



Ministry of Infrastructure and the
Environment

Smart Mobility

Building towards a new era on our roads



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A New Era

It is clear that a new era has dawned in mobility. Automated self-driving vehicles are already on our roads. The first international test involving truck platooning has been conducted. All large truck manufacturers want to start using this automated platooning technology. There are cars now on the showroom floor that can make automatic driving adjustments, monitor traffic, and automatically maintain driving distance. We are conducting large-scale field tests involving road-vehicle communication systems. And at large events we are working with intelligent traffic management.

I am convinced that these forms of innovation provide us with great opportunities to make road traffic safer and cleaner, and to improve the flow of traffic. This is why the Netherlands has fully embraced this pioneering technology. We are gaining new knowledge – not only technological knowledge, but also knowledge about liability, revenue models, safety, privacy, and behaviour.

Of special note is the fact that this concerns knowledge that is not readily available. Knowledge we can only acquire in the field: learning by doing. I think it is important for us not to go looking for answers on our own, independently of one another. This is why we are working closely with businesses and knowledge institutes, e.g., in order to develop shared strategies.

From an international perspective, our country is among the leading nations in this field. On the initiative of the Netherlands, the European Declaration of Amsterdam was signed this year. All EU countries and European car manufacturers will work together to make way for self-driving transport by 2019.

Melanie Schultz van Haegen
Minister of Infrastructure and the Environment

The Netherlands has everything it needs to lead the way. We have a good and heavily used road network, a large automotive industry and excellent institutions of knowledge. Other nations are monitoring the initiatives we are launching with interest. Our country is also increasingly being used as a testing ground for innovative applications. This offers economic opportunities for Dutch trade and industry. And the Netherlands will be the first country to profit from these new applications.

Many initiatives have been launched, many tests are still ongoing, and many questions still remain unanswered in the area of legislation and regulations. We are currently in a transitional phase in which we are carefully building towards entering a new era on our roads. This is a continuous process that is very dynamic. And we are not doing this alone; many parties are active in these developments. It is good to provide a regular overview of the activities my Ministry is developing in collaboration with the business community, the industry, and institutions of knowledge. This is why it gives me great pleasure to present you with this brochure.



Smart mobility calls for austere infrastructure

‘Smart mobility is becoming increasingly important for the functioning of our society. Rapidly advancing technology enables us to ensure, to an ever higher degree, that people can meet their biological need for mobility without negatively impacting the environment or others.

Look at the huge potential of smart mobility. It enables us to make traffic close to inherently safe and clean, presumably within the very near future. And smart mobility can reduce hold-ups by improved forecasts, information provision, and routing; but also, for example, through the option of letting the car do the work, allowing the driver to focus on other things. This will resolve tailback issues. Not by eliminating the tailback itself, but by mitigating the problem.



Many people agree on the potential of smart mobility. Its application is a different story. This requires a new form of public-private collaboration, considering that increasingly more solutions are being developed without any government control. Examples include navigation on smartphones, TomTom satnav in cars, and the use of Twitter to inform motorists. All have materialised outside governmental oversight, which does not mean that it does not contribute to mobility enhancement. It does, however, require a different attitude on the part of the government: facilitating rather than directing. I see increasingly more initiatives that acknowledge this trend. A prime example is the Traffic Innovation Centre set up by Rijkswaterstaat in Helmond.

In order to really make headway, we must let go of the – costly! – illusion that traffic is still fully manageable. Furthermore, it is my opinion that we need to prevent the construction of variable regulations and lanes, disentangled roads, roadside systems, and other visual pollutants. In my view, smart mobility calls for austerity in the infrastructure, which has the fantastic side effect of increasing the appeal of the surrounding area.’

Carlo van de Weijer
Director, Strategic Area of Smart Mobility – Eindhoven University of Technology

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Increasingly more innovative solutions are developed without any government control
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1 Smart Mobility is taking off

Developments in the field of smart mobility are occurring rapidly, and provide many opportunities in both the short and long term, for example, the improvement of traffic flow and traffic safety, as well as the possibility of having vehicles operate more economically and cleaner. In a country with a high-quality infrastructure that is also complex and heavily used, we are forced to think carefully about smart solutions for mobility. The Netherlands wants to make the most of the opportunities in this field. It has therefore profiled itself internationally as a country open to innovations in the field of smart mobility. The Netherlands is facilitating and promoting these developments so that Dutch businesses can capitalise on the economic opportunities they provide.

In the past, smart mobility was a field that was primarily driven by (new) technology. Today, the step towards the user, revenue models and social effects is becoming increasingly important. Innovations such as self-driving cars and truck platoons are expected to have a large social impact in the future. By then we will be able to organise and spend our travel time differently. Senior citizens and people with disabilities will have access to greater and better mobility. And if cars are able to park themselves, space will be used differently in the city. New, flexible mobility concepts (*mobility as a service*) focus on providing service in the areas of traffic and transport, rather than on the product (the car).

Many driving forces and initiators behind traffic and transport innovations are on the move. Various parties and organisations, both public and private, are taking valuable steps towards innovation. The role of the Internet and telecom sectors is also becoming increasingly visible, in addition to the role of automotive parties and road maintenance authorities.

How much time it will take before these promising innovations in the field of smart mobility become commonplace cannot be predicted precisely. A number of uncertainties will have to be elaborated further in the future. Among them is the collaboration that is necessary between government, (private) parties and knowledge institutes with respect to necessary smart mobility, automotive and telecom applications, and their acceptance by (road) users.

In order to move forward, we need to identify and acknowledge these uncertainties. We also need to be transparent in our collaboration with the many parties active in the field of smart mobility. The Ministry of Infrastructure and the Environment faces the challenge of setting down a future-proof policy. This is not a one-time task; it is a continual process. Many parties are active in the field of smart mobility. This brochure presents the activities within the area of smart mobility that the Ministry of Infrastructure and the Environment will be developing in the coming period on the basis of three themes:

- Legislation and regulations
- Infrastructure
- Collaboration

Ahold: Truck platooning is an important step in supermarket logistics

Ahold Transport directs the transport activities for the Albert Heijn, Etos, and Gall&Gall chains. A key task in this respect is exploring solutions, together with transport companies and their suppliers, that further our mission of conducting the transport activities as quietly, cleanly, safely, economically, and efficiently as possible. Smart mobility, and especially truck platooning, can contribute to achieving this goal.

Of course, we do not just look for solutions. We also want to field-test and implement them. That is why Ahold Transport was already involved in the first truck platooning demonstration on Dutch public roads in 2015. Subsequently, we gave a collective presentation at Scania's in Zwolle, together with Peter Appel Transport, outlining the reasons why we, as a shipper-transporter combination, support platooning. With respect to supermarket logistics, truck platooning, provided that we can get it off the ground on a massive scale, will enhance traffic safety and traffic flows. Factors that are in everyone's best interest, obviously. In addition, it would improve efficiency in logistics operations. Less delay on the road means more reliable planning, thus saving valuable time. And finally, platooning also generates fuel savings.

Following on from our participation in the Zwolle demo and the opportunities we have identified, we have also unofficially joined the European Truck Platooning Challenge in April 2016: a worldwide first, initiated by the Netherlands, involving six European truck manufacturers – DAF Trucks, Daimler Trucks, Iveco, MAN Truck&Bus, Scania, and the Volvo Group – platooning on public roads through six European countries. After this highly successful field-test we have indicated that we were ready to participate in follow-up pilot projects.

The Truck Platooning Challenge has given considerable impetus to the application of the platooning concept. Governments, truck manufacturers, transporters, shippers, knowledge institutes, and NGOs have joined forces throughout the chain. Across national borders. This marks a huge step forward. It is important now that we continue these efforts and ensure that the Challenge will not go down in history as an "event" but rather as the starting point for the introduction of truck platoons on public roads.

As far as Ahold Transport is concerned, this would still require a few more measures. Multi-brand platooning must become a possibility before long. We also need to work on societal acceptance. And for the transport sector itself, it is important to know how trucks can be linked to one another in a platoon. Large-scale platooning in Europe requires mutual data exchange among the various actors, and harmonisation of regulations across Europe. Chain partners must collaborate on standardising regulations and procedures on the basis of many more test situations. Harmonisation of legislation and regulations is paramount. In order to accomplish this, we will also need to develop the "monitoring and scheduling" system in more detail. Ahold Transport has already taken the lead in this respect, albeit on a modest scale. Together with Simacan, a specialist in making spatial data accessible, we have constructed a Control Tower to monitor our transport operations involving 23 transporters and their different transport management and onboard computer systems. This Control Tower is a neutral platform, serving as a hub to connect as much relevant – local – traffic data as possible. This enables us to monitor and direct traffic movements. We have also used the tower to analyse both the Zwolle trial and the Truck Platooning Challenge.



Through the Beter Benutten programme (aimed at optimising the use of infrastructure), the Ministry of Infrastructure and the Environment is also involved with the Simacan Control Tower. It is a good thing for various parties to liaise and encourage one another in developing innovative solutions. Ahold Transport hopes that the government will continue to be involved for the time being, through the Ministry of Infrastructure and the Environment, and its executive branch Rijkswaterstaat. It is simply too early to leave the development of truck platooning up to the private sector.'

Peter Leegstraten

Senior Consultant Transport Ahold transport

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"Harmonisation of legislation and regulations is paramount"
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2 Legislation and Regulations

Proper regulation is needed

Self-driving vehicles are characterised by the fact that, rather than the driver, it is the vehicle itself that carries out various driving tasks. However, this cannot be implemented in practice just like that. If we want vehicles to actually take over (some tasks of) driving from the driver, legislation and regulations will first have to be amended at the national and international levels. By creating (legal) room to experiment in order to provide space for trial projects to be conducted, we can determine what adjustments to laws are necessary. When it comes to a self-driving car, traffic safety is vitally important. Yet privacy, cyber security, and liability should also be regulated in a future-proof manner.

The regulations should not only cover individual cases, but also accommodate increasing numbers of innovative experiments involving self-driving vehicles in the future. In addition to the creation of this so-called “experimental space” (within the boundaries of the law) in the Netherlands, the coordination of rules is also necessary at the European level so that vehicles can cross borders freely.

Activities in legislation and regulations

In the area of legislation and regulations, the following steps are currently being taken:

2.1 Testing on Public Roads

The first step has been taken with the revision of the Decree on granting exemptions with respect to the transport of oversize or overweight loads (“Besluit ontheffingverlening exceptioneel vervoer”)¹ that took effect on 1 July 2015.

This Order in Council makes large-scale trials on public roads in the Netherlands possible.

- Twenty-seven experiments have since been conducted on the public roads in different parts of the Netherlands. New trials (real-life cases) have already been scheduled. This provides valuable knowledge and experience to enable us to further develop the results achieved further and to assess whether there is reason to revise the regulations. The line of approach used is to eventually revise the legislation and regulations in such a manner as to permanently allow automated driving tasks to be performed on our road network. Large-scale trials on public roads also enable car manufacturers to study how their systems work on public roads, e.g., in relation to other road users.
- A good example of trials conducted on public roads is the WEpod² project, an initiative of the province of Gelderland. In the project, experiments are conducted involving a self-driving vehicle without a regular steering wheel and pedals. It's a world first. The ultimate goal of the provincial government is to conduct trials in which the fulltime driver is not sitting inside the vehicle, but rather is stationed in a control room or is present as a steward in the vehicle (and sometimes functions as the driver). In addition to the technical challenges that this involves, existing regulations also present obstacles. Certain rules are based on the assumption that there is a driver in the vehicle. For example, the current law states that “the driver is forbidden to leave the location of the accident” and there are rules pertaining to showing your driving licence. This calls for more room to experiment. Several examples are presented below.

¹ Parliamentary documents II 2014/2015, 31305, no. 212

² A people mover that drives between Wageningen and Ede

2.2 Experimental Law

Under the Decree on granting exemptions with respect to the transport of oversize or overweight loads (“Besluit ontheffingverlening exceptioneel vervoer”), vehicles that are equipped with automated systems and with which researchers want to conduct experiments on public roads may be granted an exemption from certain technical requirements. This exemption currently does not apply to rules that pertain to the driver and traffic behaviour, as mentioned in the Road Traffic Act (Wegenverkeerswet 1994) or in other laws.

- In order to ensure that we continue to provide optimal testing possibilities in the Netherlands and continue to anticipate rapid developments surrounding self-driving vehicles, the Ministry of Infrastructure and the Environment is preparing an experimental law that expands current possibilities for granting exemptions. This will also make it possible to conduct experiments with a driver outside the vehicle (such as a WEpod driver operating a vehicle remotely from a control room). The Internet consultation for this bill was completed in the summer of 2016. It is expected that the bill will be sent to Parliament in early 2017.
- Based on new trials and developments, we will assess whether and, if so, what other adjustments are required to facilitate the development of large-scale trials on public roads.

2.3 Declaration of Amsterdam – European Coordination

The Netherlands is not the only country working on establishing rules that make the further development of self-driving vehicles on public roads possible. We will need to coordinate regulations and vehicle systems throughout Europe in order to prevent self-driving cars from needing a new update at every international border in the future.

- To enable the smooth introduction of self-driving vehicles in Europe, the Netherlands has initiated the *Declaration of Amsterdam on connected and automated driving*.³ During the Informal Transport

Council held in Amsterdam on 14 April 2016, European transport ministers embraced this declaration and thus pledged their support for the realisation of all forms of self-driving vehicles. The common ambition of the EU member states is to be ready in 2019 for the further roll-out of self-driving vehicles that can communicate with one another and with the infrastructure. It has been agreed that the EU member states will jointly remove obstacles for automated transport. They will coordinate national rules for traffic and transport, and launch a coordinated effort focused on digital communication to enable cars throughout Europe to “talk” to each other and to the road infrastructure. Another focal point will be cross-border trials that demonstrate how the different countries can harmonise their regulations. Based on this type of practical experience, the right steps can then be taken to support further development. The EU member states and the European Commission will also work together to tackle issues surrounding cyber security, privacy, liability, and data protection in relation to self-driving vehicles.

- To promote cross-border cooperation, the Netherlands took the initiative of conducting the world’s first trial involving truck platoons travelling over national borders on public roads. Six European truck manufacturers (DAF Trucks, Daimler Trucks, Iveco, MAN Truck & Bus, Scania, and the Volvo Group) drove – via different routes – through six EU member states to the Port of Rotterdam in the Netherlands. This test revealed that the procedures for obtaining permission to drive trucks in platoon formation differ from one country to the next. At present, a truck manufacturer must submit an application in each country he wishes to drive through. In addition, the respective national laws diverge widely from each other on some points. For example, the values used to determine the minimum driving distance between the vehicles in a platoon differ from country to country. Some countries stipulate a certain distance in metres. But in Dutch regulations, for instance, the driver must be able to bring the vehicle to a standstill within the distance over which he can survey the road and over which the road is clear. To implement the *Declaration of Amsterdam*, therefore, attention will be given to harmonising these types of national rules.

³ <https://english.eu2016.nl/binaries/eu2016-en/documents/publications/2016/04/14/declaration-of-amsterdam/2016-04-08-declaration-of-amsterdam-final-format-3.pdf>



2.4 Vienna Convention

At the international level, the Vienna Convention on Road Signs and Signals is pertinent to self-driving vehicles. The Netherlands actively takes part in international associations such as the United Nations Economic Commission for Europe (UN-ECE). In this body, any necessary interpretation or further change to the Vienna Convention is discussed.

- The initial steps have now been taken. At the start of 2016, an amendment of the Vienna Convention took effect. This adaptation makes it possible to permit new, non-regulated automated systems in vehicles, as long as there is a driver that can intervene or switch the system off at any time. Which additional changes in the Vienna Convention might be necessary is currently being considered. The Netherlands is taking an active role in this process.
- An informal workgroup co-chaired by the Netherlands is currently conducting consultations regarding fully self-driving cars – for which no driver is required – and the relationship with technical vehicle requirements.

The final goal of all proposed changes is to make vehicles increasingly able to perform the driving task independently and safely.

2.5 Other Legal Aspects

In order to introduce self-driving vehicles safely to our public roads, the following legal aspects must be carefully examined and worked out.

a. Liability and Insurability

In view of the fact that the technology is still fully under development, it is still too early to make statements about the necessity of revising the law governing liability. The current liability law is satisfactory for now. In addition, in the testing procedure, before the exemption is granted, the applicant for exemption must show the RDW (Department of Road Transport) that he is sufficiently insured for any damages.

b. Privacy and Control over Data

(Self-driving) vehicles are expected to communicate increasingly with other vehicles and with the road infrastructure. The Netherlands is fully committed to working out the conditions for the sound use and reuse of a wide range of data for smart vehicles. With the Declaration of Amsterdam, a positive step



has been taken towards structural collaboration at the European level. Increasing communication between vehicles could require additional rules that:

1. guarantee oversight of compliance with the privacy rules;
2. guarantee data(re)use for consumers and companies.

If such is the case, it would call for further research and an approach that develops in conjunction with the technology and practice.

Minister Schultz of Infrastructure and the Environment indicated to the House of Representatives at the start of 2016⁴ that she supports giving motorists influence over the collection and use of personal data that pertains to them and that they must therefore give informed consent to the (re)use of their personal data. Privacy will also be examined in light of the new “EU General Data Protection Regulation”⁵ that will take effect on 25 May 2018.

⁴ Letter to Parliament, Appendix to Proceedings (Kamerbrief, Aansluiting Handelingen) II 2015/16, no. 1230

⁵ EU Regulation 2016/679

Large-scale testing has put the Netherlands on the map internationally

'An important topic in the province of Noord-Brabant is the future of mobility and its impact on, for example, residents and road users. Societal developments in the automotive, IT and telecom sectors are advancing at a terrific pace, and offer opportunities to accelerate technological progress as well. Capitalising on such opportunities will enable us to achieve smarter, faster, cleaner and safer mobility.'

The Netherlands is taking the lead when it comes to smart mobility solutions. We have a wonderful business climate here, with ample scope for testing mobility innovations, in order to continue their development. It is for good reason that we are developing an extensive testing environment here, which in the near future will enable large-scale field tests based on international standards and protocols. To this end, we are collaborating closely with the Traffic Innovation Centre and the Zuid-Nederland Traffic Centre: two examples of the facilities that we have at our disposal here in Brabant. This also makes it attractive to international parties to conduct practical research in the Netherlands, into, for example, the use of Intelligent Transport Systems (ITS). This is extremely important, because we are working towards intelligent systems that are interchangeable and supra-national. Once our efforts bear fruit, this will create an international market for new mobility service. Ultimately, that is where gains can be made.

The Netherlands aims to contribute to achieving this ambition, at the national level but also at the European level. For that reason, the Brabant testing environment is open to both national and international parties. We are examining solutions that will improve the accessibility of the region, but also with a view to applying the solutions we find on a larger scale as well: somewhere in the Netherlands. Or in Europe.

In concrete terms, our testing environment comprises 70 km of state, provincial and local roads, from Tilburg via Eindhoven to Helmond, with a range of facilities enabling us to test new applications, technologies, forms of collaboration, and equipment in actual traffic situations. To test applications, we use two types of fast data communication: WiFi-P for short-range communication and 4G/LTE for long-range communication. The added value for suppliers is that they can test their own service in a real-life traffic situation. We expect that our testing environment will frequently be used by private parties, which makes it the pre-eminent location for researchers to monitor and evaluate, and to gather and share knowledge.

The importance of joint testing and evaluating, together with various partners, is demonstrated by the Spookfiles A58 [A58 phantom traffic jams] project, in which motorists receive individual driving recommendations on their smartphone, in order to enable them to better anticipate traffic situations. This project has shown that setting down clear agreements, and developing univocal standards is essential. Joint testing serves as a major catalyst: the required procedures and protocols strengthen collaboration and generate practicable results. And this, in turn, enables us to take further steps in the development of smart mobility.

New in this form of collaboration is that the government, the business community, and knowledge institutes together assume responsibility for good accessibility. We, as governments, also acknowledge that joining forces in looking for possibilities and capitalising on opportunities enhances the efforts we expend. We have adopted this approach in, for example, the SmartwayZ.NL programme, the innovative mobility programme being implemented in the southern part of the Netherlands, in which we are exploring optimum solutions, together with all these parties, for keeping the region accessible. This may involve tackling hard infrastructure, but also joint investments in the application of smart mobility solutions. Our main goal is to find solutions that work in actual practice. And if something works, we can copy the solutions and the associated procedures, preconditions, and standards to other cities, regions, or roads. What works in Brabant, will work for the Netherlands next. And, therefore, also for Europe!

Christophe van der Maat

Member of the Provincial Executive of Noord-Brabant, Mobility and Collaboration



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“What works in Brabant, will work for the Netherlands next. And, therefore, also for Europe.”
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Daimler has selected the Netherlands for Future Bus world first

'Daimler is an innovation leader in the field of automated driving. In 2013, the Mercedes-Benz S500 was the first passenger car to autonomously drive a route. In 2014, we presented the Future Truck 2025, the first automated truck to drive on a motorway, the A14 near Magdeburg in Germany. Another year later, in 2015, Daimler showed that trucks can also drive in a connected manner, in platoons. A natural subsequent step for us was to apply automated driving to buses. This is how the Future Bus innovation project has come about. Featuring CityPilot, a combination of intelligent systems including radar, cameras, and a satellite navigation system used in Mercedes-Benz coaches, that have been adapted for use in city traffic. The revolutionary, intelligent connectivity of the cameras and sensors provides an accurate image of the environment and the exact position of the bus.'

As a matter of fact, this project has evolved beyond the mere application of new technology. Sure, it was our intention to use the Future Bus to demonstrate automated driving. At the same time, however, the Future Bus equipped with CityPilot was a design study. What could the bus of the future look like? With this project, Daimler Buses also intends to launch a debate on this topic.

To us, the Netherlands was the ideal location for introducing the Future Bus. New legislation allows trials on public roads. Furthermore, the RNet 300 route and infrastructure – between the Schiphol Handelskade and Haarlem-Schalkwijk stops – offer a great deal of testing options for our showcase, such as Bus Rapid Transit (BRT), raised bus stops, and active traffic management. Moreover, this 20 km stretch features quite a number of exciting challenges: tunnels, intersections, and sharp turns.

So the Future Bus saw its world première on 18 July 2016 on this stretch of road in the Netherlands. A successful première it was, because here we have proved – for the first time – that our bus can drive, stop, and communicate in a fully automated manner amid regular (bus) traffic. The event was a great success. Not just because of all the media attention, but also because Daimler has learned a great deal from it too. We will now use that information for further development. We may possibly introduce components of the City Pilot system in our city buses in the very near future.

Of course, collaboration is vital in an innovation project with this much impact. You are putting an automated bus on the public road. In the field of traffic signal pre-emption, for example, Daimler has collaborated closely with the Dutch central government, the province of Noord-Holland, the municipalities of Haarlem and Haarlemmermeer, and Vialis, an experienced consultancy and design agency for intelligent mobility systems. Such a public-private construct took some getting used to. If I could offer a tip for subsequent collaboration, I would say that a tight, project-based approach with well-defined responsibilities for the various parties could further the process and the collaboration. However, our Future Bus project has eventually evolved into a highly successful collaboration. Our experience of the efforts expended by the Ministry of Infrastructure and the Environment, and the Department of Motor Vehicles has been positive. The staff were committed and provided pro-active input. This is essential if you intend to get innovative projects off the ground together. Don't just think along your own lines, participate in the collective thinking process.'

Mark Westendorp

Key Accountmanager bij Daimler Buses | Evous Nederland B.V.



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The route and infrastructure between Schiphol and Haarlem offer a great deal of testing options and challenges for smart mobility showcases
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3 Infrastructure

Applicable on the road and in traffic

The realisation of a future-proof infrastructure while taking self-driving vehicles into consideration has two dimensions:

1. the introduction of self-driving vehicles and truck platoons has an effect on the *physical* infrastructure (design and construction);
2. the introduction of smart mobility has an effect on the *digital* infrastructure (traffic management).

Obviously, the two dimensions – road design and construction, on the one hand, and traffic

management, on the other – are not developed in isolation. Their development is considered in an inter-connected manner.

The following actions are currently underway with respect to the (physical and digital) infrastructure:

3.1 Physical Infrastructure

On several lists the Netherlands is ranked among the top 3 countries in the world with the “best infrastructure”. This makes the Netherlands attractive as a testing country for self-driving vehicles. There are two processes currently underway to examine what is necessary to make the infrastructure suitable for self-driving vehicles.



- The CROW⁶ – the Dutch technology centre for traffic, transport and infrastructure – is conducting an exploratory study of the impact that self-driving vehicles have on the design of the road infrastructure. In this study, the CROW is scrutinising the entire road network in the Netherlands. With respect to the different steps in the development towards fully self-driving vehicles, the study will focus on exploring what knowledge exactly is needed and useful from a road design perspective. This will constitute the basis for drafting a development agenda that establishes design guidelines for the future. The exploratory CROW study is expected to be completed at the end of 2016.
- In addition, Rijkswaterstaat – the executive branch of the Ministry of Infrastructure and the Environment – and knowledge institutes are examining how self-driving vehicles will impact road and bridge constructions. Studies are conducted at two different speeds. The real-life cases involving truck platooning, which are currently under development, provide the possibility of exploring research questions during actual field tests. Because research into the effects on physical constructions is complex, a long-term research agenda will also be drafted in collaboration with other road authorities.

3.2 Digital Infrastructure and Traffic Management

Rapid developments in mobile data communication are generating an increasingly larger supply of individual services and support for the driving task of road users. Short-term opportunities primarily involve improved information provision for road users. In the longer run, this data communication will also be suitable for automated (self-driving) applications. In the years to come, the reality on the road will increasingly be characterised by conventional vehicles operating alongside smart vehicles in traffic. The actual use of new information services and driver willingness to utilise digital support in the task of driving will determine the pace at which new mobility applications will become a part of daily practice. In addition to providing opportunities for traffic safety, smooth traffic flow and travelling comfort, these developments also offer possibilities for smarter traffic management, control and maintenance.

⁶ <http://www.crow.nl>

a. Data Access

The general expectation is that data traffic will grow exponentially over the period ahead, in the mobility sector as well. For mobility applications this means that there will be an increasing volume of private demand for data from public processes that are not yet (fully) digitalised. This involves matters such as public frameworks and preconditions, orders and prohibitions, event schedules, road works, etc. Various sectors are working on providing access to public data that is relevant to smart mobility.

- Within the Beter Benutten⁷ programme (action plan on optimising infrastructure use), Rijkswaterstaat is working together with regional governments and road authorities to provide access to the most essential public data for traffic information and traffic management services, the so-called data top 8.

b. Communication Technology

The development of self-driving vehicles requires that such vehicles are able to communicate with one another and with their surroundings. For this type of communication – the transport of data – between vehicles and between vehicles and the roadside, there are a range of possibilities in different phases of development. These new ways of transporting data call for a hybrid approach.

In the short term, considerable results can be achieved via existing telecom networks. But there are also cooperative self-driving applications on the horizon that set higher requirements for data communication than current telecom networks can handle. New generation telecom technology (5G) and DSRC⁸, provides these possibilities via ad hoc communication. But the large-scale application of this development is still far off, in part because this requires international agreement mainly in the areas of privacy and security.

⁷ <http://www.beterbenutten.nl/ITS>

⁸ Dedicated Short Range Communications (DSRC) is a protocol for wireless communication over short to medium range distances that is specially designed for use in traffic. DSRC makes communication possible between a vehicle and a road infrastructure. Currently, DSRC is used in Europe primarily for charging tolls.



The efforts of the Ministry of Infrastructure and the Environment are currently focused on bringing parties together to create a chain that develops services and applications for road users. The Ministry thus intends to gain knowledge and experience. Questions that must be answered in the years ahead are:

1. In what way will information be transmitted from the surroundings to the vehicle (4G/5G or DSRC)?
2. What (rapid) communication structure is needed along the roadside to achieve this (wireless or fibre optic)?
3. What (pre)conditions must be met for large-scale application (in terms of cost-effectiveness, scalability, the pace of introduction to the market, the protection of privacy, the robustness of security)?
4. What traffic effects will be achieved in practice?

- In the Beter Benutten (Optimising Use) programme, the central government, private parties and regional governments are working together on the large-scale application of new services via telecom networks.
- In the context of the Beter Benutten (Optimising Use) programme, the central government and the region of Brabant are collaborating on a

hybrid test bed for testing new services based on both DSRC applications and services, and on telecom-based technologies and services. The tests are conducted in close association with the international C-ITS corridor of Rotterdam-Frankfurt-Vienna.

- In the Amsterdam Practical Trial (*Praktijkproef Amsterdam*)⁹, the central government is working with the region of Amsterdam and private parties on the development of in-car services at events for new forms of (private) traffic management.

c. Transition

Different forms of automated driving and increasing individual services focused on travel and route information have prompted Rijkswaterstaat to look into the possibilities for the controlled and safe phasing out of current systems in combination with the introduction of the required *new systems*. Different timeframes are considered for the various functions of these systems, focused on traffic safety, smooth traffic flow, air quality, and noise. Consideration is also being given to the extent to which new services are being offered and how many people actually use these new services.

⁹ <http://www.praktijkproefamsterdam.nl>

Collecting traffic information

The smart combination of innovative and existing data collections can lead to greater insight and improved cost-effectiveness. The need to deploy classic instruments such as loops is decreasing as a result.

- Within the Amsterdam Practical Trial (Praktijkproef Amsterdam), the Traffic Innovation Centre (Innovatiecentrale), the Beter Benutten programme, and the National Data Warehouse for Traffic Information (NDW), the Ministry of Infrastructure and the Environment is working with public and private partners on smart combinations of current and innovative data collection.

Smart navigation

Increasingly smarter navigation systems and apps provide an alternative to information that is now provided via DRIPs (Dynamic Route Information Panels).

- The Ministry of Infrastructure and the Environment is promoting the use of information services, apps and navigation systems via the Beter Benutten and Praktijkproef Amsterdam programmes.
- In the planned phasing out of DRIPs, Rijkswaterstaat is taking current administrative agreements into consideration and the Ministry is assessing the locations at which DRIPs will continue to be needed during times of crisis and large-scale disasters for road authorities to be able to perform their public duties.

Traffic safety

Various forms of automated driving¹⁰ and services that support the driving task of drivers¹¹ can improve traffic safety. Over time, they can (partially) replace certain functionalities and roadside systems, provided they are used by sufficient numbers. Current (roadside) systems will of course continue to be used until in-car services at least match the current safety level. The Ministry of Infrastructure and the Environment is continually monitoring this development.

- The Ministry of Infrastructure and the Environment promotes services that support the

driving task of drivers in the Beter Benutten Spookfiles¹⁰ and Talking Traffic (C-ITS) projects, and within the Cooperative C-ITS corridor.

- The Department of Road Transport (RDW) conducts type approval that is necessary before services such as CACC (Cooperative Adaptive Cruise Control) can be introduced to roads in the Netherlands.

Signs

Any phasing out of signs that display orders and prohibitions lies farther in the future because this information must reach every road user. The Ministry of Infrastructure and the Environment is working on bringing this type of information in-car, supplementary to existing signage, to provide extra support to the road user.

- Since 2013, road authorities have been required to publish their traffic decrees in digital form via the Government Gazette (Staatscourant).
- The Talking Traffic (C-ITS) project set up in the context of the Beter Benutten programme encourages service providers to offer information about driving orders and prohibitions to road users in-car.

3.3 Scheduling and Replacement

The developments outlined above are reflected in various infrastructure projects. The Ministry of Infrastructure and the Environment is promoting the application of (sustainable) innovations not only in MIRT construction projects (MIRT = multi-year investment programmes), but also in the large-scale replacement and renovation of existing infrastructure. Standard, conventional technology is therefore no longer prescribed. The Ministry is also expressly involving smart mobility parties in the National Market and Capacity Analyses (NMCA). In the southern part of the Netherlands, the Ministry of Infrastructure and the Environment and regional authorities have chosen to adopt a broader based approach in addressing the accessibility problem. Smart mobility is an important pillar in this approach. It is first assessed whether solutions can be found in the area of smart mobility, before solutions are sought in concrete and asphalt. The experiences in the southern Netherlands will serve as the basis for assessing whether a similar innovative approach will be appropriate to address accessibility issues in other areas.¹²

¹⁰ Such as adaptive cruise control and automatic emergency brake.

¹¹ For example, location-based speed recommendations that prevent "Phantom" traffic jams, such as in the eponymous Beter Benutten project, see www.spookfiles.nl

¹² <http://www.smartwayz.nl>

4 Collaboration

In close contact with our partners

The increasingly far-reaching developments and applications in smart mobility (Intelligent Transport Systems) and smart mobility itself require new forms of collaboration, both on the public side and with respect to the division of roles between public and private parties. In a continually changing reality, governments should be able to continue fulfilling their public duties and responsibilities. At the same time, businesses should be able to capitalise on opportunities to innovate.

In the area of collaboration, the Ministry of Infrastructure and the Environment has taken the following actions:

- in line with the public-private direction set in the *Routekaart Beter Geïnformeerd op Weg* (a road map for better information in transit), the **Connecting Mobility Programme** was set up to continue this work method and to help the parties involved to make the necessary transition. The Programme is also in place to strengthen the build-up and sharing of knowledge;
- the **Beter Benutten programme** (action plan on optimising infrastructure use) involves a structured collaboration with 12 regions, including governance with respect to the aggregate of projects, approaches and work methods;



- the C-ITS efforts in the *Beter Benutten* programme are being substantiated in a **procedure for Innovative Partnership**: content and collaboration are developed in close, mutual consultation;
- regional accessibility issues are tackled in close consultation with regional governments, private parties and institutions of knowledge, such as in *Bereikbaarheid Zuid Nederland* (Accessibility of the Southern Netherlands) and *Bereikbaarheid Amsterdam* (Accessibility of Amsterdam);
- Rijkswaterstaat – the executive branch of the Ministry of Infrastructure and the Environment – fully supports the needs of private service providers in the Traffic Innovation Centre (*Innovatiecentrale*);
- the **European Truck Platooning Challenge**¹³ was established by Rijkswaterstaat in unified collaboration with truck manufacturers, logistics service providers and institutions of knowledge;
- the Amsterdam Practical Trial (**Praktijkproef Amsterdam**), in which the Ministry of Infrastructure and the Environment and regional partners collaborate and facilitate the private sector in the design and testing of new traffic management concepts;
- In the creation and implementation of the **Declaration of Amsterdam**, the Ministry of Infrastructure and the Environment is working closely with various bodies of the European Commission (DG Move, Grow, Research and Connect), other EU member states and industry.

For the establishment of general conditions and to guide the Netherlands' contribution in the international circuit, **round tables for Smart Mobility** have been set up. At these round tables, governments and private parties discuss different conditions¹⁴, such as interoperability, security, and privacy. These are only a few examples of public-private collaboration in which public parties work together, reach agreements and take on different innovative roles, such as a co-investor, a catalyst, a director, broker or partner. Public parties thus consciously choose not to enter into a traditional “client-contractor” relationship, with which governments and businesses are naturally very familiar.

The Ministry of Infrastructure and the Environment values the collaboration between the Central Government and regional and local governments very highly: only in this way can we offer shared, consistent preconditions – in the areas of privacy, role division, and technology – to private development and investments. The users that ultimately benefit from these investments are, after all, not limited to a city or region, while the business community is focused on a national or predominantly even on an international market.

This innovation in collaboration is creating new opportunities and producing considerable new knowledge and insights. At the same time, new uncertainties have arisen as a result. This is inherent to the typical Dutch approach of learning by doing. It is an approach in which we do not know all the answers in advance, but rather deal with the uncertainties that do arise by studying them and working them out. This produces results.

¹³ <https://www.eutruckplatooning.com>

¹⁴ <http://rondetafels.ditcm.eu>

Dit is een uitgave van het

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