

# CIVITAS INSIGHT

## Mobility-as-a-Service: A new transport model

Hyper-urbanisation, climate change, and demographic and societal changes are some of the trends that have put pressure on transport networks and set obstacles to door-to-door mobility. Technological breakthroughs can tackle many of the problems, and produce novel mobility services that could contribute to seamless mobility.



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## A chance for a fundamental change in people's behaviour in and beyond cities

Urban transport is crucial to economic competitiveness, social cohesion, the sustainable growth of a city, the individual member states, and the European Union. As such, an efficient transport system has to be the heart of every successful city. However, the majority of today's transport networks are the by-products of earlier systems designed to serve societies with rather different characteristics. Since then, certain key drivers have been restructuring the way we live and think, and the technologies we use in our everyday lives. This changed society strives for efficiency and connectedness, which need to be core features in modern transport systems. Understanding these drivers, the pressures they place, and the changes they necessitate in urban transport networks are the first steps in creating transport systems suitable for today's society.<sup>1</sup>

"The millennials don't value cars and car ownership, they value technology — they care about what kinds of devices you own," said Mimi Sheller, a sociology professor at Drexel University and director of the Center for Mobilities Research and Policy<sup>2</sup>, in a New York Times article in 2013.<sup>3</sup> "The percentage of young drivers is inversely related to the availability of the Internet. Why spend an hour driving to work when you could take the bus or train and be online?" People's lifestyles have changed significantly in the past 50 years. Young people are more likely to spend money on other forms of mobility rather than buy a car, so current trends are moving towards a service model of mobility. With the rise of technology in an increasingly integrated world, a long-term cultural shift in what consumers want and expect from transport could mean a different future for both older and younger generations. A new lifestyle where people drive less is emerging among millennials, a generation exchanging driving for cycling and walking and more enthused about the latest technological product than owning their first car. Moreover, with a larger ageing population will come a larger group of people who have long-term health conditions and will have to give up driving. Indeed, free travel on public transport for older people, common in many European cities, is making many think twice about car ownership, or at least about giving up that second car.<sup>4</sup>

What if a concept exists that can improve travelling habits and the efficiency of the transport network? A service, which is able to cut costs for the user, improves the use of transport providers, and reduces city congestion? Mobility-as-a-Service (MaaS) is such a concept, combining services from public and private transport providers through a unified gateway that creates and manages the trip, which users can pay for with a single account.

1 Kamargianni, Matyas, Li, Schäfer, UCL Energy Institute. Feasibility Study for 'Mobility as a Service' concept in London, 2015, accessed April 28, 2016, <https://www.bartlett.ucl.ac.uk/energy/docs/fs-maas-compress-final>  
2 More information about Mimi Sheller, accessed June 28, 2016, <http://drexel.edu/coas/faculty-research/faculty-directory/sheller-mimi/>  
3 New York Times - The End of Car Culture, accessed April 28, 2016, [http://www.nytimes.com/2013/06/30/sunday-review/the-end-of-car-culture.html?\\_r=0](http://www.nytimes.com/2013/06/30/sunday-review/the-end-of-car-culture.html?_r=0)  
4 Steve Cassidy, ESP Group. Mobility as a service: The rise of the Service Model and the decline of car culture, accessed April 28, 2016, <http://the-espgroup.com/local-transport-today-mobility-as-a-service-the-rise-of-the-service-model-and-the-decline-of-car-culture/>



As defined by the European Mobility-as-a-Service Alliance<sup>5</sup>, the key concept behind MaaS is to “put the users, both travellers and goods, at the core of transport services, offering them tailored mobility solutions based on their individual needs. This means that, for the first time, easy access to the most appropriate transport mode or service will be included in a bundle of flexible travel service options for end users”.

MaaS is not limited to individual mobility as the approach can apply to moving goods as well, particularly in urban areas. A myriad of innovative new mobility services such as bike-sharing<sup>6</sup>, carpooling<sup>7</sup> or car sharing is fuelling this shift<sup>8</sup>. This shift is further enabled by improving the integration of multiple modes of transport into seamless sequences of trips,<sup>9-10</sup> with bookings and payments managed collectively for all legs of a journey.

There are many benefits of MaaS for users, the public sector and businesses:

- **Users:** Developed, personalised and smart mobility services reflecting users’ diverse needs. Seamless, transport services that function well and provide easy access to mobility, strong user orientation, high-quality services and competitive pricing.
- **Public sector:** Information and communications technology (ICT) improves the effectiveness of the whole transport system. Benefits include being able to allocate resources efficiently (based on a user’s real needs), creating new businesses and jobs, improving the management of traffic incidents, and having a more reliable transport system through advanced data.
- **Businesses:** MaaS is a profitable market for new transport services. Renewed opportunities for the traditional transport and infrastructure business sectors are part of innovative service concepts and cooperation.

5 European Mobility-as-a-Service Alliance, accessed April 28, 2016, <http://maas-alliance.eu>  
6 See also CIVITAS Insight 10 - Bike-sharing as a link to desired destinations, accessed April 28, 2016, <http://www.civitas-initiative.eu/content/key-publications>  
7 See also CIVITAS Insight 09 - Same destination - Same vehicle  
8 See also CIVITAS Insight 05 - Car sharing: New forms of vehicle use and ownership  
9 See also CIVITAS Insight 12 - Integrated ticketing and fare policy for public transport  
10 See also CIVITAS Insight 15 - Linking intermodal services better



## CIVITAS stimulates door-to-door mobility services

Innovative transport telematics systems for managing traffic and supporting travellers can make urban passenger transport faster, more reliable, efficient and passenger-friendly. The CIVITAS Initiative's Thematic Group on Transport Telematics<sup>11</sup> provides a number of resources, such as training and guidance material, policy recommendations, and learning opportunities such as trainings, study tours or workshops. The group also offers the possibility to network with the city officials and experts involved in examples of best practice.

Although Intelligent Transport Systems (ITS) and their corresponding features are one of the CIVITAS Initiative's building blocks, the concept of MaaS is relatively new. Therefore, the CIVITAS Initiative has only considered this concept over the last few years. The following CIVITAS case studies provide an overview on how this topic has evolved since 2002, from real-time information to IT-based traffic management, further to smartphone applications, Mobility 2.0 services and an alliance of mobility providers.

## CIVITAS I | Rome (Italy): Real-time multimodal information for smartphones

To encourage citizens and tourists to use public transport, Rome's Mobility Agency (RSM) explored ways to improve access to mobility information via new media and mobile devices.

RSM provided an online, wireless, multimodal, multi-lingual system with information about the most appropriate public transport services for mobile devices to allow people to plan journeys on the move. The service provides information about arrival times for all bus lines at every city stop, using data generated by automatic vehicle monitoring, and real-time news on traffic, road works, public demonstrations, disruptions and access

restrictions. Furthermore, the journey planner calculates the best public transport routes with an interactive map; provides information on the availability of shared bikes, and parking spaces in four city car parks; and information and advice on services and relevant contact details.

The number of visitors to the website rose by 197 percent between 2002 and 2005. Following the introduction of the wireless system, mobile users performed an average of 10,000 queries per month. The measure was a success because the user-friendly platform capable of delivering information (texts and maps) was accessible across all devices.<sup>12</sup>

## CIVITAS II | Stuttgart (Germany): IT-based event-oriented traffic management

This measure focused on improving traffic and promoting intermodality to and from major city events and reducing congestion and travel times by providing optimum information. Prior to introducing the measure, Stuttgart's road network suffered traffic disruptions about 90 days per year due to coinciding events in congress centres, concert venues and sports stadiums. In 2006 Stuttgart established the Integrated Traffic Management Centre (ITMC) to control traffic and provide better information.

Stuttgart's research helped establish the strategic and technical bases for controlling traffic, including scenarios for managing traffic incidents and for the parking and traffic guidance system. Inaugurating a new Security and Mobility Management Centre, which includes the ITMC, is a unique approach in Germany. It puts the authority responsible for managing city traffic, the police traffic department, the fire department and ambulance service, and the Stuttgart public transport operator all

<sup>11</sup> CIVITAS Initiative – Thematic Group on Transport Telematics, accessed April 28, 2016, <http://www.civitas-initiative.eu/TG/transport-telematics>

<sup>12</sup> Real-time multimodal information for smart phones, CIVITAS Initiative, accessed April 28, 2016, <http://www.civitas-initiative.eu/content/real-time-multimodal-information-smart-phones>



under one roof. The partners cooperate strategically and operationally, coordinating information and taking joint action, allowing them to manage crises rapidly. The online platform, launched in August 2008, provides drivers with up-to-date information on traffic conditions and available parking spaces in Stuttgart. Additionally, the ITMC controls traffic flow during rush hours, sports matches and in areas with construction work, and in unforeseen circumstances such as road accidents. During the 2006 football World Cup in Germany, the new ITMC managed traffic smoothly and prevented traffic jams.

Vehicles were able to leave the car park after a football match rapidly due to the use of three lanes rather than two. The fourth lane for incoming traffic is exclusively for pedestrians leaving the area.

Carbon monoxide and nitrogen oxides emissions during peak times reduced by between 10.2 and 53 percent during six 10-minute measurement periods. This equates to an hourly average reduction of approximately 38.1 percent from traffic leaving the stadium after a match.<sup>13</sup>

## CIVITAS PLUS | Brescia (Italy): Mobility channel

Prior to Brescia developing a new light automatic metro line, the city had never encouraged the significant use of intermodal services. Recently, however, it proposed several initiatives to promote an intermodal transport system, including a smart phone app called Brescia Mobile Channel (BMC).

The BMC promotes smart public transport in the city by developing different apps that are compatible with smartphone operating systems, accessible from mobile

devices and able to exploit a device's on- and off-line computing, storage and communication capabilities. Information updates in real-time, including the number of available parking places, available bicycles for the bike-sharing service, and bus timetables. The app was developed for Apple and Android operating systems and was released in November 2011 and July 2012, respectively. In September 2012, there were over 3,350 Apple downloads of the app, while Android downloads numbered over 650.

Users were happy with the app, with interviewees marking it 4 out of 5 points on average. This good result is due mainly to the progressive upgrades to improve the quality of the product. BMC users could also leave a comment after closing the app. Analysing the feedback together with back-office information revealed that the real-time information on bike-sharing and parking was highly appreciated. Thanks to such dynamic information, the time users spent connected to BMC sessions substantially increased. In the near future, the app makers will upgrade it with further features, such as information about the new metro line and an updated map layer with the new bike-sharing stations near the new metro stations.<sup>14</sup>



13 Introducing IT-based event-oriented traffic management, CIVITAS Initiative, accessed April 28, 2016, <http://www.civitas-initiative.eu/content/introducing-it-based-event-oriented-traffic-management>

14 Mobility channel, CIVITAS Initiative, accessed April 28, 2016, <http://www.civitas-initiative.eu/content/mobility-channel>



## CIVITAS PLUS II | Palma (Spain): Mobility 2.0 services

Palma's main challenge is combining available mobility information and on-going ICT development processes from different departments and operators into an integrated mobility platform. The aim is to allow users to plan intermodal trips in real-time and choose the most appropriate transport. The information should make the use of public transport services, walking, and cycling easier and more comfortable and, thus, discourage the unnecessary use of private vehicles. Palma launched a beta version of MobiPalma– an integrated mobility app – in 2013.

Palma discovered that there was a lot of interest in real-time mobility apps when in spring 2013 it launched an app for real-time bus information covering the network of Palma Municipal Public Transport Company (EMT). By May 2014 over 50,000 users downloaded the Android app. Different organisations in the city, pleased by the popularity of the app, started work on other services as well. A private developer included data from the Palma public bike-sharing system in a generic app on public bikes, and the operator handling on-street paid parking

introduced an app for mobile phone payments in April 2014. However, achieving the desired intermodality requires a more coordinated approach to integrate the different isolated projects and to overcome technical and administrative barriers. Therefore, Palma decided to develop MobiPalma- one of the measures implemented within the CIVITAS DYN@MO. The main technical challenge is to combine all the scattered data to feed the main core of the app.

On the administrative side, different departments and public companies had to agree on cooperation. In the first phase of the project, SmartOffice Palma<sup>15</sup>, the municipal department responsible for helping Palma turn into a smart city, supported the standardisation of data formats and offered open-data platforms for private developers. After this first phase, local partners concluded that it was necessary to contract an external company to address the overall integration and design of the user-interface of the mobility app. With the MobiPalma, Palma hopes to offer its citizens an easy way to plan their trips and access mobility information.<sup>16</sup>

## CIVITAS PLUS II | Aachen (Germany): Mobility alliance

An alliance of mobility providers in Aachen is tackling pollution and noise emissions, improving road safety, revitalising urban space, discouraging the use of private vehicles, and encouraging and harmonising smart information and communication services for improving alternative mobility services. The alliance brings together different players in the mobility market in a regional mobility network, concentrating knowledge and opening up synergies in the field. It represents a uniform information and distribution platform that enables citizens to arrange their individual mobility needs in a fast, comfortable and competitive way.

The main goal of the alliance was to get all local Aachen mobility providers to work together and develop a cross-border mobility platform for the regional transport market and to offer multimodal/intermodal mobility

options for citizens, built on interactive Mobility 2.0 applications. The aim was to provide a multimodal/intermodal routing information platform and integrate reservation and booking options for car sharing and bike-sharing services with an interoperable, cross-border ticketing function that extends to the Netherlands and Belgium.

All mobility service providers in the Aachen region have various electronic information and distribution channels and diverse ways to access public transport (paper tickets from ticket machines or printed at home, validating mobile tickets via smart phones, chip cards, etc.). In addition, there is a lack of coordination as information and distribution systems run largely independently from each other. Aachen aims to cooperate more closely on mobility services, an approach that led to the

<sup>15</sup> More information about the SmartOffice Palma, accessed June 28, 2016, [http://smartoffice.palma.cat/portal/PALMA/smartoffice/smartoffice\\_principal1.jsp?codRes=1&language=en](http://smartoffice.palma.cat/portal/PALMA/smartoffice/smartoffice_principal1.jsp?codRes=1&language=en)  
<sup>16</sup> CIVITAS Initiative – Mobility 2.0 services, accessed April 28, 2016, <http://www.civitas-initiative.eu/content/mobility-20-services>



establishment of networks to increase communication and to initiate common activities. In particular, activities such as FahrRad in Aachen (cycling in Aachen), the European Mobility Week campaign or pedelec-testing weeks encourage alternative mobility solutions.

The goal of establishing a mobility alliance is highly supported by local authorities. The alliance has also produced an expert report that provides an overview of multimodal mobility offers in Germany and particularly in Aachen; a detailed market analysis, including

information on mobility behaviour in the Aachen region; and outlined customer target groups, considering the specific requirements of future mobility. The expert report also includes a detailed concept for a mobility alliance, examining various organisational, financial, technical and legal issues. Moreover, this concept provides proposals for implementing a mobility alliance in the Aachen region. This has led to the development of a business model, including a short-term, practical solution for the pilot phase and long-term concept that goes beyond the CIVITAS DYN@MO pilot.<sup>17</sup>

## Creating a seamless travel experience based on demand

ITS will allow advanced capabilities across transport modes to respond to multiple users' needs and improve the performance of transport. To make advanced travel planning a reality, Europe's transport system must move towards a more user-friendly, digital and intelligent mobility model by analysing and developing coherent concepts, and encompassing all relevant elements, systems and services. Many expect a paradigm shift in transport through MaaS, where the service providers could offer travellers easy, flexible, reliable, affordable and environmentally sustainable daily travel. This includes, for example, public transport, car sharing, car-leasing and road-use, as well as shipping goods more efficiently and better delivery possibilities. Although activities in this field are continuing in EU member states, there is not yet sufficient quantifiable evidence on its costs and benefits, and on its influence on people's travel patterns and behaviour.

Apart from the CIVITAS examples mentioned above, there are already some further examples on MaaS in European cities. Most prominent are the examples from Finland, where this idea was born, Vienna (Austria) with its SMILE pilot project, and Hanover (Germany), which launched the world's first example of MaaS.

### Finland – birth of a concept

The MaaS concept already plays a key role in national transport policy. Developed by ITS Finland, a consortium of ICT experts, the originally purpose of MaaS was to improve the traffic flow, safety and environmental performance of transport. It is widely recognised as a “disruptive innovation” – that is, an innovation that creates new markets by discovering new categories of customers - which will change the entire transport industry through digitalisation and combining the best of existing apps. With transport being the world's second-largest consumer market and the average user spending EUR 300 per month on their mobility, MaaS has amazing potential. Besides protecting the environment, it will offer unparalleled business opportunities across the globe. MaaS Finland, the world's first MaaS company, started operations in February 2016, raising a total of EUR 2.2 million from private investors and the Finnish Funding Agency for Innovation, Tekes.<sup>18</sup> Since its launch, the MaaS concept has attracted a great deal of international attention. Now, MaaS Finland has started operations as an independent company focusing on the international market, intending to serve as an operator between transport services providers, users and third parties. It will combine all existing transport services into a single mobile application on the “single-ticket” principle and offer personalised transport plans tailored to customer needs.<sup>19</sup>

<sup>17</sup> Mobility Alliance, CIVITAS Initiative, accessed April 28, 2016, <http://www.civitas.eu/content/mobility-alliance>

<sup>18</sup> More information about the Finnish Funding Agency for Innovation, Tekes, accessed June 28, 2016, <https://www.tekes.fi/en/tekes/>

<sup>19</sup> MaaS Finland to revolutionize the global transportation market, accessed April 28, 2016, <http://maas.fi>



## Austria – Vienna’s SMILE project

The SMILE project in Vienna was a six-month pilot project. A unique mobility service, it allowed access to a single platform door-to-door mobility alternative to the private car by integrating a broad range of mobility services with public transport, with the possibility to immediately book and pay for these services. It created a completely new customer experience, relying upon integrated real-time information, booking and ticketing. Furthermore, it provided the possibility of comparing and choosing the best route through an app. The technology and methods used in the project led to improvements in the communication with the customer, providing optimum routes and giving an incentive for people to use public transport by breaking down entry barriers. The SMILE platform gathered all relevant and available data for real-time information, bookings, ticketing and payment through standardised interfaces to the different mobility providers. The mobile app based on the SMILE mobility platform enables people to make the best choice for their everyday mobility. It is a breakthrough in terms of usability and as an enabler for integrated multimodal mobility services. Its unique achievement is integrating multiple mobility providers throughout Austria, such as national rail operator, ÖBB; Vienna public transport operator, Wiener Linien; taxi service Taxi 31300; car sharing service Car2Go, electric car sharing service Emil and Emorail (e-car sharing); bike-sharing platform Citybike; Tanke, a charging network for electric cars; and many other services. Strengthening further electric mobility and connecting other modes was also a focus of the SMILE project. Ending in May 2015, the project successfully developed and tested the prototype of an integrated mobility platform open for all types of mobility services, including electric mobility. Based on the results of the project, both Wiener Stadtwerke and the ÖBB will continue the development of a digital multimodal mobility solution to provide a wide usable application.<sup>20</sup>

## Germany – world’s first operational example of MaaS

Following a pilot scheme that began in November 2014, the Hanover public transport operator, üstra, and the Transport Association of Greater Hanover<sup>21</sup> launched Mobility Shop in February 2016 - the first operational example of MaaS. The Mobility Shop is a truly multimodal service, the core feature of which is an integrated process that includes registration, routing, booking and invoicing for several transport modes (public transport, taxis and car sharing). The service offers people the possibility to bundle mobility modes to their individual needs and to book their journeys directly, whether it is a public transport ticket or a taxi ride with mobility options, including travel times, appearing in real-time. Users then receive a monthly bill from üstra. More flexible than the original pilot, the service is not limited to annual season ticket holders of public transport anymore, broadening its appeal to the “multimodal” target group. At EUR 9.95 a month, the “Hannovermobil” service includes car sharing membership and heavily discounted rates for car sharing and taxis, and a free 25% discount card from the German rail network operator, Deutsche Bahn.

MaaS was a major discussion point at the 2016 IT-TRANS conference in Karlsruhe, Germany. The rise of the sharing economy is causing people living in urban areas to reconsider how they think about access to goods and services and the need for ownership, particularly of the private car. “There are good reasons for owning a car these days and we need to overcome these,” said üstra’s Martin Röhrleef at an IT-TRANS plenary session on emerging technologies. “MaaS might be even more attractive than owning a car.”<sup>22 23</sup>

20 UITP. Awards: a single-platform, problem-solving SMILE solution, accessed April 28, 2016, <http://www.uitp.org/news/awards-smile-vienna>

21 More information about the Transport Association of Greater Hanover, accessed June 28, 2016, <https://www.gvh.de/the-gvh/about-the-gvh/history/?l=1>

22 UITP. World’s first example of Mobility as a Service now live in Hanover, accessed April 28, 2016, <http://www.uitp.org/news/maas-hannover>

23 Üstra official website, accessed April 28, 2016, <https://www.uestra.de/en/>



## Bundling services to simplify access to mobility ensures the best use of all transport modes

The transport sector is entering a period of significant change, with new technologies, products and services fundamentally shifting people's expectations and opportunities – and the market for intelligent mobility is rapidly developing. Customers, transport authorities, businesses and governments understand the huge potential of mobility opportunities as part of a wider, integrated system. There is a global discussion on how digitalisation, new technologies and the increasing connectedness of people are potentially changing the transport sector in a fundamental way. Mobility platforms will integrate transport modes and the possibility for people to purchase "mobility packages" granting access to public transport, bike-sharing, car sharing and taxis at the same time.

Professor Matthias Finger from the Florence School of Regulation and the École Polytechnique Fédérale de Lausanne is convinced that among the major changes influencing the European transport sector in recent years, introducing ICT is among the most prominent. Indeed, the rapid evolution and ever more significant application of ICT in the transport sector is a heavy trend, breaking down boundaries between different transport modes. In fact, ICT creates an intermediate level between the different means of transport and their users thanks to a new layer of data. For users the focus is no longer on the transport mode, but rather on mobility. Consequently, mobility is an information service with products that physically transport people, rather than a transport product with additional services.

Today, mobility has a wider meaning, acting as an enabler that provides the means to multiple ends. The debate is shifting, particularly in the context of cities (and smart cities), from providing urban transport networks, to focusing on what urban mobility means, what people actually require, and how a more considered and integrated approach could produce far better outcomes. In its publication *Journeys of the Future - Introducing Mobility as a Service*, the Atkins Group<sup>24</sup> provides five key trends that are manifesting this shift in thinking. By tying these points together, a range of concurrent factors is working together to support and drive these changes to the transport sector. The development and uptake of technology is supporting new opportunities for existing businesses and allowing new entrants into the transport sector. Today, people have greater access to better information and more channels to communicate with transport providers and other customers. The transport system as a whole, and those who have a part in it, is becoming more integrated as the focus shifts from solely providing the supply of transport to what and where the demand is and how to cater for it more effectively.

**1 Integration and convergence:** Many different forms of transport are now an integral part of transport networks. Walking and cycling are key parts of the whole system.<sup>25</sup> Furthermore, the modes may start to expand (such as bike-sharing and car sharing) or the distinctions become blurred with new services such as Uber, Lyft and Bridj.<sup>26</sup>

<sup>24</sup> Atkins official website, accessed April 28, 2016, <http://www.atkinsglobal.com/en-GB>

<sup>25</sup> Bike-Share Could Be A Much More Integrated Platform, accessed April 28, 2016, <http://www.citylab.com/commute/2015/01/a-conversation-jay-walder-the-man-running-motivate-the-nations-biggest-bike-share-company/384534/>

<sup>26</sup> Uber Technologies Inc. is an American multinational online transportation network company headquartered in San Francisco, California. It develops, markets and operates the Uber mobile app, which allows consumers with smartphones to submit a trip request which is then routed to Uber drivers who use their own cars. Lyft is a privately held American transportation network company based in San Francisco, CA. Launched in June 2012, the company's mobile-phone application facilitates peer-to-peer ridesharing by connecting passengers who need a ride with drivers who have a car. Bridj is a commuter shuttle service owned by the privately held firm Bridj Inc. based in Boston, Massachusetts, with a mobile-phone application that allows passengers to ride a shuttle between home and work during commuting hours.



**2 User experience:** Transport is redefining itself as “mobility” and focuses on the customer rather than as a product to the customer. This is a profound shift due to an increase in and the ability to share information, and by new business models becoming possible thanks to technology and a greater willingness among people to try new things.

**3 Access over ownership:** Providing access to mobility rather than owning (and long-term commitment to) the means of mobility is changing the landscape. The focus on people’s experiences and the new business models emerging in the transport sector has established new space to enter into markets where previously entry was much more difficult. Expectations and requirements have changed with a greater emphasis on flexibility and on-demand services. Furthermore, the collaborative economy and technological developments will jointly enable people to be more selective thus continuing this trend.

**4 Technology:** New technologies are significantly changing the established transport sector. It is now possible to integrate journey planning across transport modes and to provide live, accurate information that travellers can rely on. It also provides new opportunities that lower barriers for businesses and innovators to enter the transport sector.

**5 Use of a combination of technologies:** The whole approach to a journey, centred on the user, is the underlying driver to these changes. People are now looking at transport as a whole network and understanding the full range of seamless opportunities available. Technology is enabling journey-planning tools such as Moovit<sup>27</sup> to provide solutions that give people the ability to navigate the transport network more easily.

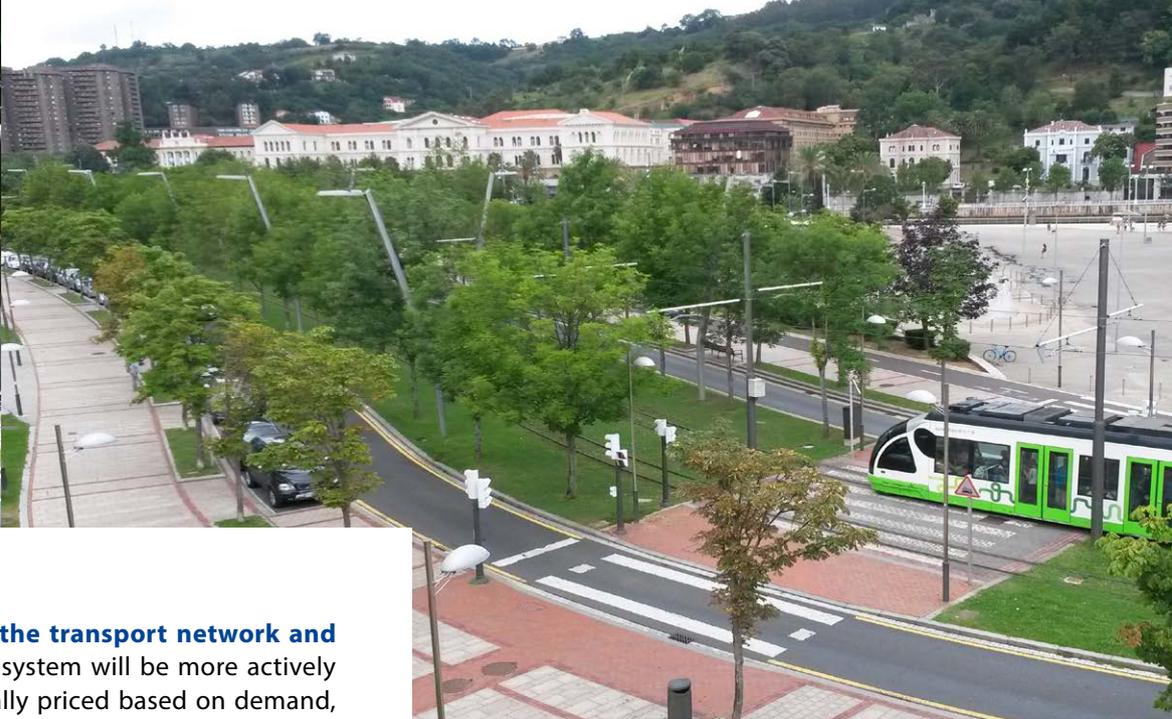
Out of these five trends, the authors were able to draw seven long-term trends that they consider will become norms for the transport sector:

**1 MaaS will create a new model for how we buy travel:** People will purchase travel using service contracts. Season tickets will disappear and travellers will buy fares as they do monthly or pay-as-you-go mobile phone contracts, with extras available as needed.

**2 The transport sector will split:** The transport sector will provide more and more integrated, customer-focused services and products. However, a distinction will emerge between customer-facing service businesses and the infrastructure and hardware providers supplying the capacity. Using the model of utility companies as an example, customers might have a monthly service contract with company A who may or may not be the actual provider of the service but is purchasing capacity separately from companies B, C and D. Therefore, the transport system is like the national electricity grid with non-customer-facing businesses providing the supply of capacity and services; while customer-facing businesses detach themselves from providing services and instead focus on meeting people’s demand effectively and innovatively.

**3 More new business models:** Car manufacturers’ primary customers will be themselves, or subsidiaries and other partners, who provide car sharing schemes.

<sup>27</sup> Moovit is a public transit app and mapping service which features live arrival and departure times, up-to-date line schedules, local station maps, service alerts, and advisories that may affect one’s current trip.



**4 Actively managing the transport network and its price:** The transport system will be more actively managed and dynamically priced based on demand, measured in real-time. By recognising that there is a limited supply of capacity for travel at certain times and places, there needs to be a greater emphasis on managing that capacity better. This means using technology to provide dynamic pricing based on, for example, the level of congestion, capacity, or air quality at a particular point or place in time. This should create better use of the network and free up more capacity by incentivising people to choose when and how to travel.

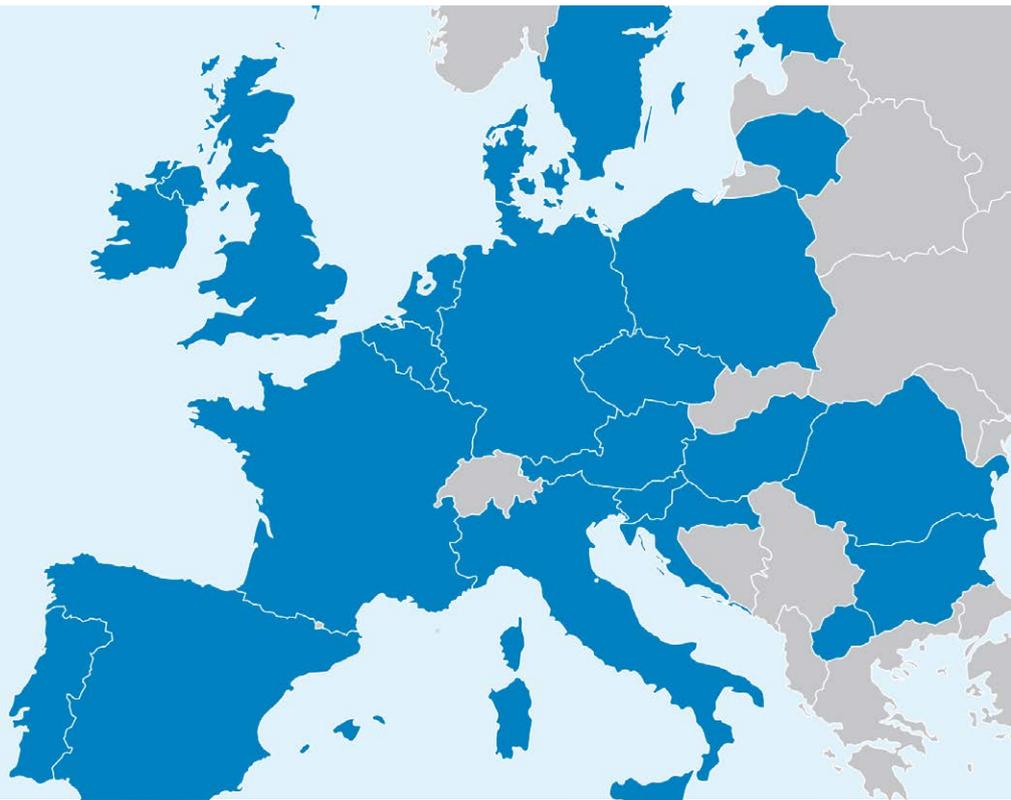
**5 The end of public vs. private transport:** Rather than the current approach to urban mobility, that pits public and private transport against each other, car owners and users will be better connected and integrated with the whole transport system. It also opens the door to connecting the use of roads and transport more broadly and incentivising change.

**6 Joining different transport modes:** The links between transport modes such as buses, trains or trams will blur as hybrid services cross the divides between them. People's demand for flexibility will reinforce this and put more emphasis on switching between modes and using the collaborative economy to greater effect.

**7 Greater cross-sector emphasis, recognising the wider role of transport:** Transport will integrate with more aspects of people's lives and this will happen in two areas. Firstly, governments, cities and policy-makers will better understand and use the links between improved transport and mobility opportunities and other areas such as better public health and supporting communities. Secondly, organisations and businesses will build partnerships to enable opportunities and benefits across sectors, such as local shops benefiting from their location next to a busy bus interchange. Jointly, this is the means for encouraging and incentivising the behavioural change needed to better utilise transport capacity across the network.

A final thought: Society is moving towards an era where everything is a service. People's needs and expectations will continuously become more demanding and fragmented, while the resources for developing transport systems are decreasing. New technologies enable travellers to take a more dynamic, proactive role as a developer and data producer in the transport system. The user will no longer be the only consumer in the transport system. Instead, the whole transport system will be generated together with and by the people.





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CIVITAS Insight N°18, August 2016

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