

***Passenger mobility in a digital society:
New challenges for competition, transport
policies and regulation***

Issue Paper

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1. Introduction

Passenger transport in Europe is undergoing a profound transformation as a result of the digitisation of mobility. As in other industries, the development of the internet and the diffusion of mobile phones have changed mobility practices. The objective of the CERRE seminar for which this paper was prepared is to analyse these changes and to consider the likely developments. We will also discuss new "business models" and their impacts on intra-modal and intermodal competition. This will enable us to project the impacts of this new organisation of the sector on economic regulation and on the respective roles of the private and public sectors.

This background paper provides an introduction to the issues.

In order to accomplish this, we first observe what occurred in areas that were previously affected by the shock of digitisation. Three overlapping waves of diffusion of the internet in the economy can be distinguished:

- The first digital revolution is mobile data. Smartphone and tablet penetration empowers consumers by allowing constant access to the internet and apps, e-commerce, media, etc. As a consequence, in less than a decade, the world of media and culture was deeply changed. New firms have emerged (the famous GAFAM: Google, Amazon, Facebook, Apple), playing the role of intermediary between producers and consumers of information and cultural products, and, in some cases, producing their own content.
- The second wave started some years ago. It occurs mainly in the service sector with the digitisation not of services themselves, but of access to services, including mobility services. The changes began with the emergence of new intermediaries (Booking.com for hotels, Opodo or Trainline for travel tickets ...). These were followed by mobility service providers (Uber, BlaBlaCar...) based on fully new business models. The seminar will be an opportunity to note these developments and analyse their implications on competition, regulation and public policy.
- We also will question the potential impacts of the announced third wave of digitisation, associated with the Internet of Things. Although the scale of the change and its speed of diffusion remain uncertain, we will focus in particular on autonomous vehicles and other impacts of ICT on transport management.

2. The digitisation of mobility services: new business models and new frontiers of competition

The objective of this first part is to present the economic impacts of digitisation: including new business models, new producers, new intermediaries, new forms of competition, and new practices.

2.1 The first wave of digitisation: the main economic impacts

From an economic point of view, the main impact of digitisation is a lower cost of information and more generally lower transaction costs between producers and consumers of information and cultural goods (literature, music, movies etc.). The digitisation of all these forms of data associated with the development of the internet and the global diffusion of smartphones has led to major innovations in two key areas: new forms of citizenship on the one hand and new business models on the other hand. The border between the two is blurred and porous, but it is important to distinguish these two movements.

- New forms of citizenship: the digitisation has allowed a democratisation of access to information and culture. Websites in open access, blogs and emails are now a kind of common goods. They have allowed the development of collaborative productions and exchanges. Wikipedia¹ is the best symbol of the collaborative economy and inspired many new practices in the “sharing economy”.
- New business models: the digitisation has also led to the development of entirely new companies that, in a short period of time, have become global giants, including on the stock markets. From an economic point of view, the GAFAs are characterised by increasing returns to scale. In a few years, Google has acquired a dominant position or a quasi-monopoly just as was the case with Amazon, Apple or Facebook. For Google and Facebook, the business model is based on a mix between free access for users and indirect funding through advertising.

The arrival of new players in the digital economy posed two main challenges for the functioning of markets and the key role played by competition:

- The first is that the value chain is disrupted by this new situation. Traditional actors, and the property rights on which they based their business, have been weakened. The dramatic cost reduction in access to information has totally transformed the structure of

¹ Wiki is a Hawaiian word meaning quick. A wiki is a website that provides collaborative modification of its content and structure directly from the web browser. In a typical wiki, text is written using a simplified mark-up language (known as “wiki mark-up”), and often edited with the help of a rich-text editor. Ward Cunningham, the developer of the first wiki software, WikiWikiWeb, originally described it as “the simplest online database that could possibly work” (Source: Wikipedia)

the market in favour of new entrants, while also raising the question of the remuneration of producers of information and cultural property.

- The second question is related to the market power acquired by the new giants of the digital economy who quickly obtained a dominant position. Can we consider that these quasi-monopolies are operating in contestable markets? The recent history of the sector showed that former giants like AOL have been supplanted in recent years. Will the same apply to Facebook or Google? It seems less obvious to the extent that their strategies include the acquisition of innovative start-ups that could threaten their position.

2.2 The second wave of digitisation - mobility services

The second wave of digitisation is affecting the services sector (banking and insurance, hotels, catering, transport, etc.). Is it likely that the changes will be the same as those observed in the sectors of information and culture? What do we already see in the domain of transport and mobility?

- In the area of the sharing economy, platforms have been developed to transform the role of the private automobile. The success of the carpooling website "BlaBlaCar" has been slow to materialise, but it is a reality firmly rooted in the supply of long-distance mobility services. Every month in Europe, millions of drivers welcome passengers in their cars. It is also possible for combinations of individuals to rent cars through platforms like Drivy or OuiCar. Many start-ups were also launched in order to develop dynamic carpooling. Applications combining geolocation and online payment allow for the collective use of a personal vehicle for short distances trips in urban areas. A recent study conducted in Lisbon and financed by the International Transport Forum (ITF-OECD) showed that this type of service could be developed on a large scale. The result could be a marginalisation of the use of private cars. All these initiatives change the market place for mobility services. New players are competing with old ones and mobility behaviours change. The nature of the sharing arrangement is also changing. Thus, Blablacar is now a market service, in which the passenger has to pay for the trip in advance to Blablacar, and the company is now raising funds on financial markets. We are therefore facing the same issues as those raised by the first wave of digitisation: changing value chains and, because of increasing returns, market power and dominant position becoming an objective of firms.
- Making money is not the main motive of participants in carpool services. Frédéric Mazzela, founder of BlaBlaCar, recently explained that it is not possible for drivers participating in this service to become a taxi driver. If they are tempted to do that, they are identified and banned from the platform. Nevertheless, the boundary between sharing economy and market economy is not clear. It is significant to note that for many start-ups creators in the field of mobility, as elsewhere, the ultimate goal is to sell the

company to a larger group. This was the case for the founders of Captain-train², an online train ticket sales site recently acquired by Trainline³, their British rival.

- Making money is the main motive of drivers who join the Uber platform. It is also very present in the founding of this new form of linking drivers and potential taxi customers. The founders of Uber look to expand rapidly and globally, raising significant funds on financial markets. Their goal is clearly to achieve critical mass that puts them beyond the reach of competitors. However, the latter have demonstrated that this kind of market is contestable. Uber type applications are not very difficult to set up. Therefore, even if we are clearly in the presence of a search of dominance, the outcome is uncertain and competition remains at a high level between Uber and other new entrants in the market on one hand, and between these new entrants and the former taxi companies on the other hand. In many countries, Uber is facing strong opposition from taxi companies but also barriers established by public authorities, who have in some cases banned the platform. Intra-modal competition is still at work today.
- The transportation sector has also long-been characterised by intermodal competition at the edges of the modes' respective areas of influence. Even if these boundary changes are not easy, digitisation is shifting the borders of these areas of influence. The resistance of the former actors of mobility is strong because the former players try to actively participate in the wave of digitisation. SNCF offers many examples. From June 2000, SNCF created www.voyages-sncf.com, which became the first online shopping platform in France. More recently, SNCF-mobility entered the field of carpooling in 2013 by buying, for 28 million euros, the website "123envoiture". SNCF also launched a car-sharing rental service (OuiCar) to compete with Drivy.

This proactive strategy of SNCF is explained both by its desire to be part of, rather than weakened by, the new value chain. Access to mobility services is becoming important to the actors in the first wave of digitisation. Google and Apple are developing projects of automated vehicles (see below). Amazon is developing its own fleet of drones and cargo aircraft in the United States in order to be independent of UPS and FedEx. But for now, the main challenge lies not in vehicles but in how to best use the available data in the so-called world of Big Data. As shown by the successive developments of Google Map, Google Transit or Google Weeze, Google is able to provide free, real-time, detailed map information; data on public transport to get to a

² Captain Train offers Internet and mobile application service (iOS / Android) to buy train tickets simply, quickly and at the best price. By combining offers of 14 railway companies, Captain Train provides access to the cheapest tickets and already covers 19 European countries. With over 1.5 million registered users, Captain Train sells about 5,000 tickets every day. Captain Train had made fundraising from Alven Capital, CM-CIC Capital and Index Ventures.

³ Trainline is the largest independent provider of UK train tickets and travel planning. Trainline is also the travel application being number one independent UK. With £1.6 billion (€2.1 billion) in annual transactions on train tickets, Trainline, established in 1997, counts 28.8 million visitors per month on its website and mobile applications. In March 2015, KKR, a US financial company acquired Trainline

chosen destination; and information not only on road traffic (congestion, travel times) but also on air transport alternatives. Using data from users of "Android" smartphones, the collection and processing of a huge amount of information freely available on public and private sites allow digital players to stay at the heart of the relation between consumers and current providers of mobility services. For the latter, there is a risk of marginalisation. They could be eventually replaced when the giants of the digital services transform their business model from the intermediate position to that of producer. In that case, what are the opportunities for the consumers, what are the risks for the former actors of mobility services and, consequently, what are the main challenges for public policies and regulation?

2.3 A digression: other developments in the field of mobility services

It is clear from the above that competition is taking on new forms in the field of mobility services. However, some of these mutations do not come directly from digitisation. Thus, rail transport operators, especially for long-distance travel, are suffering from the development of old competitors (air and road).

Lower oil prices have reduced the relative cost of air transport and road passenger transport (coaches, cars, etc.) leading to a loss of market share for railway services. Low-cost airlines and other low-cost business models have been allowed to continue their growth, while the weak economic growth observed since 2008 has led to a stabilisation of rail traffic, even if some low-cost rail services have been implemented (e.g. Ouigo, IZY). The recent deregulation of coach services in countries such as Germany and France has brought into question the relevance of certain rail links and, more generally, of subsidised regional and national public transport. Traditionally well-subsidised public transit is threatened by the emergence of new business models, along with the growing scarcity of public funds.

European transport policy is particularly challenged. The white papers of 2001 and 2011 called for a revitalisation of railways. However, this vision is now disputed. High-speed trains are developing in Europe but, with certain exceptions, they will not replace medium-haul flights as hoped for in the 2011 White Paper. Intercity and regional trains face competition from low-cost carriers and coaches, and to some extent from car-pooling and car-sharing. Far from leading to revitalisation, competition could therefore lead to a contraction of rail services.

Digitisation reinforces this new situation, particularly for railways but also for other traditional transport players in general, due to the drastic reduction of costs of access to other mobility services. It allows new players to appear in the same generation of mobility services. The case of Uber has become so emblematic of this phenomenon that "uberisation" became the buzzword to describe the impacts of the second wave of digitisation. However, looking at the difficulties encountered by Uber⁴ in many countries and the fragility of its development model, it is

⁴ The competition is strong with Lyft the United States but also in countries like China where Uber decided to retire by selling its assets to a local company.



necessary to look also at some restoring forces or mechanisms that lead to specific impacts on mobility services.

The idea that we could assimilate the observed impact of the first wave of digitisation to the expected impacts of the second and third waves was popularised by J. Rifkin (see Box 1). However, the hypothesis of a "zero marginal cost to society" does not withstand scrutiny. As in most of his books, Rifkin turns local singularities into universal law. It appears that its real objective is to prophesise the end of capitalism⁵. However, as we have seen, digitisation is neither the end of the market economy nor the end of capitalism. The fact that some costs fall does not mean that, for example, the cost of energy will decrease substantially in the coming years. The decline of some price does not mean the end of scarcity. For instance, the weakness of some marginal costs should not lead us to forget the importance of fixed costs that have to be taken into account in the business models of mobility providers.

This is particularly the case in the transport sector where infrastructure and transport vehicles are an important part of the social cost of a trip. In general, whether for roads or railway tracks, public subsidies are important. Similarly, most of the public transit in urban areas are subsidised by local governments and regulations remain, as in the case of taxis. Digitisation cannot change all that with just the decline in the cost of access to services, especially because among the components of the cost of mobility, there are the taxes and social contributions. Thus, it is clear that while major changes are already underway in mobility services, including, but not only, due to the second wave of digitisation, many questions remain, including on taxation and social contributions related to work, but also on financing and regulation. This will be even more true with the third wave of digitisation and the development of autonomous vehicles.

⁵ J. Rifkin (2014), *the Zero Marginal Cost Society: The Internet of Things, the Collaborative Commons, and the Eclipse of Capitalism*; J. Rifkin (1995), *The decline of the global labor force and the dawn of the post-market era* (1995); J. Rifkin (2013), *The Third Industrial Revolution: How Lateral Power Is Transforming Energy, The Economy, and The World*.

Box 1: Toward a zero marginal cost society?

According to J. Rifkin, the notion of near-zero marginal cost for arose 12 years ago in the music and entertainment industry, as well as the newspaper and publishing fields.

“At this time, the consensus was that it would likely be restricted to information goods, with limited effects on the rest of the economy. But it is no longer the case. Now the zero-marginal cost revolution is beginning to affect other commercial sectors. The precipitating agent is an emerging general-purpose technology platform – the internet of things. The convergence of the communications internet with the fledgling renewable energy internet and automated logistics internet in a smart, inter-operable internet-of-things system is giving rise to a third industrial revolution. (...) What if I were to say to you that 25 years from now, the bulk of the energy you use to heat your home and run your appliances, power your business, drive your vehicle, and operate every part of the global economy will likewise be nearly free? That’s already the case for several million early adopters...”

Rifkin announces that technical progress will allow the development of decentralised production of cheap energy which, combined with 3D printers and the Internet of Things, will free companies from the scarcity constraint. However, things are not so simple. When marginal cost is zero, it is usually because fixed costs are high. Who will cover the cost of the networks that will, in future, support the huge data flows required by the Internet of Things? Should we rely on "GAFA" to support these costs? Or should we expect an increase in public spending? While public funds are increasingly scarce, we have a key issue, as that of the regulation of new mobility services. As a consequence, we have not only to focus on the factors leading to the reduction of the costs of access to mobility services, we have also to understand what are the restoring forces. It is also the case for the coming revolution of autonomous vehicles.

2.4 The third wave of digitisation and the emergence of autonomous vehicles

The third wave is in the course of rapid development, but still some years away from the widespread commercial applications of fully-fledged autonomous vehicles. We are concerned in this seminar not with issues such as safety and insurance, but with the impact on the transport market place. A major development of this kind is likely to have a significant impact. We are particularly concerned with how it should be regulated economically, for example with respect to restrictions on entry, the imposition of common standards, and the pricing of access to key inputs (including the requisite communications infrastructure and the physical highway infrastructure). These issues arise in relation to travel on land, (and water, presumably), and also in relation to the use of aerial drones.⁶

⁶ In July 2016, the UK government agreed to get together with Amazon to start testing use of drones to deliver parcels to a customer’s door.



These decisions have to be made quickly, to meet (or even get near) the target of Commissioner Oettinger to have driverless cars available by 2020. The April 2016 ‘Declaration of Amsterdam’⁷ records an agreement to co-ordinate developments. Some Member States have their own pathways and action plans. All these require resolving all kinds of difficult problems, such as authorisation of trials, driving rules, insurance, cyber-security and so on. There will also be significant and intractable single (digital) market issues associated with ensuring that autonomous vehicles can cross national boundaries, especially since autonomous vehicles will be an arena in which firms struggle for competitive advantage.

However, the longer-term consequences for the transport market place are considerable and relatively unexplored. For example, will households and firms want to own their own cars? Or to rent one when they need it? What will be the effect on miles travelled? How will demand for road and for parking space change?

At present, a variety of degrees of autonomy are recognised, from limited lane-changing capability, through platooning of trucks along motorways, to fully driverless cars and other vehicles, including buses. The more advanced modes require the ‘wiring-up’ (or ‘wirelessing-up’) of roads, creating the need for a very substantial investment in a 5G internet of things to meet the needs of a major road transport specialist communications service or ‘vertical.’

Immediate regulatory decisions in these areas may have very large repercussions throughout the value chain, and on the outcome of the inevitable struggle to control the process and capture the rents. Suppose, for example, that in a world of autonomous vehicles, households and firms chose to rent them on a short-term basis from one of a number of intermediaries in place of the current practice of buying them from a car manufacturer. In the consensus view of the future, vehicle to vehicle and vehicle to environment communications will have to be jointly supplied to all vehicles, but if in addition, other communications with the car (personal communications, passenger entertainment, telematics – e.g. engine monitoring) were handled by a wholly separate operator serving vehicles of all types, then the car manufacturer would lose any direct relationship with users.

If on the other hand, manufacturers contrived to personalise an individual vehicle to the needs of a particular user, and tie her to a proprietary communications channel, the manufacturer’s degree of information about and control over the user would go up. Which of these scenarios occurs may well depend on the combination of regulatory decisions covering safety issues, economic regulation of transport, and communications regulation (possibly right down to individual spectrum allocation and assignment decisions).

⁷ Declaration of Amsterdam on cooperation in the field of connected and automated driving. Navigating to connected and automated vehicles on European roads, 14 April 2016

3. Challenges to economic regulation associated with the digitisation of mobility⁸

This section of the seminar will focus on the consequences for *economic* regulation of these and other changes; thus, we will consider issues relating to competition, pricing, investment and public subsidy. We will also concentrate on changes which disrupt present modes of regulation, either widely (across modes) or deeply (for example, allowing considerable deregulation or altering financing in a significant way). The effects of these changes are emerging, as are analysis and projection of them. What follows is a non-exhaustive listing of a selection of issues.

3.1 Better pricing

Ubiquitous wireless broadband networks and computing power have increased information and communication capabilities, enabling smart and more efficient network management. This includes the use of road pricing for congested roads, to replace the current inefficient 'first come, first served' regime, which prevents users from taking into account detriments they reciprocally impose on one another through congestion. The spread of mobile telephony, smart phones, broadband internet, and e-commerce has now made possible e-payment for road use at prices determined in real time, by distance travelled, characteristics of vehicle used, time of day, and congestion level.

One traditional concern with pricing access to roads has been its transaction cost: it is costly to exclude people from roads and charge a price, especially if you required them to stop at a toll station. When congestion was minimal, the costs of exclusion to support pricing may have seemed unwarranted, and inefficient. However, with limited public investment in roads, more and more of the day is congested.

There is thus greater scope today for smart network regulation using pricing to achieve the optimal trade-off between congestion and investment. Of course, road pricing is subject to considerable consumer resistance, but recent US experience suggests that it can begin with a mixture of schemes confined to commercial transport and with self-selected private car volunteers.

These considerations apply not only to the physical transport network (including roads and train tracks) but also to access to the communications networks which will be increasingly required. Partly as a result of the foregoing developments in ICT, society's expectations are also changing. The old fixed networks with their fixed schedules are becoming less acceptable to consumers and more possible to adapt technologically. People expect greater freedom and more opportunities for individual achievement, but at the same time expect higher levels of safety

⁸ George Barker of LSE and the ANU has contributed to this section.

and consumer care. The extension of more efficient retail pricing for transport services (exemplified by Uber's demand-dependent approach) is also feasible (though also likely to be subject to consumer resistance).

3.2 Inter-modal competition, new business models and new services

Online platforms already exist in cities which inform users in real time of the expected duration and monetary costs of accomplishing journeys by different modes. Technology enables customers to access and assess the options, make choices, and then book a seat at the stipulated price. The transport can be effected on an individual or a ride-sharing basis, and be provided by either a public or a private firm.

The EC has recently published its views on the regulation of on-line platforms in general, identifying different categories, but taking a generally sceptical view of the need at this stage to adopt ex ante regulation of platforms. However, ownership of a supposedly neutral price (and other information) comparison site by a competing service provider can create an incentive and an opportunity to discriminate, and the right policy to adopt towards, say, 'must display' and other rules for such sites is likely to depend on the competitive structure of the information market.

Transport modes can rely on new business models, including the use of ride-hailing platforms to customise pick-up and drop-off locations. Although the most prominent of these new developments is Uber, its model, though radical in its mobilisation of individually owned capital resources, is likely to lead only to a fairly modest extension (or contraction) of the existing regulatory regime for taxis.

It is reasonable to expect incumbents will generally resist the licensing of new product and process innovations. It is also a feature of new entry that a regulator (in energy or telecommunications, for example) will continuously rethink the degree of unbundling in a sector – essentially to consider whether there are any bottlenecks controlled by incumbents which, if they are not made available to competitors, will exclude or weaken those potential rivals. To take a traditional example, in the UK the competition authority mandated access by competitors to bus stations. For this reason, it may be desirable at either Member State or EU level to have a 'stock-take' of transport regulation.

3.3 Private vs public investment

In Europe, the transport sector differs from, say, the communications and energy sectors because of its high dependence on public subsidy and the widespread presence of public



operators. This is true particularly of the road and rail infrastructure, where the two characteristics are linked.⁹

It is possible to speculate whether the digitisation of transport will permit this situation to change. A number of factors seem to make this possible, if government at various levels choose to avail themselves of this possibility.

One is the use of more efficient pricing, especially of roads, where ICT permits the acquisition of revenue at very low transactions costs, and, crucially, generates a considerable increase in welfare for travellers, some of which can be captured to recoup the costs of the road system.¹⁰

Enhanced multi-modal competition among existing operators may play its familiar role in getting costs down and allowing consumer, rather than producer, sovereignty to flourish. In some markets, for example commuting to work by train, the widening of choice is likely to be limited - the inescapable cause of the journey being limitations on the available stock of housing. But other journeys have greater discretionary elements, and, as noted, online platforms have the capacity to give customers much better real time information about competition possibilities.

Competition among existing modes is also supported by new entry. Again, the scope for this varies for the various modes, but transport regulators should be on the lookout for cases where a particular service provider may control a bottleneck which its competitors need to get access to, if they are to exercise a constraint on the incumbent.

The final case noted above is autonomous vehicles. Here it is quite difficult to anticipate what will happen, and when; and thus difficult to devise a strategy for economic regulation. There is likely to be a co-ordinated communications infrastructure, but other ramifications concerning pricing for access to those services and the competitive structure of collateral activities are still up for grabs.

⁹ Thus the UK rail infrastructure was recently reclassified as a body brought back into the public sector after a twenty year period in the private sector

¹⁰ One should not, however, under-estimate the difficulty of explaining to road users the benefits from lower congestion which road pricing leads to, when they begin paying for previously 'free' road access.