly shown that the virus spreads faster in polluted air. This is another reason why we must push to raise awareness, hence the importance of reiterating the benefits of public transport as part of the move towards a climate-neutral economy.

WHAT ARE THE MAIN CHALLENGES POSED BY THE EU'S GREEN DEAL FOR PUBLIC TRANSPORT AUTHORITIES AND OPERATORS?

The Green Deal must be central to all plans to rebuild the economy after Covid-19. In fact, it must be our compass as we navigate the long-term recovery. In 2018, buses, trams, metros and commuter and regional trains in Europe carried close to 60 billion passengers, allowing us to avoid more than 40 billion trips by . Expanding the use of public transport is part of the solution to achieving the ambitions of the Green Deal. To cut pollution levels and improve the quality of life of European citizens, the Commission should implement policies

to reallocate public space away from  to public transport. The transport sector accounts for around one-quarter of greenhouse gas emissions. It's one of the main causes of air pollution in urban areas and, unlike the building and manufacturing industries, has not succeeded in cutting its emissions. In fact, transport emissions have continued to increase, mainly due to the use of private .

That's why public transport authorities must develop a strategy to facilitate the modal shift. And this strategy will be pivotal to achieving the goals of the Green Deal, namely: developing multimodal mobility, accelerating the shift to more energy-efficient modes, embracing digital technology, and stepping up automation and electrification. In short, everything that contributes to more efficient transport networks! The energy and environmental aspects of urban transport systems are determined by this modal split. The challenge facing authorities is to strike the right balance between different modes of transport as part of a new mobility ecosystem. The cities with the fewest , such as **Oslo** , **Copenhagen** , **Stockholm**  and **Amsterdam** , have achieved the best results. Around 20 years ago, the Austrian city **Vienna**  set the target of splitting journeys evenly between public transport, private cars and cycling/walking. The result has been remarkable, with public transport currently accounting for 39% of the city's modal split. ●

@MEDMEZGHANI



GET UP AND WALK!

Rapidly emptied of cars when lockdown measures were introduced, cities around the world have experienced the unprecedented phenomenon of A MASS RETURN TO ACTIVE TRANSPORT. Pedestrians took over pavements and even reclaimed roads, as walking became the safest and most popular way for city dwellers to get around during the pandemic.

By Adeline Tissier
Illustration: Célia Callois

Over the past months, one thing has become very obvious to anyone living in an urban area. The space freed up by the absence of private cars during lockdown starkly exposed the extent to which cities are designed to facilitate their use. In just a few weeks, cars became a rarity and the number of people walking in the streets sharply increased. But the rise in pedestrian traffic wasn't without consequences. Pavements became overcrowded, making it difficult to comply with physical distancing guidelines. Cities had no choice but to adapt – and fast.

LEVERAGING THE FLEXIBILITY OF TACTICAL URBANISM

SOME CITIES, including Ottawa  and Milan , extended pavements onto the road using traffic cones, while others, such as Amsterdam , introduced one-way circulation for pedestrians. In Mexico City , Bogotá , Berlin  and Budapest , road barriers were simply used to close off certain streets to cars. The success of these initiatives was instant, paving the way for the development of “tactical urbanism”. This relatively recent approach enables cities to make temporary changes to the layout of a street or other public space using materials that are easy to move. It’s quick, practical and inexpensive. “Cities copied each other, drawing inspiration from the best practices developed elsewhere,” says Sonia Lavadinho, a researcher at the École Polytechnique Fédérale de Lausanne. “Oakland, California, for example, was one of the first cities to close off part of its road network – 10 km, to be exact – for the exclusive use of pedestrians and cyclists.” Other cities followed suit, including Paris , which closed some of its most beautiful avenues, but also Calgary , Denver , Cologne  and New York . In May, in the middle of lockdown, New York City mayor Bill de Blasio pledged to dedicate 65 km of the city’s streets to pedestrians and cyclists, with an ultimate objective of 160 km.

TAKING BACK THE STREETS

THE CHANGES made so far are temporary and can easily be reversed. But what will happen after Covid-19? Will cities make good use of their experience in active mobility and implement long-term changes to the urban layout that benefit pedestrians? Will they dare to take back the space given over to cars for so long? Some cities were already heading in that direction well before the outbreak of Covid-19. In these cities, pedestrians are seen as key stakeholders in the mobility network. Oslo , Barcelona, Bilbao  and many others have all become “walkable cities”. Developed in North America  about 20 years ago, the concept of walkability reflects a radical shift in attitude. “For certain cities, walking is now a mode of transport like any other,” says Bronwen Thornton, CEO of Walk21. Often spurred into action by signs that the current

system isn’t working (too many cars, accidents, public health issues; too much pollution; not enough space for pedestrians, etc.), these cities have decided to rethink their mobility strategy. Against a backdrop of continued urbanisation, they’ve decided to dedicate more space to active mobility solutions and less to cars.

BECAUSE IT’S GOOD FOR OUR HEALTH AND WELL-BEING

“THESE CITIES have chosen to stop sacrificing their residents’ health and wellbeing; they’ve decided to challenge the dominance of cars,” says Bronwen Thornton. “I often cite Barcelona’s  ‘superblocks’ as a highly successful example of how public space can be divided up in a way that puts communities before cars. By imposing super-low speed limits and minimising the space allocated to motor vehicles, ‘superblocks’ discourage road traffic, while enabling pedestrians to enjoy the benefits of a leafy environment, wider pavements, functional street furniture and intersections that have been transformed into public squares.” Obviously, the issue isn’t the same in Asia or Africa, where people primarily walk out of necessity. “In Hong Kong , for example, 94% of the population walks simply because it’s the most practical mode of transport available – and the most enjoyable,” explains Thornton, adding, “Walking isn’t always a conscious choice”. But everywhere else, across Europe , and Latin America, the walking trend is catching on, partly because it fits with a healthier vision of our society, but also because it meets an urgent need to decongest our cities. “Walking is an active mobility solution that is both enjoyable and extremely beneficial for our mental and physical health,” says Sonia Lavadinho. It also enables us to “reconnect with our origins,” she adds. “Let’s not forget we have two legs for a reason.”

KEY SUCCESS FACTORS FOR WALKABILITY

“BUT IT’S actually not that easy to make a city walkable,” warns Lavadinho. “Implementing the necessary practical measures isn’t enough to make it work.” The success of a new urban



Bronwen Thornton, CEO of Walk21*

Walking changes your perception of distance and time. The more you walk, the shorter each journey seems and the faster the time passes. It’s a very positive process.

Obviously, walking has to be a choice. But it’s a choice that cities can make possible or easier by providing pedestrians with enough space. It also requires political leaders to have vision and a sense of creativity.

Once the vision is there, and the first pedestrian streets and greenways have been shown to work, bigger changes can follow.

*Walk21 is an international organisation dedicated to promoting walking and defending people’s right to walk worldwide.



10,000 STEPS
The World Health Organization recommends walking 10,000 steps a day, or around one hour.

IN CITIES ON AVERAGE

-  15 km/h
-  14 km/h
-  5 to 8 km/h

Easy to do several times a day.
10 minutes = 1 to 1.5 km
A reasonable length of time for most people.
30 minutes = 2.5 to 3 km
The psychological upper limit.
60 minutes = 5 to 6 km

See also the “accessibility” diagram on the Walk21 website: <https://www.walk21.com/knowledge/?lightbox=datatem-j8ois94a1>



Sonia Lavadinho, researcher at the École Polytechnique Fédérale de Lausanne

A journey should be experienced, not endured. Walking will only become part of people’s daily routine through a conscious effort – one that reflects a shift in attitudes among individuals and city leaders.

For that to happen, we need to change our outlook and eliminate the cognitive biases that hamper our desire to walk, like the idea that it isn’t “practical” to walk to work or that walking is “a waste of time”.

We need to focus on the quality of the time we spend walking and remind ourselves that getting around without an artificial “shell” is simply experiencing life the way we’re supposed to.

planning policy depends first and foremost on the buy-in and commitment of transport authorities and elected officials. “Without the political will, it just won’t happen.” The researcher also highlights the importance of taking a joined-up approach that encompasses the city as a whole, rather than a single neighbourhood. “When a particular mode of transport is given more space, it automatically fills up that space,” explains Lavadinho. “It’s true for cars, and it’s the same for soft and active mobility solutions. A well-developed walking network is essential. By providing more paths and making sure they interconnect and serve strategic locations, you automatically encourage people to walk more.”

A SHIFT IN PERCEPTIONS OF TIME AND SPACE

WALKING IS often seen as unproductive or even a waste of time, so changing people’s perceptions is also an important part of the process. For Sonia Lavadinho, who recently advised the Paris  authorities on its pedestrian streets, the key is to think in terms of time, rather than distance. “Five kilometres, for example, seems like a long way,” she points out. “And that can turn people off. But if you emphasise the time the journey takes, rather than the distance, you get a completely different reaction. Time provides structure to our lives. Why not use it as a unit of measurement?” In cities, half of all journeys made are less than 3 km, so there’s clearly an opportunity for change. Bronwen Thornton agrees: “It generally takes people two to three months to adjust to something new. But the period we’ve just been through has given us the time to make that change. It’s the perfect opportunity.” When you look at the initiatives chronicled by Walk21, it’s clear that numerous cities are starting small. “That’s okay,” says Thornton. “They need time to come to grips with the idea of a dramatic shift in behaviour. Because habits are the hardest thing to change.” That said, people in many cities are already speaking out against a return to the way things were. Walking has become a part of their daily routine. In Paris , 75% of the population is in favour of adapting the division of public space to provide more room for pedestrians (73%) and for cyclists (63%).¹

¹ According to a survey of 1,000 people in six French cities, conducted by European NGO Transport & Environment in June 2020.

LONG-LASTING BENEFITS?

DENSITY, POLLUTION, congestion – the pandemic has brought the many contradictions cities face into sharp focus. “The changes under way around the world today represent an extraordinary opportunity,” says Sonia Lavadinho. To enable physical distancing, many cities are experimenting with new ideas. “Solutions are being tested, rejected and adjusted, creating a very positive dynamic that could give walking a real boost.” Many cities started talking about change as early as June and even prompted certain governments into action. But will they be able to maintain these initiatives over the long term? One thing is certain. Whether the initiatives carried out are success stories or not, they’ll need to be evaluated carefully. “If we don’t measure, we don’t learn,” says Lavadinho. “Tangible results will provide proof that can help us persuade cities to shift towards a car-free mobility system.” As Bronwen Thornton points out, we’ll soon know whether or not the pandemic has really helped promote urban walking. “But I’m optimistic,” she says. “There’s just so much to gain.” ●

CHECKLIST FOR THE MAKING OF A WALKABLE CITY

- **Political leaders** who are firmly committed to a paradigm shift.
- **An approach that takes into account the bigger picture** and not just a single neighbourhood going beyond the 500 metre barrier.
- **A network developed first and foremost for walking and leisure activities** to make it easier for people to change their habits.
- **Greenways and green spaces** to reconnect cities with nature and foster biodiversity.
- **“Soft mobility”** friendly ring roads to link suburban areas with city centres, which are often well suited to walking.
- **“Superconnectors”** to get from one district to another and the creation of a constellation of destinations, each connected to the public transport network.
- **More parking on the edges of cities** and nicer car parks, like those by Lyon Parc Auto, which has turned its car parks into underground art galleries.
- **Public squares** and intersections fitted out with street furniture.
- **A focus on safety and security**, particularly to keep pedestrians safe at night.
- **An approach that takes into account both time and space** and that is aligned with new work practices (remote working, flexible hours, etc.).



TRANSPORT CAREERS: ALL CHANGE!

E-mobility is expanding its reach. Vehicles are becoming autonomous, while advanced data crunching makes travel easier and safer. In cities, more and more people walk, pedal, share and use multiple transport modes. What impact will this have on job trends in the shared mobility sector?

By Tiphaine Clotault

“By 2030, half of today’s jobs won’t exist anymore,” noted Ludmila Heitz, Head of Recruitment and HR Business Partnership for Transports publics de la région lausannoise, Lausanne’s Public Transport Authority, at the International Association of Public Transport (UITP) Summit in June 2019. This observation clearly raises awareness of the extensive changes to come. Over the last 30 years some jobs in the mobility industry have disappeared, such as warehouse managers, while other functions have been outsourced, such as cleaning. As in many other industries, powerful computer systems have allowed us to combine a number of administrative functions. But the coming transformation will surpass anything we’ve seen so far, due to a combination of technological, energy-related and behavioural disruptions, starting with people’s changing travel and consumption habits.



Bike sharing scheme
Syntus, a Keolis subsidiary, Netherlands

urban public transport for the Public Transport Union, UTP¹. Unsurprisingly, information technology (IT) jobs led the way. In the future, the role of data scientists, data administrators, cybersecurity engineers, IT application managers and other back-office staff will be even more important. They will protect data and develop new services for travellers, while helping other functions make even better use of their digital tools.

Technical trends and customer relations

The jobs involved in shared mobility are increasingly qualified and technical – and this trend is set to continue. The energy transition and the gradual increase in vehicle autonomy will require ever more specialised maintenance. With the large-scale deployment of autonomous buses of all sizes a likely development in the medium-term, the driver’s job will be transformed. The driver becomes a supervisor, acting only if needed, and will also have to handle light maintenance tasks. But they will no longer have to handle other



Shared bike repair and maintenance
Keolis Dijon Mobilités

routine tasks, freeing up time for customers. This should support recruitment in a sector that’s having a hard time attracting candidates. In fact, this trend towards more versatility concerns all positions that are customer-facing: inspectors, information desk staff, safety and cleaning staff, to name just a few. Once the Covid-19 crisis is behind us, these jobs will have to take on a three-pronged role encompassing prevention, mediation and information.

Increasingly strategic jobs

Certain jobs will play an increasingly strategic role to help the shared mobility sector address its major challenges. Anticipating this trend, trade association UTP has projected hiring needs in urban transport systems from now

Enhanced performance

Digital now irrigates all jobs in the shared mobility sector. It is transforming these jobs, in addition to driving unprecedented performance. Infrastructure and rolling stock alike are now equipped with sensors, making them intelligent and paving the way to connected, preventive and predictive maintenance. Advanced data techniques reconfigure operations around new areas of expertise, from real-time information reporting to data analysis that transforms this data into a powerful decision-support tool. Digital is also key to personalising the relationship with travellers, giving them instantaneous, multimode and contextualised information. At the same time, it allows the functions critical to multimode transport (network organisation, traveller information, ticketing) to integrate and combine their increasingly vast offering of transport modes. “In the long run, all job families will have to thoroughly understand data to improve efficiency, which means that data governance should be strongly decentralised” says Arnaud Julien, Chief Innovation, Data and Digital Officer at Keolis.

Digital tidal wave

Today, the sector is looking for highly-skilled people, capable of developing Mobility as a Service (MaaS), the user experience (UX) and artificial intelligence (AI). Out of the 19 job families that have emerged in recent years, such as drivers for dependent persons or electric bike mechanics, more than two-thirds are directly related to digital technology, according to the consultancy KYU Lab. In 2018, this firm drew up a list of the main current jobs in French



Smart maintenance
Keolis Lyon



Hydrogen-powered bus
Syntus, a Keolis subsidiary, Netherlands

to 2026. For instance, IT related jobs will jump by 128% compared with 2016, while those concerning quality, health, safety, security and the environment will increase by 46%. These employees will be tasked with managing new risks – including terrorism, sexual harassment and epidemics – and designing safety protocols for upcoming generations of rolling stock. In operations, inspection and control jobs are due to become the second most sought-after profiles behind drivers. With a 35% jump in this employee category by 2026 control and inspection jobs will take a leading role in managing increasingly complex traffic and stepping up the fight against fare evasion.

Looking further into the future

Exactly what new jobs will we be seeing in 2030? Nobody can say for sure. As the KYU Lab expert explains, “The major unknown factor is the technological transformation of the sector, or how quickly new technologies will be embraced, especially autonomous vehicles. Furthermore, which type of propulsion will be chosen? With a choice among all-electric vehicles, hybrid systems and fuel cells amongst others, we still don’t know which solution will emerge triumphant, and what share of the market it will capture.”

So, how can we plan ahead under these circumstances? Appraising future scenarios is in fact the job of the... “futurist”. A speculative fiction book published in 2018, *Capsules intemporelles*, had imagined, in conjunction with Keolis, 20 stories related to future mobility. One of the inspirations was a British government project to apply a CO₂ emissions quota to each citizen – but the project was ditched because of the financial crisis of 2008. In a world where travel

will be limited, this book raised the hypothesis of a “silver ecology”, where seniors will transfer their mobility quotas to younger persons in exchange for personal services.

Sustained reinvention

“The world is increasingly uncertain, and our expectations for tomorrow’s mobility will be shaped by a need for adaptability, efficiency and agility,” notes Arnaud Julien. “Instead of new jobs, I think we’re headed for a market in which jobs continuously evolve.”



Managing passenger flows
Shanghai Keolis

It may look like we’re flying blind, but in fact the public transport sector has a major advantage, namely its ability to reinvent itself. “Companies in the shared mobility sector have to compete, and they know how to offer solutions that meet real-world needs through creative thinking,” says the KYU Lab expert. “Each year, their project teams challenge their own strategies to offer transport authorities improvements in terms of performance, operations and new services. For each project, there’s a pilot site and improvements are incremental, but, unlike other sectors, we’re constantly thinking about how to do things better.” ●



By Soazig Sarazain, Head of Social Affairs for French Public Transport Union (UTP)

“Adapt to the accelerated pace of the emergence of new jobs, which are, by definition, difficult to imagine today: that’s one of the challenges in the upcoming reclassification of job families in France’s national bargaining agreement for urban passenger transport systems, which in particular defines minimum wages. The current agreement, from 1986, has become obsolete. For the revision, we are planning to use the ‘prioritised criteria’ method, which entails, for example, the required qualification for the new job type, its level of management, independence and responsibilities. By combining a ranking, associated with a number of points, the classification should be able to indicate a minimum remuneration for each new job type.”

@UTP-FR

RECRUITMENT

2,000 NEW LOCAL AND LONG-TERM JOBS

The Covid-19 crisis has been synonymous with job loss anxiety and furloughing, which means that transport operators must now reassure their employees and job applicants: shared mobility continues to be a major source of employment in various regions, with jobs open to people with all levels of qualification. Given these conditions, Keolis has changed its employer brand tagline to “The world is changing, but not our commitments”. Between June and December 2020, Keolis will be hiring 2,000 new employees in France, including drivers, mechanics, workshop supervisors and operational managers.

5G

DRIVING A WAVE OF CHANGE?

BY SPEEDING DOWNLOAD TIMES, REDUCING LATENCY AND GIVING A BIG BOOST TO THE INTERNET OF THINGS, THE FIFTH GENERATION OF MOBILE NETWORKING (5G) COULD RADICALLY CHANGE THE WAY WE TRAVEL. AS FREQUENCY ALLOCATION HAS BEGUN IN 50 OR MORE COUNTRIES, HERE'S AN OVERVIEW OF NEW POSSIBLE USES.

By Julien Thèves

Illustration: Mariano Pascual

AN ENHANCED CUSTOMER EXPERIENCE

5G technology improves **onboard connectivity** and facilitates **in-vehicle infotainment**. With 5G, passengers can download a whole season of their favourite boxset to their phone in just seconds, whether they're at a station or on the move. 5G also makes it easier to operate a **virtual service desk**, with mobility advisors guiding passengers around the transport network. **Support for people with reduced mobility** is also enhanced, thanks to improved geotracking and navigation services. And 5G facilitates and speeds up **ticket payment and inspection** and **network access**, notably through high responsiveness.

EFFICIENT CRISIS MANAGEMENT

Safety is enhanced by onboard **video surveillance** and the use of **drones**. In the event of a crisis, remotely located security experts with **VR headsets** can get a **360° view** of the scene. It also facilitates communication and cooperation with everyone involved, such as network operators, local authorities and emergency services. This gives them a level of situational awareness almost as if they were physically on the ground.

SMART AUTONOMOUS VEHICLES

Vehicle-to-everything (V2X) technology makes it possible for **autonomous cars, buses, trams and trains** to communicate with each other and also with local infrastructure like traffic lights and car parks — and even with pedestrians. And 5G's ultra-low latency reduces the risk of accidents. The advent of **connected ambulances** also heralds a significant improvement in patient care. By receiving medical data from the vehicle in real time, the hospital emergency team can prepare more effectively for the patient's arrival.

EXCELLENCE IN MAINTENANCE

A maintenance operator and network expert can interact via **3D video** using smartglasses and an **on-screen annotation** system. **Remote-controlled construction equipment** is starting to appear on network tracks, and **cobotics** — collaboration between humans and robots — is becoming more widespread. 5G is also **reducing downtime**. Thanks to **real-time data transmission**, a damaged or defective vehicle can be repaired as soon as it gets to the workshop.

IN HIS OWN WORDS



"Smart cities, energy, healthcare, retail and industry are all closely connected to mobility and benefit from the advances offered by 5G. This new technology is known for its advanced **performance**, which includes super-fast download speeds and response times and the ability to manage a large number of connected devices in real time. Contrary to popular opinion, it's also designed to **allay environmental concerns**. 5G is up to 20 times more energy efficient than previous-generation mobile networks, and the antennas are more accurate than their 4G equivalents, reducing electromagnetic radiation. 5G will also help bridge the **geographic digital divide** by compensating for the lack of fibreoptic cables in some rural communities. Last but not least, the new standard is **flexible and modular**. Thanks to a concept called 'network slicing', a 5G network can be split into multiple virtual networks. This means that within the same space such as a train station, one slice could be dedicated to staff, for example, and another to communicating with robotic devices. To ensure the effective rollout of these eagerly awaited services by 2023, telecoms operators and industry need to **cooperate**. So, they'll need to find the economic equation that best enables all these improvements to become a reality, without raising costs for users."

Sébastien Kaiser,
Connectivity & Networks Director,
SNCF

RAILWAY MODELLING, OR THE

M E A N D E R I N G S

OF THE

I M A G I N A T I O N

by Tiphaine Clotault

It's a childhood passion that comes back around in adult life. Tales of small electric trains resonate, but they were all packed away during teenage years. Then one day, there's a sudden urge to dig out those boxes, driven by a need to "do something creative again" or "take some time out". For some it happens in their 30s, others much later, but now it's for life.

Some railway modellers love spending their days running trains, while others are more interested in designing the world around the track. On the layout Bernard Déluard has built in his garden in Burgundy, France, some of the slopes are quite steep. **"You have to keep trains short and use two locomotives, but the manoeuvres are a lot of fun."** The Paris-based creator of the P'tit Train de Paris-Saint-Lazare, on the other hand, draws his inspiration from the beauty of the buildings

around the actual station, which he's recreating from photographs: **"My model is finished, but I'm completely reworking the buildings to add more detail and style"**.



Related interests developed over the years also feed into the creative process. Architecture, history, poetry and the sociology of the people around the railways all contribute to these hyper-realistic or, in some cases, thoroughly fanciful worlds. Take Isabelle, for example. Through model railways, she's found an outlet for her passion for pre-history and folk art. For others, engineering or computers are their jobs, so

they enjoy designing and building their own rolling stock and perfecting the technical aspects of their layouts. But they're all pursuing the same quest: perfection. Or at least the satisfaction of a job well done. **"With the desire to build a model, there's always the intention to create an ideal world, which is one step removed from everyday life, whether it's the bygone past or a better present,"** says Yann Baude, editor of French magazine *Loco-Revue*. **"The scope for expression is almost infinite, but modellers all have one thing in common: the perseverance needed to bring the imaginary to life."** Some thrive in the hustle and bustle of modelling clubs, online forums and exhibitions, unveiling new and better layouts every year. Others pursue their passion more quietly on their own, constantly improving their layout. The important thing is to keep on dreaming.



"There's a nostalgia to my 1960s and 70s layouts, which take me back to the summer holidays and train journeys to see my grandparents. But I don't get especially attached to the models I create. I've built a new one every year for three decades. I trade them, or give them to friends. Seeing their flaws helps me envision the next one to ensure it's always a bit better."

Yann Baude, editor of *Loco-Revue* magazine



"I'm currently working on a little suburban house with a flower garden that I plan to put at the far end of a station. I want it to look so cozy people will want to live there!"

Yann Baude, editor of *Loco-Revue* magazine



"Each layout starts with a simple creative theme — like rock art or the night — and then I let my imagination run wild. I write the story I want to tell through my model. I do my research to create the features of a realistic setting. Then the railway is built into it as a way to travel. That's how my two tourist trains were developed — one explores a prehistoric cave, the other a mountain hamlet during Christmas festivities."

Isabelle, creator of "Pimbelles Carhye, Octobre" and the "Tacot des Planteaux".



"This garden layout, with its 70 metres of track serving three stations, is the result of 30 years of passion for the technology, the landscape and the life of the railway. The triple-arched bridge, which I finished a year ago, was its last extension. But with maintaining the greenery, upgrading the layout and repairing it after a storm, there's always something to do!"

Bernard Déluard, Dijon



"Paris doesn't often feature in model railways, but I love this city. It's where I was born and still live today. The five-track network that leaves Paris-Saint-Lazare and forms the Batignolles sector, and the lovely surrounding buildings, is the most aesthetically pleasing in the whole of the capital. Because it's right next to where I live, it offers a vibrant source of inspiration. But I don't attempt to reproduce the traffic as it really is. Instead, I run trains that mean something to me, like sleeper trains, 'Corail' passenger trains and double-deck commuter trains. My model is finished, but I'm completely reworking it to make it more lifelike."

The creator of *Le P'tit Train de Paris-Saint-Lazare*.

☀️ Yann Baude
🌸 Bernard Déluard

◆ Isabelle
⊕ Le P'tit Train de Paris-Saint-Lazare

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