

# Abstracts

## 06 Connections and intermodality: A European viewpoint

Catherine TRAUTMANN

Mobility and transportation are not only important economic factors but also key elements in European integration. Climate change compels attention and forces us to reinvent modalities of transportation and make them evolve in response to major issues. Intermodality and connections between forms of transit imply redesigning current models while taking account of users' expectations so as to better manage traffic and offer riders quality services. Digitization, a trend cutting across all modes of transportation, can help us respond to expectations; but it also gives rise to other challenges: the management of data protection, control over complexity, cybersecurity and the digital divide. Solutions can be found only by collaborating with all stakeholders, users and citizens.

## 09 Road safety, data management and individual freedoms in the era of connected, driverless vehicles

Floran VADILLO

The “autonomous” vehicle, a subject long confined to science fiction, is ready to ride into reality. Beyond the adjustments to be made in traffic laws, highway safety administrations and the assignments of police forces, it is worthwhile devoting thought to the driverless vehicle as an “actor” in road safety, sometimes independently of its driver or passengers. By expanding the range of possibilities, technology enables us to imagine interactions between this new actor and the highway police — prospects to be qualified, however, with legal and social considerations, which are also evolving. A car is not just a simple means for movement nor a machine; it is an economic and social object with very strong implications.

## 15 Roads of the future

Nicolas HAUTIERE

Roads are a core issue in society, especially owing to CO<sub>2</sub> emissions. Launched in 2010, IFSSTAR's R5G program for a “5th Generation Road” has become the de facto roadmap for adapting highways to mobility in the 21st century. This approach, in line with the EU's program “Forever Open Road”, seeks to build an effective system of national innovation for responding to climate change by making highways part of an evolving, automatic and resilient, system of mobility. The strategies of the automobile and construction industries now take “Roads of the future” into account.

## 20 Hybrid menaces and the safety, security and resilience of transportation networks in the digital era

Antoine-Tristan MOCILNIKAR

In a context of technological proliferation and an open economy, the transportation industry's relation with the problems of safety and security and with the actions of local authorities is complex. Resilience provides a methodology for handling this situation. In this sector (or other sectors) of the economy, digital technology creates new risks for

activities and the parties involved. At a time of “hybrid menaces”, the questions related to safety and security are being decompartmentalized, since they entail what amounts to a global security. What tools does resilience offer us? Resilience is systemic: given the many interdependent relations, it must be designed on a global scale. The priority is to identify all risks and time frames, and take account of territorial logistics. This means reinforcing our ability to anticipate and manage. It implies an integrated approach for optimizing transportation that simultaneously takes into account the economic, social, financial and digital aspects of safety and security as well as a form of territorial governance based on a multiparty dialog for anticipating and monitoring current changes and those to come.

## **27 The digital issues of urban logistics**

Laeticia DABLANC

New concepts, new urban logistics companies have emerged over the past decade in Asia, Europe and the United States, and more recently in all urban regions of the world, driven by digital revolutions. This logistics aims to meet the demand of urban companies and consumers for new services, while providing solutions to cities' concerns about the environmental and social impacts of current urban deliveries. However, the rate of effective introduction of innovative logistics in urban areas is slow and varies considerably from one city to another. For cities with efficient urban logistics (such as Tokyo) that integrate logistics facilities in very dense urban areas, or “intelligent” neighborhood logistics such as in the historic centers of European cities – where cleaner and quieter deliveries, mass deliveries, high-level home delivery services and high-tech experiments are emerging, there are still many less central districts and many large cities in the world whose congestion and emissions from freight transport remain at levels that are still much too high. Municipalities, on the other hand, support innovation in urban logistics, but most of it is done through projects that focus mainly on innovative but high-cost demonstrators whose diffusion remains very limited. Above all, cities are seeing the fast train of e-commerce innovations and deliveries pass by without a coordinated response. In France, the draft law on the orientation of mobility will offer cities a more stable legislative framework (on the use of control cameras, for example) which will in fact also concern the mobility of goods.

## **34 Managing a sustainable supply chain**

Anicia JAEGLER

In response to environmental and social problems, it is necessary to design a sustainable supply chain, which will have to be managed so as to minimize its environmental footprint, more widely share development and reduce several risks. This management will have to take account of the whole chain. Upstream, this concerns suppliers and raw materials, and calls for ecodesign and the many tools that exist for assessing sustainability. Consumption and wastes must be limited at the level of production; and buildings, ecodesigned with regard to both energy and ergonomics. The management of people must also be redesigned. Downstream, thought must be given to transportation and products at the end of their life-cycles, but the logistics of all this must be taken into account when products are designed. Solutions exist (or are to be explored) that involve new forms of technology or take account of new societal values.

### **38 Logistics inspired by digital platforms: Towards a physical internet of merchandise**

Henri ISAAC

At the end of the 1990s, e-commerce emerged out of networks of individuals and merchandise. This transformation of the retail trade modified flows of information and freight by extending supply chains to end customers in urban areas, which were neither designed nor organized to handle this change of logistics. This increase in traffic has marred urban areas by worsening congestion, pollution and greenhouse gas emissions. This organization is hardly tenable, and the logistics of freight must be redesigned. For this purpose, the idea of organizing the flow of merchandise by drawing from the ideas of packet-switching on the Internet opens a new perspective for handling economic and environmental problems and seeing to the sustainability of this new form of commerce. Logistic platforms would thus be “smart hubs” capable of processing flows of merchandise, independently of senders and receivers, so as to become a link in a physical internet, which alone will be capable of managing an optimized flow of merchandise.

### **43 Mobility as a Service, a new approach**

Marie-Claude DUPUIS

Megacities, the growing need for urban transit, the environmental transition, changing relations to mobility, digital platforms.... The RATP Group will soon face competition in a fast, changing transportation market in Île-de-France Region. In response to the aforementioned societal issues and to the needs of this urban region’s inhabitants, the Group intends to become a leading partner of smart cities by switching its offer of mass transit toward mobility as a service (MaaS): door-to-door transportation, multimodal and digital with access to information in real time and to services during the full duration of the trip. This need seems relatively simple to clients but represents a major challenge for public transit operators: physical connections between modes of transit, the governance of data (open data as a common good), the distribution of added value, and the sharing of responsibilities among all parties in the ecosystem.

### **48 Everyday carpooling, technological and societal aspects**

Frédérique VILLE

Given the massive growth in long-distance carpooling, the prospects of reproducing this trend for the 600 billion passenger-kilometers per year by car for trips of less than 80 km have attracted several players to the market for short-distance carpooling. The mounting difficulty of covering the costs of daily trips and the determination to limit their environmental impact have not sufficed to turn this potential into a profitable business model. What levers to use so that carpooling for everyday trips becomes a reality?

### **53 Digital technology at the service of urban mobility: The stakes for metropolitan areas?**

Chloé PERREAU & Héléne ROUSSEL

Local authorities must adapt to digital technology while being “proactive” to rapid technological, environmental and societal trends. The “smart city” approach, adopted by Montpellier, seeks to make the social, environmental and economic spheres converge

toward a global, systemic solution. Montpellier Mediterranean Métropole has adopted a roadmap for the digital transition in this metropolitan area in France. This roadmap includes information and ticketing services for multimodal transit, an open data policy and public-private partnerships for handling changes in mobility (“intermodality”, the reduction of emissions, driverless vehicles, connected mobility...). Given the scope of the changes in both mobility and digital technology, local authorities are faced with challenges that are considerable but exciting (e.g., digital sovereignty or organizational changes)!

## **59 Digital technology at the service of sustainable urban mobility**

François MIRABEL & Mathias REYMOND

Urban transit systems have undergone major changes since 2000. Besides the redeployment of public transit, the emergence of “soft” forms of transportation (bicycles, scooters, etc.) and the adoption of measures for restricting automobiles, local authorities now have an additional tool: digital technology for cutting the costs of implementing complex public policies (variable tolls in urban areas, markets for permits to circulate) and better informing users about the external effects of their uses of transportation. Though attractive in theory, this new tool is not yet global enough, since part of the population is excluded from using it.

## **65 Toward “mobile hyperplaces”? Mobile activities enhanced by the potential of connected and driverless vehicles**

Mireille APEL-MULLER & Jean-Pierre ORFEUIL

The traveling salesman or circus is a traditional, universal figure, but contemporary owing to recent variations on it. Everywhere in the world, new (homemade or state-of-the-art) activities “on wheels” are springing up in response to poverty or isolation, or as an element added onto traffic services in dense (attractive and chic) urban zones. They are helping, to make “a territory, a city, an environment”. Though overlooked in studies on mobility, these “mobile hyperplaces” are the forerunners of a revolution in practices related to mobility. These practices have as much to do with “hyperconnectivity” (social media, geolocation, the Internet of things, real-time information systems) as with the advent of connected, autonomous vehicles, which make it possible to radically rethink our relations to transportation time and space (vehicles with multiple functions and used for various purposes). How far to go in imagining these mobile hyperplaces? What are the benefits? For whom?

## **71 Shared micromobility: Have they gone mad?**

Henri MOISSINAC

The development of services for “sharing” electric bicycles and scooters in urban areas are the sign of a revolution in mobility. Linked to technological trends and deep changes in society, this revolution will soon affect cities as much as the coming of mobile telephones affected our lives.

## **74 Public-private leverage for funding smart mobility**

Carine STAROPOLI & Benoît THIRION

“Smart mobility”, which lies at the core of the energy transition in urban areas, has to improve energy efficiency while satisfying needs. Such a policy requires investments, infrastructures, an adapted, computerized system, the creation of new uses, and so forth.

To finance smart mobility, relations between local authorities and the private sector have to be activated. Three major levers can be used: contracts for public investments, incentives for private investments, and regulations in view of a public-private synergy.

## **79 Financing sustainable, digital mobility: What model where?**

Jean COLDEFY

In France, the anger of the “yellow vests” is but a new symptom of a deep feeling of injustice at a time when fixed costs amount to 61% of the household budget, and nearly 70% for households with a net income of €1300 per month. Most people have no other choice but to use their car to go to work. Not only did the cost of housing in big cities rise threefold over the past twenty years, but also job creations are concentrated in urban agglomerations, while jobs are being destroyed in medium-sized cities. All of this has, over the past forty years, stretched out the distance from home to work. The lack of alternatives to a trip in a single-passenger car for persons on the periphery of urban agglomerations is what causes the saturation of rush-hour traffic on highways. The feeling of not being fairly treated is intense: gasoline price hikes have hit hard low-income residents on the periphery or in rural areas — who, understandably, do not put up with lectures on the environment from people who live where they can use a car less often. A tax is not well accepted if its receipts are not allocated to a purpose, or if no explanation is given about how they will be used. To access zones of employment in urban agglomerations, simple, proven solutions exist that can be rolled out fast. However the question of how to pay for them has not yet been answered. Will the new tools for mobility promised by digital technology provide an answer? How to better connect urban agglomerations with their peripheral areas? As we see, the issues reach far beyond mobility. They have to do with social cohesion and geographical solidarity in a context of a shortage of public funds while the problems related to climate change are becoming more pressing day after day...

### **MISCELLANY**

## **88 The impact of the EU’s copyright directive on the digital economy**

Pierre BEYSSAC

The European parliament has adopted the copyright directive, which is now being transposed into French law. Article 17, which requires a filtering of uploaded contents, is controversial. It is supposed to restore a balance in the sharing of income between the giants of the Internet and copyright-holders. However implementing it will be costly and erect an entry barrier for small firms, thus penalizing the whole European ecosystem of digital technology.

## **93 Artificial intelligence: A review of the 2018 seminar of the Amicale du Corps des Mines**

Andréane BOURGES & Colin DUCROTOY

Artificial intelligence offers our economy powerful scientific tools for analyzing and processing a growing volume of data. There are many promising applications, whether for productivity gains or assisted decision-making. They provide us a glimpse at the start of a structural transformation in our society. However this fascinating trend raises questions and arouses apprehensions having to do with society (Should we worry about massive job destruction?), ethics (Who is responsible for an algorithm’s decisions?) and sovereignty

(What role for the public administration service and Europe?). A review of these issues and prospects, which were discussed during the 2018 seminar of the Amicale du Corps des Mines...

## **98 Navigating the fudge and breakthroughs of artificial intelligence in China**

Pierre-Étienne GIRARDOT & “Corps des mines” 2018 students

China managed to become a digital superpower able to compete with US companies, contrary to Europe. Protected and pushed by Chinese government, technology giants developed cutting-edge technologies thanks to China leading position in hardware (in the 90s, China became the manufacturing hub for electronics on the planet) and thanks to the impressive ability of Chinese people to adopt new digital products (as for digital payment). A pragmatic mindset about technology, for both population and government, enables faster adoption, by focusing on developing applications first, and dealing with issues only when they arise. Thus, Chinese big players have managed to reach a level of technology close or sometimes better than their American counterparts, especially regarding artificial intelligence (AI). AI actually became a political priority whose applications, from healthcare to smart cities, security or autonomous driving will progressively reshape Chinese citizens' way of life. From the way those companies can manage and have access to data, to the way they deal with trust issues for their algorithms (ethics, transparency, bias and interpretability), what can we learn from this impressive AI development in China?

*NB: This paper was written by “Corps des mines” 2018-2019 students, after a learning expedition in Shenzhen, Shanghai and Hangzhou. From visiting tech giants (Alibaba, Tencent, Huawei, PingAn) to getting insights from French companies working on those topics in China (Valeo, Airbus), from going to universities (Shanghai Jiaotong, Zhejiang University) to talking with “smaller” firms (Deep Blue, Sense Time, incubators) or venture capital companies (Cathay innovation), they studied the dynamism and vitality of the prosperous Chinese technology environment.*

## **110 Imagining factories, factories that imagine, the imagined factory**

Pierre MUSSO

Production activities in industry are accompanied by stories, images and stage effects, since industry involves a projection, often in the long run, and thus puts imagination as much as science and technology to work. This imagination is so bountiful that it has even produced imagined industries, and has tirelessly spun revolutionary narratives about the past and future. Industry was born in the West out of a crystallization of a technical, scientific fantasy that became for real and has started imagining industries. This fantasy is now producing stories about the future of industry, ranging from “Industry 4.0” to the “industrial Internet”, for the purpose of a hyperindustrial development.