



Connected Mobility

How Connected Mobility will succeed in future

Most cars are now equipped with intelligent assistance systems. However, the connection of vehicles to each other, to traffic lights, congestion warning systems and infrastructure is still in its infancy. Connected Mobility is a key future market that holds many pitfalls. In this regard, the automotive sector can benefit from the methods of Corporate Foresight.

By Dr Maria Schnurr and
Sivert von Saldern

CONTENT

1 /	Connected Mobility: a market of the future paved with obstacles	03
2 /	Potential of Connected Mobility	04
3 /	Barriers on the path to Connected Mobility	10
4 /	Lever for the effective implementation of Connected Mobility	12
5 /	Routes into the future of the automotive industry	14

1 / Connected Mobility: A market of the future paved with obstacles

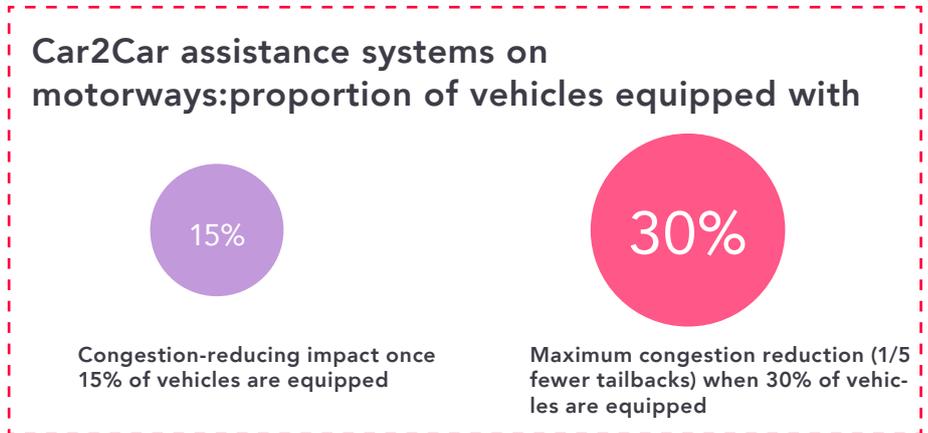
Satnav, lane-change assistance systems or cruise control: most cars are now equipped with intelligent assistance systems; the integration of mobile devices in vehicles and their connection to the Internet are now well advanced. However, Car2Car or Car2X Communication – the connection of vehicles to each other and their connection to traffic lights, congestion warning systems and infrastructure – is still in its infancy. Yet, such communication is a prerequisite for autonomous driving, which represents a key technological development for the future of the automotive sector.

Players in the mobility sector are now reinventing themselves thanks to the enormous potential of Connected Mobility: the market for connected vehicles is supposed to grow by 45% up to 2020 – which would equate to a ten-fold increase in the vehicle market as a whole. In five years, three quarters of all new vehicles are expected to be connectable; autonomous driving outside protected environments is also likely to become feasible from 2025 onwards. Politicians, traffic planners and car drivers are hoping this will increase safety and comfort, whilst reducing congestion and holdups.

2 / Potential of Connected Mobility

2.1 / Connected solutions over long distances

Many application fields for Connected Mobility manage without the need for equivalent infrastructure – such as Car2Car assistance systems or cruise control, as well as automatic braking in stop-start traffic. For instance, motorway congestion levels already start to decrease when just 15% of all vehicles are equipped with Car2Car communication technologies, which allow vehicles to “talk” to each other; and maximum effectiveness can be achieved when the level of equipment reaches 30%. This collective intelligence can contribute to optimising traffic flows: the traffic researcher Michael Schreckenberg assumes that 20% of tailbacks resulting from congestion could be prevented by using this technology in the future.



Data source: Audi Urban Future Initiative – blog

With most manufacturers, “Adaptive Cruise Control”, the system for making driving in stop-start traffic easier, currently only works at speeds of up to 30 km/h. Higher levels of equipment are also needed for higher speeds, i.e. the number of vehicles with this equipment would have to increase significantly for it to be used reliably in normal motorway traffic at speeds of over 100 km/h.

2.2 / Intelligent solutions for driving in cities

In urban traffic, however, intelligent vehicles alone are not sufficient as infrastructure must be included to keep traffic flowing. For example, traffic light assistants allow vehicles to communicate with traffic lights meaning that they can then adjust their timings accordingly. Traffic control centres highlight alternative routes to achieve even use of the road network. In 2013, IBM achieved 90% prediction accuracy in a pilot project involving 170 monitoring stations in Cologne. And Chicago is currently installing a city-wide system of sensors, which will allow traffic light cycles to be adjusted and empty parking spaces to be identified.

The fact that the significance of connections to infrastructure may be overestimated is suggested by the forecast from Dr Gereon Uerz, Leader of Foresight and Innovation Europe at the international planning office Arup: *“Given the rate at which intelligence is shifting to vehicles, the need for intelligent infrastructures could diminish again. The vehicles in the ‘Internet of*

moving objects' will assume a significant role as nodes in ad hoc networks – perhaps a more important role than the traditional traffic management centres.” The city of Stockholm, which has equipped 1,500 taxis with GPS systems and uses their movement patterns to model traffic flow in the Scandinavian capital, is currently adopting course.

2.3 / Autonomous driving: the supreme discipline of connected intelligence

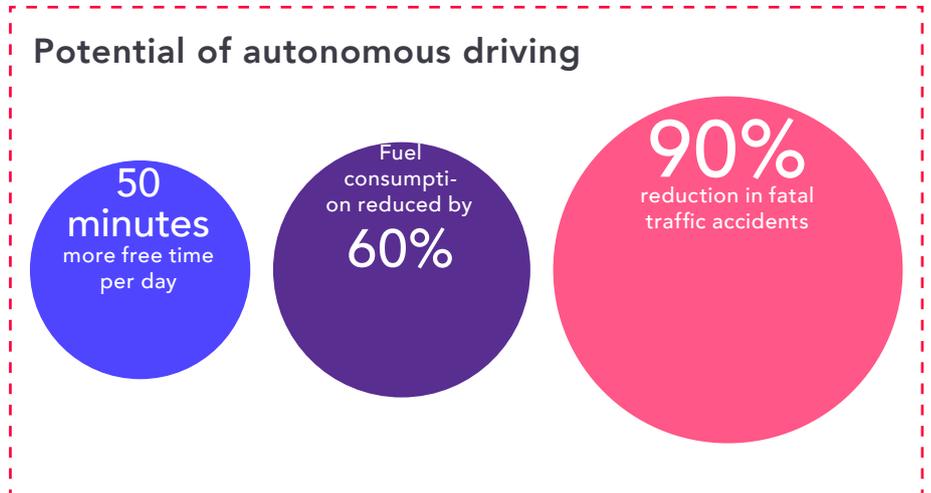
The supreme discipline of connected mobility, autonomous driving in self-drive cars, requires the extensive connection of vehicles to each other and to the corresponding infrastructure. Here too, a combination of sensors that can scan the environment and Car2Car technologies is sufficient for the moment on long distance routes, particularly on junction-free motorways. However, on other routes, intensive communication with and connection to infrastructure is required; in addition, a far greater range of transport modes comes into play. How will vehicles behave when faced with transport users that are not connectable, how will they deal with streets which change frequently because of construction work? Cramped European cities, in particular, with their large numbers of pedestrians and cyclists constitute an enormous challenge for fully autonomous driving in the medium term. It would be conceivable soonest in grid-based cities, which are to be found typically in the American Midwest. However, it is still assumed that autonomous driving will be mainly deployable in closed areas up to 2025. *“In addition to large campuses, factory sites or planned cities”, Gereon Uerz from Arup can “envisage entirely automatic neighbourhood mobility, such as in a quarter or a small town.”*

2.4 / What will be the benefits of self-drive cars for customers?

How will users react to self-drive vehicles? Generation Y may soon take autonomous vehicle functions for granted but the majority of today's potential purchasers belong to a generation that can still remember manual window winders. Unless conservative customers can clearly recognise the added-value offered by autonomous driving – namely a reduction in the strain imposed by driving plus improved safety and efficiency – they will leave this playground to a small, progressive elite. It is still unclear how much benefits such as saved time – the assumption is that car drivers will have an additional 50 minutes' free time on average per day – or greater fuel efficiency, which already stands at 60% among small test fleets today, will influence actual acceptance.

For politicians and infrastructure operators, the advantages are, however, obvious; the potential improvement in road safety alone is very promising, after all a reduction in fatal road accidents of 90% is assumed. According to the US Department of Transportation, the number of accidents for which the driver is responsible stands at 93% – all these accidents could be eliminated should technology take over in the respective situations.

However, the most massive change could be the change in the number of vehicles over all. Today, only 10 to 15% of all vehicles are on the road even at peak times, which means that over 80% of all vehicles are unused at any time. If vehicles were assigned and made their way to their users "under their own steam", the number of vehicles needed could be reduced enormously – implying a model based on "use rather than ownership".



Data source: Bertonecello/Wee (2015), NHTSA

2.5 / Autonomous vehicles will change the value added logic

The value added logic will change along the entire value added chain and affect more than just the automotive industry. This will start with the trend where OEMs are already losing influence compared with IT companies. A large number of OEMs are already working hard on adapting their IT structures to the new requirements. Enormous changes are foreseeable even at the end of the value added chain, in repair and maintenance. It is probable that independent workshops will no longer be licensed to service autonomous vehicles and features in future. However, additional adjacent sectors will also be affected: insurance companies, for instance, would only have to serve a dozen or so motor manufacturers as customers instead of vast numbers of individual customers, should agreement be reached that it is not the driver but the manufacturer of the (autonomous) vehicle who is responsible for accidents.

3 / Barriers on the path to Connected Mobility

The most discussed obstacle at present is concerns about data security. The recent experimental attacks against driving vehicles by hackers have provided support for these concerns: in an experiment by the magazine WIRED, the engine of a Jeep, which was travelling at full-speed, was switched off while the hackers were cosily ensconced on the sofa in the editorial building. However, Professor Stefan Bratzel from the Centre of Automotive Management, a think-tank for the automotive industry, makes clear it is not worth getting too wound-up about these risks: *"Fear about gaps in security must not mean that we 'give up on using IT technology in cars'. Rather the technology used must be reliable and safe; manufacturers must invest accordingly. To start with, entertainment functions must be clearly separated from steering functions. If the entertainment software is attacked, the vehicle's steering and safety functions would not then be affected as well."*

Incomplete standardisation constitutes another hurdle. The automotive sector must learn from the mishaps with electric mobility and do better this time: car and battery manufacturers were never able to agree with the legislator on a uniform standard for battery formats, which is why the large scale expansion of battery exchange stations was never started. Instead, the industry had to switch to the second best solution, namely charging stations – and now has to combat problems such as occupied charging points and vandalism to electricity cables.

4 / Lever for the effective implementation of Connected Mobility

The introduction of compulsory legal requirements is an obvious lever for achieving the appropriate critical mass of connected cars and infrastructure. Supporters refer to safety technologies that have been successfully implemented in the automotive sector – such as ABS or ESC. In the USA, the Department of Transportation (USDOT) has been looking at which Car2Car technologies will be introduced compulsorily in future to improve road safety since 2014. Legal requirements would also promote standardisation and ultimately reduce costs.

However, first there must be more opportunities to try out connected or autonomous vehicles on a non-binding basis similar to the way in which electric vehicles can be tested today in car-sharing fleets. The founders of the design research platform design:transfer, Daniela Peukert and Andrea Augsten, suspect that the impact of “field tests” of this kind would be enormous: *“Autonomous driving and intelligent traffic control will only realise their full potential when they are part of the people’s living environment. This needs not so much a critical mass than an area for experimentation in which a learning system can be tested and continuously improved.”*

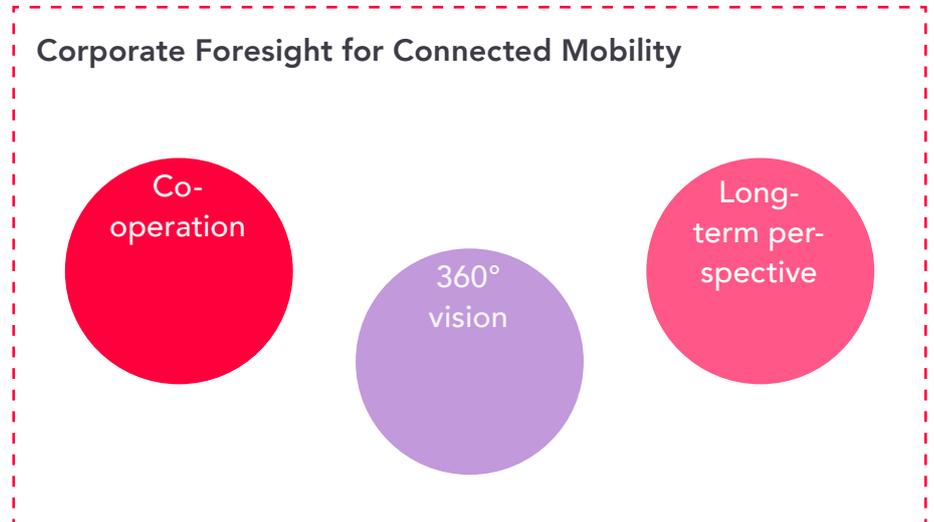
5 / Routes into the future of the automotive industry

Better utilisation of infrastructure and the security gained are certainly likely to be the greatest incentive for promoting Connected Mobility. Congestion and accidents cause substantial economic losses every year, whether in cities or on motorways. The technologies are already available in many cases but there is a failure when it comes to implementation. Manufacturers will get nowhere with ambitious solo efforts as soon as infrastructure becomes a factor – as a rule, this is a matter for the public sector. If Connected Mobility is to become a success, three basic principles of Corporate Foresight will help: 360° vision, cooperation and a long-term perspective.

5.1 / Cross-sector cooperation

Close cooperation between manufacturers, municipalities/the government and the IT sector is needed to develop the potential of Connected Mobility little by little. Cooperation will ensure synergies can be achieved and friction losses avoided. Connected Mobility means extending the field of vision and action, usually across sector boundaries. It is a long time since development of the issue was only dependent on technological progress, now it is also dependent on political programmes, sponsorship and investment budgets and the competitive situation.

However, cooperation is not only required at the implementation stage but often far earlier, in the research and development stage. The issue of cross-industry innovation comes into play here: the development of applications outside one's own area of expertise is most successful with the right partner. Assessing their expertise correctly and including it effectively is an entirely new experience for many technology players.



5.2 / 360° vision: focus on the customer

Corporate Foresight starts out with the 360° vision needed for this purpose: as a rule, each Foresight process starts with the identification and assessment of various actors and the influencing factors involved. It is crucial to successful strategic or innovative projects, as environmental factors and developments are often still dismissed as being of secondary importance for many technological projects.

The fact that this does not achieve the desired result is already common knowledge – however, the experience needed for optimal inclusion of the 360° vision is often lacking. Given the large number of possible factors and developments, it is easy to lose track of the essentials. Here, Corporate Foresight offers various methods for condensing the crucial aspects in a comprehensive but trenchant view of the future.

Users' future requirements can then be deduced from such views of the future. Using creative methods, their environment, their motives and their preferences can be explored with the aim of deriving specific product and service-related innovations – always tailored to a company's range of expertise, of course.

5.3 / Adopt a long term perspective – but the right one

Many players, particularly in technological sectors, have a good overview of the immediate future. Depending on the timescale, different opportunities and challenges will arise with regard to Connected Mobility: if infrastructure and traffic flows are included, it is not sufficient to look at the next five years. Long term perspectives – ten, fifteen or twenty years – will be needed in this case. The uncertainty associated therewith can be cushioned by the development of alternative scenarios. The Corporate Foresight toolbox focuses on those areas where there are gaps in traditional forecasting and planning tools – in the case of complex issues fraught with uncertainty. It highlights room for manoeuvre, underpins decisions, secures investment and creates the framework for the cross-sector dialogue and cooperation that is needed.

Corporate Foresight: Methodology for Connected Mobility



Strategic growth fields

New growth opportunities arise on the fringe of current skills and business areas. Recognising them requires you to transcend boundaries. Our structured process guides your team from foresight analysis, through an exploration of the growth areas of tomorrow right up to a full-scale evaluation of an innovation project. We have the long-standing experience necessary to transform a successful pilot project into regular innovation foresight processes, which you can then conduct on your own in the future.



Client environments of the future

You know your clients extremely well. Yet, what will tomorrow's customers look like – and what requirements will they have? Since we can't ask them, we use a variety of qualitative and quantitative foresight methods to anticipate the lifestyles of tomorrow. In doing so, we consider changing sets of values as well as shifts in incomes and spending patterns in your target countries. Using new approaches, such as value proposition design, we identify innovation opportunities that allow you to captivate the next generation of customers.



Developing visions and roadmaps

"Where do we see ourselves in the next ten years?" We help you answer this question using images of the future. In doing so, we openly tackle your core strategic issues and systematically unravel the spectrum of future options available to you. We consciously introduce images of the future into the mix that are outside your current alignment strategy. By thinking in terms of alternatives and evaluating the options from a forward-looking internal and external perspective, we introduce a transparent basis that management can use to make decisions, thereby accelerating the implementation process.

About the authors

Dr. Maria Schnurr is an expert in innovative solutions in the areas of mobility and sustainability. Starting from the belief that our mobility system requires a fundamental rethink, Maria Schnurr used her dissertation to analyse the potential offered by urban mobility services for car manufacturers. A key area of Maria Schnurr's work at present is alternative strategies for the social, economic and political implementation of ambitious sustainability targets.

Sivert von Saldern is an expert on questions relating to technology and innovation management, an interest that was sparked during his degree course in business administration. He is particularly interested in new routes to innovative products and services, such as those in the area of open innovation, for instance. Sivert von Saldern's expertise also covers the future of mobility and the disruptive potential of information and communication technology.

About Z_punkt

Z_punkt The Foresight Company is a leading international strategy and foresight consultancy that focuses on strategic future issues. It translates findings derived from trend and futures research into practical advice to facilitate strategic management. Using corporate foresight processes, Z_punkt helps companies to make the most of sustainable future markets.

Contact

Z_punkt GmbH
The Foresight Company
Anna-Schneider-Steig 2
50678 Cologne – Germany
info@z-punkt.de
+49 (0)221.355 534.0