

Mobility of the future: Technical vectors, business models and public policies

Foreword

Serge Catoire, engineer from the Corps des Mines, Conseil Général de l'Économie (CGE)

Future forms of mobility and the organization of society

For a new approach to mobility

Jean-Claude Raoul, Académie des Technologies

Efforts to restrict mobility are usually made for the sake of conservation of the environment. From the viewpoint of a global cycle, very few advances have been made in nonpolluting forms of transit. Supply-side responses to the demand for mobility have been proposed; but little is known about the effects of mobility and its segmentation. We still need to determine the forms of mobility needed for a thriving society. But the possibilities of digital technology (foreseeable, now or soon) can be used to make plans for cleaner forms of mobility at the service of a harmonious human society. For this purpose, information must be methodically collected; and multidisciplinary work teams, formed. It is the right time to do this in France; the path is laid out before us...

Mobility, transit time and investments

Yves Crozet, Laboratoire Aménagement Économie Transports, Université de Lyon 2 (IEP)

To understand mobility in the future, we must not look just at changes in transportation, which simply serve as variables in the general equation. Over the past decades, the factor of speed has made mobility democratic owing to relatively lower prices. This trend has met its limits. The "commercial" speeds of various forms of transport are stable or even declining. To imagine mobility in the future, focus must be shifted from speed to the new ways (individual and collective) of managing time, which has become the scarcest resource for people. For this reason, public policy has set as priority "daily forms of mobility", which are subjected to financial, energy and environmental conditions. The aim is no longer to increase speed but to optimize the management of space, the scarcest collective resource.

The new vectors of mobility

Connected, automated vehicles: Economic and industrial issues

Iarion Pavel, engineer from the Corps des Mines, Conseil Général de l'Économie, **Denis Vignolles**, head of the Mis-

sion de Contrôle Économique et Financier, Conseil Général de l'Économie, and **Gérard Lallement**, engineer from the Corps des Mines, Conseil Général de l'Économie

Many issues surround the rollout of connected, autonomous vehicles. There are public policy issues related to safety, improved circulation of traffic, public transit and the reduction of energy consumption. There are also economic and industrial issues, as well as regulatory problems, in particular, the access to, and use of, personal data. Finally, there is the issue of sovereignty owing to cybersecurity and inadequate control over certain strategic techniques (cartography). These issues have come under consideration at the EU and international levels, which are decisive for the development of connected, automated vehicles, in particular for vehicle registration and road safety. Under certain scenarios, the makers of the vehicles and of parts for them might no longer be the leading financial players in the ecosystem of self-driving cars.

The electrification of light commercial vehicles: Trends and questions

Michel Savy, professor emeritus at École des Ponts and École d'Urbanisme de Paris; and **Pierre Camilleri**, doctoral student at Institut Français des Sciences et Technologies des Transports, de l'Aménagement et des Réseaux (IFSTTAR)

Although light commercial vehicles represent a major part in the transportation system, little is known about them. Making them electric is a key to reducing greenhouse gas emissions and local pollutants from road traffic. This can be done in several ways, which are explored herein...

Electric mobility and charge stations

Joseph Beretta, AVERE France (Association pour le Développement de la Mobilité Électrique)

The French government's Climate Plan, launched in July 2017, sets 2040 as the date when no more gasoline or diesel vehicles are to be sold. The priority is to accelerate changes in mobility by controlling demand, helping to diversify forms of transit and new uses (car-pooling or -sharing), and speeding up the conversion of the existing fleet of vehicles toward new motor systems. "Electric mobility" has, it is often said, to make it possible to reach the environmental objectives set under EU and French programs for fighting against climate change (in particular, reducing CO₂ emissions). The contribution, and its limits, of electric vehicles to this fight is inherently linked to the pursuit of the energy and environmental transitions. It is,

therefore, necessary to take account of “electric mobility” when planning tomorrow’s electricity grids. As much can be said about reducing environmental nuisances and reasonably using natural resources.

Batteries for hybrid and all-electric vehicles

Philippe Azais, Thierry Priem and Florence Lambert, CEA LITEN, Université Grenoble Alpes

Batteries (in particular Li-ion) are evolving as demand rises owing to electric vehicles. Several industrialists have already staked out positions on this market, including the leaders who are mainly in Asia (China, Japan and South Korea). Europe, which has lagged in the production of batteries, is starting to set up ambitious programs for competing with the Asian monopolies. Nonetheless, several technological and economic issues must be addressed to create a durable battery industry for electric vehicles. Among them are: the “second life” of batteries once they have been used for mobility, and the “post-Li-ion” solutions for increasing efficiency, reducing production costs and breaking the dependency on critical raw materials.

New forms of mobility: Electric scooters, hoverboards, bicycles...

Frédéric Héran, economist and urbanist, Université de Lille 1

In recent years, new, light forms of “urban mobility” have developed that use innovative materials or update older solutions. There are many variants and a proliferation of brands. The press sees this trend as a new, alternative form of urban mobility (the “urban glide”), a “micromobility” that will set off a revolution in lifestyles, at least for hip city-dwellers. These means of personal mobility, to which should be added bicycles of all sorts, consume much less energy and fewer materials than private cars, and they cause fewer nuisances. They are all treated alike, as if each had the same chances of being developed. Marketing studies are of little use for making a long-term assessment. Based on past sales and customer surveys, they tend to overestimate the potential market and consider as durable something that is but a fad. To understand the advantages and limits of each means (actual or potential) of personal mobility, a better method is to review the principal technical choices for making innovations in this field, then to assess the consequences of these choices on the efficiency of these various means of light mobility and, finally, to propose a typology.

Aerial tramways: The example of Orléans

Charles-Éric Lemaignan, city councillor, Orléans, and member of the Bureau d’Orléans Métropole

For several years now, the city of Orléans has faced the question of how to renovate an urban zone located between its two train stations. The Aubrais station with through-traffic opens in the east on a zone of 110 hectares and in the west on train tracks. An urban planning project (InteRives) seeks, in the coming twenty years, to build in this zone a new, sustainable neighborhood with nearly 300,000 m² of offices and stores, and 3000 housing units.

This innovative neighborhood will be the place to live in this French city in the 21st century. For this project to fully exercise its attraction (one hour by train from Paris), the Aubrais station must be opened toward the west thanks to a modern method of transit for crossing the approximately 400 meters of train tracks. Following several studies and competitive bidding procedures, an aerial tramway has been selected. The only other urban aerial tramway in France is in Brest.

Economic players and public policies

The automobile industry supports French small and medium-sized firms for developing future forms of mobility

Éric Poyeton, managing director of the Plateforme de la Filière Automobile (PFA)

At the core of mobility in the future, automobiles must take up several challenges. The automobile industry is undergoing a transformation: new sources and techniques in the field of energy (electricity, natural gas, hybrid vehicles, autonomous connected vehicles, etc.), new uses (car-pooling and -sharing) and automobile factories in the future. Thanks to collaboration among all players, this industry can turn these challenges into opportunities. As a creator of durable working relations based on confidence between big firms and small and medium-sized companies, the Plateforme de la Filière Automobile (PFA) is to open the way to take up these challenges thanks to the strength of this collaboration involving small and medium-sized firms.

The individual car, a new public transit?

Stéphane Beaudet, mayor of Courcouronnes, vice-president of Île-de-France Region in charge of sustainable transportation and mobility, and vice-president of Île-de-France Mobilités

Deep changes are under way in mobility. After successive periods with a dominant form of transportation (e.g., trains replaced by cars), we are entering a new, more complicated period owing to changes in lifestyles, environmental requirements and societal choices. There are now many, dispersed and irregular, forms of (chosen) mobility; and traditional means of transportation are no longer adapted. Initial responses have been formulated, spontaneously or as a result of private initiatives, some of them related to the invention of new vehicles thanks to technological breakthroughs in digital technology. For years now, cars and roads have been criticized, but the coming of these new vehicles is restimulating interest in the road system, an infrastructure to be modernized. Till now however, public authorities have been holding back. They must, if not build, at least support and oversee the solutions being developed. From this perspective, the individual car and public transit could finally be made compatible.

The prospects for car-pooling? How to overcome drawbacks?

Matthieu Jacquot, Covivo

An odd paradox: how to imagine the future of car-pooling, which used to be “natural” when cars first came into use?

Without claiming to predict the future, we can, at best, recall how we have come to be where we are and imagine the prospects....

The way out of institutional complexity: Transport for London (TfL)

Alex Williams, Director of City Planning, Transport for London

Cities are the economic powerhouses of nations, cultural and artistic hubs that draw in greater and greater proportions of the world population to exchange ideas and histories and create new lives, jobs, homes and growth. Yet, around the world, cities are grappling with the same problems – pollution, poor air quality, congestion, poor health, a lack of housing and patchy access to jobs and opportunities.

Transport is a key part of the solution to many of these issues. Affordable, reliable and safe transport services can unlock the power of transport to improve people's lives.

This is perhaps why there are many cities around the world where the way that people travel has become synonymous with the city itself. The Paris Metro, or New York's subway and iconic yellow taxis spring to mind.

But no other city is as recognised by its transport system as is London. Our red double deck buses, black taxi cabs and London Underground trains are known the world over, and our distinctive 'roundel' logo – which features on all of our services – is one of the world's most recognised brands.

The organization of transportation in the London metropolitan area: A history of its positive points and difficulties

Christian Fatras, assistant to the pole of industry, digital technology and energy in the Regional Economic Service of London (DG Trésor), and **Pauline Virlouvét**, attaché for transportation and industry in the Regional Economic Service of the Embassy of France to the United Kingdom (DG Trésor)

The rest of the world often points to the organization of transportation in the London metropolitan area as an example. Equipped with the world's oldest "tube", London has an extended, intermodal system. The city has ad-

ressed many of the issues in this 21st century related to "green growth" and new forms of mobility. However the metropolitan area's system is overused, and there are major difficulties (of funding and governance) with conducting the big public works on the infrastructure that are necessary to relieve congestion. Like other cities worldwide, London is going to have to become used to new forms of mobility and overhaul its organization to adapt to this change.

Future forms of mobility: The Grand Paris Express on track

Philippe Yvin, chairman of the board of directors of Société du Grand Paris

An automatic subway line 100% accessible: the Grand Paris Express will move two million passengers per day with, on the average, a train every two or three minutes circulating at 55 km/hr. Expectations are high for this new line, since it will directly connect suburbs without forcing passengers to transit via the center of the capital. This revolution in everyday transit is even more awaited given the current system's congestion! The Grand Paris Express will aggrandize Paris by pushing outwards the bounds of the metropolitan area and by reinforcing the centrality and solidarity between Paris and its suburbs and exurbs in Île-de-France Region. Above all, this new "métro" is a harbinger of mobility for tomorrow owing to the ambition of an innovative, technologically connected city that places people at the center of urban planning.

New interurban bus services: A soft or hard landing?

Laurent Guihéry, professor, Cergy-Pontoise University, Laboratoire Mobilité, Réseaux, Territoires and Environment (MRTE)

There is no doubt that "freely organized interurban bus services" have been a success, but one based on a business model deep in the red – a point unawares to the public. Following a recent inventory of these services, light is shed on the financial losses of players in this very competitive market. Approaches for finding solutions for a recovery and imagining a soft landing are presented...

Issue editor: Serge Catoire