MÜNCHNER KREIS
Workgroup "Intelligent and Interconnected Mobility"
Digital Mobility Analysis

Management Overview

The implementation of a comprehensive integrated control system to optimize the entire transportation network (both Motorized Private Transport [MPT][1] and Public Transport [PT][2]) could make a significant contribution to reducing congestion in high-density areas. Furthermore, the efficiency of public transit in rural regions could also be improved. This improvement would require the widespread use of the new key technology "Autonomous Driving" in combination with a comprehensive Integrated Traffic Management System (ITMS)[3] and would have serious repercussions for the automotive industry and for the European economy as a whole.[4]

The Mobility Challenge

While mobility currently poses one of the greatest challenges to society, it is also an important economic factor and will serve in the future as an important basis for a new generation of services. Today's mobility exceeds the capacity limits, is very expensive, and is marked by time loss due to traffic jams, air pollution, wasted urban space, accidents, and high consumption of valuable resources. Innovative technologies could lead to new concepts in mobility that would bring major benefits to for society and significantly improve the quality of mobility overall. Having recognized its importance, the MÜNCHNER KREIS held a symposium on this topic at the Hasso-Plattner-Institute in Potsdam on 21 and 22 March 2019. In this analysis we focus on technology-based measures that are needed to meet the enormous demand for increased mobility.

An Effective Tool: The Integrated Traffic Management System (ITMS)

After conducting comprehensive, intensive analyses and discussions, a group of experts from the working group **"Intelligent and Interconnected Mobility" at** the MÜNCHNER KREIS concluded that the mobility challenge could not be met without a digital mobility system characterized by comprehensive traffic management based on autonomous driving and a high level of integration of other modes of transport, especially public transport. We believe that a "systems views" is needed to analyze all the data and information necessary for an optimization of the system for planning and controlling the smooth flow of traffic. Only with such an approach can the objectives of low-cost, congestion-free, and low-accident mobility without air pollution and with minimal resource consumption be achieved. In the following, we use the term "integrated traffic management" in the sense of the mobility management of all participating forms of transport.

Key Technology Autonomous Driving

Leading experts from academia and industry have analyzed business behaviors to determine what will happen when the technology of "autonomous driving" is ready for daily use. Large-scale pilot tests with autonomous vehicles worldwide show that this will be the case sooner rather than later. This new technology is fast approaching market introduction [5] with the current leaders in Asia and North America

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[1] Traffic commonly known as Motorised Personal Transport (MPT)
[2] Traffic commonly known as Motorised Personal Transport (MPT)
[3] Integrated Traffic Management System (ITMS)
[4] *See the MÜNCHNER KREIS study paper VII "Mobility Implementation System—Mobility Future 2025+"* www.muenchner-kreis.de/zukunftsstudien.html)
[5] Ante portas, Latin for "at the gate" referring to Hannibal's military movements.

(e.g.: Waymo, Cruse, Tencent).

We believe that consumers will have to change their mindsets: we will no longer own a car, but will be using the mobility service that brings us to our destination more cost-effectively, quickly, and safely (Mobility as a Service—MaaS)[6]. Environmental issues will also be addressed. This autonomous mobility service will first be used in the urban areas in order to make better use of the existing infrastructure there and ensure congestion-free traffic. It will encompass all forms of modern mobility, such as shared taxis, on-demand buses etc. The drive towards digital solutions for motorized individual transport (MIV) is very strong in the major cities of North and South America, as well as in Asia. This means that "autonomous driving" will not simply be a feature that can be ordered with the purchase of a new vehicle—as is widely assumed in Europe—but rather it is becoming the basic technology for digital mobility. Public Regional Transit (PRT)[7] and MPT will effectively merge into one digital system even if this service is provided by different operators. To the user, it will be ONE system. This view is also held in the USA and Asia. After the urban areas, digital mobility will be employed in rural areas as a new type of public transport or as a supplement to public transport and will satisfy the mobility needs there much more efficiently.

The Share of Software-based Added Value of the Motor Vehicle Will Increase Dramatically

The digitization of the automotive industry is following a pattern similar to that of other industries, in which hardware, which is so important in the analogue world, is declining in importance and software is becoming the key technology for customer-oriented services. While there will still be privately owned cars for enthusiasts and for people who need their car daily and frequently, these privately-owned vehicles will have to drive autonomously when they enter an urban region with a central traffic management system. Such vehicles will then be classed as luxury items and technically demanding while the vast majority of vehicles will belong to providers of MaaS services and will be less complex.

This transformation towards MaaS and a comprehensive mobility management will have drastic consequences for Europe and especially for Germany. According to the BMWi, there is a danger 'that the loss of added value in the motor vehicle industry due to the autonomous cars could be so great that it could have an impact far beyond the automotive industry. This problem thus affects not only the companies in the sector, but all economic and governmental actors as well.'

The need for high-value hardware will be much less in the future motor vehicle industry because the new vehicles will use low-cost standard hardware that can typically be produced in low-cost countries. This change corresponds to the trend in other industries that are being changed by digitalization: the added value in hardware is decreasing very sharply and the hardware is becoming a commodity with adjustment to customers and user needs carried out by the software. In other industries, the volume of hardware has been reduced drastically to about 10% of the previous volume as a result of digitalization. For example, the number of large manufacturers of telecommunications equipment has almost halved. Companies like Lucent, Northern Telecom, Philips and Siemens have left these industries. The digitization of mobility will have very similar effects. For today's car manufacturers, this will prove a major turning point as the lost value added in hardware cannot simply be replaced by value added in software. Software is a completely different industry with different practices. As a merging of hardware and software, autonomous driving can be realized for vehicles that comply with new specifications. Presumably only a few suppliers will offer such units in large quantities. Specific adaptations will then be possible with application software. A basic development and production of the function of autonomous driving for only one model series or brand will hardly be worthwhile in terms of quantity. A conventional car company would have to become a pure software developer—a lengthy process alongside very powerful competitors who are more experienced in software development.

Stand-alone Solutions are NOT what is required

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[6] Mobility as a Service (MaaS)
[7] Public Regional Transit (PRT)

Our expert group was particularly interested in the overall "Traffic Management System" ("ITMS"), which in the future will control all traffic in accordance with demand and will integrate all modes of transport in a region. Studies in the Munich region showed that the various transport providers could not agree on a common platform. Modern, digital mobility requires an integrated VMS—perhaps even a multimodal ecosystem—that on the one hand enables comprehensive mobility services (integrating all modes of transport) and additional services, and on the other hand takes into account our data security laws in Europe This poses a very great challenge

A legal framework needs to be developed

The most obvious and simplest solution to the legal issues arising in this context would be a public policy determination that the function of the ITMS is part of the public infrastructure and is therefore a public task that can be transferred to companies by license. According to the Treaty of Rome, the EU is obligated to shape this new mobility system in such a way that on the one hand, competition is ensured, and on the other hand, mobility is realized without barriers in the EU. Thus, EU-wide licensing conditions and communication standards for ITMS and autonomous driving are required. Although this new technology is arriving soon, no activity of this kind has so far been identified at the European level.

This leads to the further negative consequence that the wave of innovation in new services associated with the ITMS will be open first to those providers who supply such centers with manufacturer-specific interfaces and come then, presumably, come from the USA or Asia. Such ITMS centers will form a nucleus for many other services (for example, the logistics to be redefined, new services for travel and transport, changes in today's standard purchasing procedures, etc.). In terms of economic policy, it will be of paramount importance to develop this field of new digital services from Europe.

In order to develop an effective future mobility system and remain competitive at the same time, it is necessary to not only to develop the technology of autonomous driving in cars, but, above all, to develop the interplay in an integrated traffic management system.

Major Political Impulses are Necessary

Europe—and Germany in particular—is well positioned for a self-driven future in digital mobility. To achieve this goal, Europe needs a clear expression of will, clear objectives with concrete steps, and a common approach—possibly at different speeds—in Europe. This would include:

- an analytically-sound formulation of objectives
- a European-wide technical standardization processes for the interfaces of an integrated traffic management system for urban areas
- a European-wide regulatory system of licensing for the operation of such management systems, taking into account data protection laws and the specific European conditions.
- the promotion of new technologies in the mobility sector, in particular those suitable for use in the shared economy

We must tackle these developments quickly so as not to diminish our future economy and our export opportunities. And we need a strong, efficient, modern service industry based on digital mobility as the new focus of our economy.