Experiments on autonomous and automated driving: an overview 2015
• Public Affairs ANWB
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April 2015
**Experiments on autonomous and automated driving: an overview 2015**

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Introduction

Autonomous and automated driving will be happening in the near future. Today, manufacturers like Audi, Mercedes and Volvo are developing and testing new vehicles for future use. And new players like Google and Apple have also arrived on the scene. Governments need to be involved in these developments because testing on the road means changing existing legislation. In some countries governments are prepared to cooperate with manufacturers and developers to test these new services. The Dutch government is also willing to allow tests with connected, autonomous and automated vehicles. The Netherlands has crowded roads - which create good circumstances to conduct road tests - and a lot of technical institutions and companies that can support these tests. Therefore the Netherlands is one of the countries that want to have a leading role in the development of these new technologies; it also believes it can offer a premium location for such tests. At the same time, experiments in other countries are also contributing to these developments.

This was the reason for ANWB to collect information about all such activities and to create an overview of what activities are happening all around the world. What tests have already been conducted in other countries and how can the Netherlands be of additional value? The collected information in this report has been combined with information provided by the clubs and collected from websites and reports like ‘The pathway to driverless cars’ by the UK Department for Transport and VRA’s ‘Regulatory needs and solutions for deployment of vehicle and road automation’.

One of the important differences among experimenting countries is their involvement in the conventions of Vienna and Geneva. A lot of countries are signatories to the Vienna Convention on Road Traffic, which requires that ‘every moving vehicle or combination of vehicles shall have a driver’ and that ‘every driver shall at all times, be able to control his vehicle’. Some countries have taken this to be a barrier to the introduction of automated vehicles. The Convention is in the process of being amended to allow a car to drive itself so long as the system can be overridden or switched off by the driver, though it has been argued that a further change is needed to allow automated vehicles on the roads in many countries.

It is interesting to note that the Vienna Convention is not considered an obstacle in the UK and China. The UK has signed but not ratified the Convention, and testing is consistent with proper driver control. China has not ratified the convention either.

Summarize

Many countries are active in the field of autonomous vehicles, but the level and intensity of their activities vary. We hope that this inventory will provide you with a good impression of the different global initiatives.

The developments in automated and autonomous driving will, of course, continue. This document was finalized at the beginning of April 2015. To keep up with the latest developments worldwide, we suggest that you check the website: www.driverless-future.com.

Public Affairs ANWB
ITS team
**Netherlands**

**In general**

In June 2014 the Dutch government announced its intention to allow large-scale testing of self-driving vehicles on Dutch roads, but acknowledged that, in order to make this possible, existing legislation needed to be amended. The Netherlands wants to position itself as an international leader and testing country.

The Dutch sector is already involved in small-scale trials on the main road network, such as the Dutch Integrated Test Site on Cooperative Mobility (DITCM) in Helmond. Over the next four years, they will carry out projects with the market, building upon the existing innovative projects.

In January 2015 a proposal to extend exemption rules to allow the large-scale testing of self-driving cars and trucks was approved. A spokesperson stated that testing would start in summer 2015 once parliament approved the necessary legislative changes.

The Dutch also plan to initiate amendments to international regulations and have launched a study into potential issues such as liability, driving skills requirements, traffic data and the possible impact on infrastructure. The Dutch will occupy the EU presidency in 2016 and have stated that they might then further develop these issues.

In February 2015 Scania held the first partially autonomous self-driving truck tests on Dutch public roads. The Dutch government is currently backing a plan to market automated trucks to deliver goods from Rotterdam to other cities in the Netherlands within 5 years. They claim benefits include reduced road space requirements, improved safety and environmental impacts.

RDW, a public authority in the mobility chain appointed by the Ministry of Infrastructure, has other autonomous driving test applicants. The Netherlands Organization for Applied Scientific Research (TNO), the Dutch truck manufacturer DAF, the Port of Rotterdam, the Province of Gelderland and the University of Wageningen all partnered together and tested self-propelled vehicles in the vicinity of Wageningen early this year, a Twente University release stated.

On behalf of the minister of the Ministry of Infrastructure, RDW has published an exemption process for large-scale testing on public roads. It consists of four steps:

1. **Intake**
   - ‘Mission analysis’
   - Functional description
   - Comprehensive risk analysis
   - EMC

2. **Desk Research**
   - In consultation with the applicant

3. **Testing on a closed proving ground**
   - Physical inspection of the vehicle(s)
   - ‘Happy flow’ testing
   - Stress testing
4. Limited admittance with an exemption
   - With requirements and conditions, such as insurance, test times, test location, duration, monitoring and logging

 ● **In general**

 ● **Scania**

 Swedish heavy-truck manufacturer Scania held the first partially autonomous self-driving truck tests on Dutch public roads on Monday, 9 February 2015. During the test, Scania trucks drove themselves in a convoy. The trucks departed from Scania factories and carried the test out on the A28 motorway in a partnership with Transport en Logistiek Nederland (TLN). The test demonstrated linked driving, in which the trucks are within a fixed distance from each other and linked to other lorries in such a way that when the first truck brakes, the others brake simultaneously.

 ● **Province of Gelderland**

 The province of Gelderland, together with the municipalities of Ede and Wageningen and Wageningen University and Research Centre (WUR), have conceived a plan to realize a system of fully automated vehicles on the public roads between Ede-Wageningen railway station and WUR to transport WUR guests in a way that is representative of a leading innovative region. Commissioned by the province of Gelderland, TU Delft will conduct the WE-pod pilot, which will be operative by May 2016.

 This plan is in line with the province’s policy objective to find alternatives for private car use and regional bus services, considering automated vehicles as an alternative to local public transport. The WE-pods project is taking automated transport at the WUR Campus into account in its ambition to support several policy areas.

 This WE-pods project intends to realize a demonstration project by December 2015 to show the concrete possibilities of automated transport, contribute to the desired Food Valley image and provide a basis for further developing future mobility concepts.

 Where other projects focus mainly on transportation in vehicles with a driver on motorways, WE-pods focuses on automated transportation in driverless vehicles on local public road systems.

 The WE-pods vehicles will have to be able to cope with cyclists, pedestrians and oncoming traffic, as well as cross-signalized intersections. This puts high demands on the detection of other road users and on the strategies that secure safe interactions. During the WE-pod pilot, researchers will systematically study under which conditions safe interactions can be realized and where and which adjustments to the infrastructure are required.

 For the time being and for safety reasons, the vehicles will not be able to exceed a speed of 25 km per hour during this pilot. The vehicles’ speed will be adapted in bends, at side roads, intersections, etc. The route has been selected for its relatively quiet roads with maximum speed limits of 30 or 60 km per hour.
The WE-pod project will use a phased development approach and work towards increasing complexity, functionalities and speed. The project referred to above is only the first step. With the WE-pod pilot, the province of Gelderland wants to pave the road for the long-term development of self-driving vehicle systems.

Source: Province of Gelderland

**DAF/TNO**

On 25 March 2015 and in cooperation with DAF, TNO demonstrated Truck Platooning with two trucks on the N270. This test involved two virtually linked trucks: one driver drove and the other (second) driver had no driving task. This unique demonstration was the start of a series of tests in real traffic on a public road to show that Truck Platooning makes road transport more efficient, more economical, cleaner and safer. The next tests of DAF and TNO are planned for the near future at the Maasvlakte, near Rotterdam.

**DAVI**

The Dutch Automated Vehicle Initiative (DAVI), which develops highly automated vehicles for research and demonstrations on public roads, was initiated by TU Delft, RDW, Connekt and TNO. Their research tries to prove the safety of these vehicles and focuses on human factors in automated driving. DAVI implements automation technology in real cars that can be driven on existing roads in normal traffic.

Source: [http://davi.connekt.nl](http://davi.connekt.nl)

**Role national automobile and touring club**

**ANWB**

ANWB is member of Connekt, an association of ITS parties in the Netherlands. It is also involved in DITCM. Together with TNO, ANWB has worked out a proposal to start a community in which road users can do live tests and exchange experiences. Working with the Ministry of Infrastructure, ANWB is investigating how consumer involvement can be of value.
**United Kingdom**

**In general**

As part of the 2013 National Infrastructure Plan, the government pledged a review of the legislative and regulatory framework to enable the trialling of driverless cars on UK roads. These plans were also announced in the 2013 Autumn Statement. On 30 July 2014, the government also launched a driverless cars competition inviting UK cities to join together with businesses and research organizations and host vehicle trials locally.

On 3 December 2014, as part of the Government’s Autumn Statement, 4 cities were awarded up to £10 million in funding from Innovate UK for testing innovative driverless cars in the real world.

- Greenwich, in south-east London;
- Bristol;
- Coventry and Milton Keynes.

The decision was made public after George Osborne’s Autumn Statement. The chancellor also announced an additional £9m in funding for the work, adding to the £10m that had been awarded in July 2014. The businesses involved will add further funds. The tests will last from between 18 to 36 months and begin on 1 January.

Bristol will host the **Venturer consortium**, which aims to investigate whether driverless cars can reduce congestion and make roads safer. Its members include the insurance group Axa, and much of its focus will be on the public’s reaction to the technical as well as the legal and insurance implications of its introduction.

Greenwich is set to **run the GATEway scheme**. This will be led by the Transport Research Laboratory consultancy and also involves General Motors and the IAM, AA and RAC motoring associations. It plans to carry out tests of automated passenger shuttle vehicles as well as autonomous valet parking for adapted cars. In addition, a self-drive car simulator will make use of a photorealistic 3D model of the area to study how people react to sharing the driving of a vehicle with its computer.

Milton Keynes and Coventry will host the **UK Autodrive programme**. Among other parties, this involves Ford, Jaguar Land Rover and the engineering consultancy Arup and will test both self-drive cars on the road as well as self-driving pods designed for pedestrian areas. Part of this group’s work will be to develop the technologies that will need to be built into roads and the surrounding infrastructure to aid vehicle navigation.

The UK Government published a detailed review of regulations on 11 February 2015, examining the regulatory framework for the safe testing of driverless cars. The main conclusions were

- Driverless vehicles can legally be tested on public roads in the UK today, providing a test driver is present and takes responsibility for the safe operation of the vehicle and that the vehicle can be used compatibly with the road law;

- A Code of Practice will be published in this spring for those wishing to test driverless vehicles on UK roads;

- Review and amend domestic regulations by the summer of 2017 to accommodate driverless vehicle technology;
• Liaise at an international level with an aim to amend international regulations by the end of 2018.

More information can be found on the website: 

Sources: www.bbc.co.uk/news/technology-30316458 and https://interact.innovateuk.org/competition-display-page/-/asset_publisher/RqEt2AKmEBhi/content/introducing-driverless-cars-to-uk-roads?p_p_auth=CjGJE10t

• In detail

• Greenwich

A consortium led by TRL has been selected by Innovate UK to deliver the GATEway project (Greenwich Automated Transport Environment), one of three projects awarded to test ‘driverless’ vehicles in UK urban locations. The £8 million GATEway project will see three trials of different types of zero-emission automated vehicles within an innovative, technology-agnostic testing environment set in the Royal Borough of Greenwich. The project will build upon Greenwich’s reputation as one of the UK’s premier digital hubs and aims to leave the legacy of a driverless vehicle test environment in Greenwich, attracting international manufacturers and associated industries to the UK.

In each of the three trials to be undertaken within the GATEway project, safety will be effectively managed through the careful choice of test environments, vehicle systems and testing protocols and by working closely with the relevant authorities. The purpose of the project is multifaceted. It will demonstrate automated transport systems to the public, industry and media stakeholders in the three planned trials. These will include various public tests of fully automated passenger shuttle transport systems and autonomous valet parking for adapted cars.

In undertaking these tests, objective and subjective feedback on their use will be captured to build a detailed understanding of the extent to which these systems are used, trusted and accepted. This will inform how such systems can integrate into and complement existing multimodal transport infrastructure and provide essential insights into the human factor issues that may be critical for the successful deployment of automated transport systems.

**Milton Keynes and Coventry**
The huge potential of autonomous (self-driving) vehicles has been identified by the Transport Systems Catapult (TSC) as a key growth area, and the LUTZ Pathfinder (autonomous pods) programme marks our first foray into this exciting sector.

Carried out on behalf of the UK Automotive Council and the Department for Business, Innovation and Skills, and sitting within the wider LUTZ (Low-carbon Urban Transport Zone) programme, the LUTZ Pathfinder programme is overseeing a trial of three autonomous pods in Milton Keynes and assessing their feasibility from both a technical and societal point of view.

Currently being built by the Coventry-based firm RDM, the electric-powered two-seater pods will be equipped with sensor and navigation technology initially provided by the University of Oxford's Mobile Robotics Group, but with an open platform capability that will allow other Autonomous Control System suppliers to use the pods for test purposes.

Later this year, the TSC will test the pods in an "urban laboratory" using a footpath route agreed with our partners at Milton Keynes Council. Some of the initial findings from the project will also be fed into the larger-scale Autodrive UK programme, which will trial both footpath- and road-based vehicles in Milton Keynes and Coventry.

Source: [https://ts.catapult.org.uk/lutz](https://ts.catapult.org.uk/lutz)

**Bristol**
The VENTURER consortium has secured funding from Innovate UK to test driverless cars in the Bristol region. This appointment followed Osborne’s Autumn Statement announcement to make the UK a world centre for the testing and development of this new technology.

VENTURER is made up of organizations in the South West that includes Atkins, Bristol City Council, South Gloucestershire Council, AXA, Williams Advanced Engineering, Fusion Processing, Centre for Transport and Society, University of the West of England (UWE Bristol), University of Bristol and Bristol Robotics Laboratory, a collaboration between the University of Bristol and UWE Bristol.

The VENTURER consortium have joined forces to explore the feasibility of driverless cars in the UK, by trialling autonomous vehicles in the Bristol region, investigating the legal and insurance aspects of driverless cars and exploring how the public react to such vehicles.

The novelty of Bristol’s approach is the focus on public-private-citizen partnerships, championing experimental solutions through the deployment of information and communications technology (ICT) and digital technologies in a people-friendly manner.

• **Role national automobile and touring clubs**

**IAM and AA**
The IAM and the AA are involved in the Advisory Group for the GATEway project in Greenwich. As no one knows how transition from driver control to driverless will work and how long it will take, the pilot studies are the best way to build real world experience in each country’s unique road environment.

There is also a report on the future of motoring being undertaken by the Transport Committee in the UK Parliament. It is not sure when the final report will be published. The IAM gave evidence\(^1\) that covers wider issues, but does nevertheless contain some IAM survey figures on driverless cars. It appears that IAM members are sceptical.

• **RAC**
The RAC Foundation (that represents the Royal Automobile Club at FIA Meetings) consists of GATEway project advisory group members. This advisory group will review project documentation and provide insight to ensure that the project meets its objectives and delivers best value for Innovate UK.

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1 House of Commons Transport Committee Inquiry on Motoring of the Future by Neil Greig, Director of Policy and Research, September 2014
Sweden

In general

Initial findings from the Swedish Transport Agency in May 2014 stated that current vehicle legislation, driver’s license rules and liability rules may need amending to permit the testing of vehicles using information systems, which might be considered beyond those cars offering only driver assistance.

Existing vehicle regulations and roadworthiness testing would have to be amended to cover the hardware and software used for automated vehicles. Driver’s licenses could be introduced for those with impairments to license the use of fully automated vehicles only. The study highlighted required improvement to Sweden’s registry of all national and local traffic regulations.

The ‘world’s first full-size safety test track for driverless vehicles’ opened near Gothenburg in August 2014.

In detail

• Lindholmen Science Park

Lindholmen Science Park is leading a national process from the ‘Automated Transport System’. The current main activity is to establish a so-called ‘Strategic Innovation Programme’ through the Swedish Innovation Agency Vinnova. Together with this activity, Lindholmen is also involved in other initiatives, like the “Drive Me” project, initiated by Volvo Cars.

• ‘Drive Me’: Autonomous Driving

In Sweden Volvo Cars will play a leading role in the world’s first large-scale autonomous driving pilot project in which 100 self-driving Volvo cars will use public roads in everyday driving conditions around the Swedish city of Gothenburg.

The groundbreaking project ‘Drive Me – Self-driving cars for sustainable mobility’ is a joint initiative between Volvo Car Group, the Swedish Transport Administration, the Swedish Transport Agency, Lindholmen Science Park and the City of Gothenburg. The ‘Drive Me’ project has been endorsed by the Swedish government. The aim is to pinpoint the societal benefits of autonomous driving and position Sweden and Volvo Cars as leaders in the development of future mobility.

Autonomous vehicles are an integrated part of Volvo Cars’ and the Swedish government’s vision of zero traffic fatalities. This public pilot represents an important step towards this goal for Volvo. It will give an insight into the technological challenges as well as providing valuable feedback from real customers driving on public roads.
The pilot will involve self-driving cars using approximately 50 kilometres of selected roads in and around Gothenburg. These roads are typical commuter arteries and include motorway conditions and frequent queues. The aim is for the car to be able to handle all possible traffic scenarios by itself, including leaving the traffic flow and finding a safe ‘harbour’ if the driver for any reason is unable to regain control.

What makes the ‘Drive Me’ project unique is that it involves all the key players: legislators, transport authorities, a major city, a vehicle manufacturer and real customers.

**Focus areas**
The ‘Drive Me’ project will focus on a number of areas, such as:

- How autonomous vehicles bring societal and economic benefits by improving traffic efficiency, the traffic environment and road safety;
- Infrastructure requirements for autonomous driving;
- Typical traffic situations suitable for autonomous vehicles;
- Customers’ confidence in autonomous vehicles;
- How surrounding drivers interact smoothly with a self-driving car.

The project commenced in 2014 with customer research and technology development, as well as the development of a user interface and cloud functionality. The first cars are expected to be on the roads in Gothenburg by 2017.

In April 2014 Volvo reported that the first test cars were already rolling around the Swedish city of Gothenburg and the sophisticated Autopilot technology was performing well.


**Role national automobile and touring clubs**

**Motormännena/SMVC**
Neither Motormännena nor SMVC is involved in the ‘Drive Me’ pilot.
Italy

In general

In Italy automated activities are not allowed on public roads for safety reasons, though some very special tests may be performed on short road sections after the area has been secured for that purpose. In principle, automated transport systems in Italy may be considered legal if they are certified according to a technical standard that has been developed for rail systems. The only regulatory acts on this matter are the Decree of 1 February 2013 on the diffusion of Intelligent Transport Systems (ITS) - published in the Official Journal of the Italian Republic and signed by the Minister of Transport - and the National Action Plan for ITS approved by Minister Maurizio Lupi on 12 February 2014. The problem is that both the above-mentioned documents deal exclusively with cooperative driving (connected car, vehicular applications), whereas no mention is made of automated driving (meaning driverless cars on public roads).

In detail

In 2010 VISLab, the research group of the University of Parma led by Prof. Alberto Broggi, launched a research and development project that saw an automated van successfully drive from Italy to China through different traffic, weather and road conditions. The van followed a lead vehicle that was also automated but required some input from a human driver and that consisted of a solar-powered self-driving vehicle equipped with an artificial vision system. Technological development has led to the creation of Braive, a prototype that has already circulated through the streets of Parma during some experimental tests.

Other research projects included the testing of both automated cars and buses. One of these projects, PROUD, was carried out in a mix of rural, freeway and urban traffic. It required a police escort at all times and a passenger ready to use the brake pedal in an emergency.

Role national automobile and touring club

ACI

Though currently not directly involved, ACI is closely monitoring these issues.
France

In September 2013, French authorities launched 34 programmes for a new industrial conquest called the 34 plans of the Nouvelle France Industrielle. France pressed for an amendment to the Vienna Convention and, in July 2014, it published its roadmap for automated vehicles. This included proposals such as pilot zones for testing, changes to driver training, R&D projects running to 2018 and the development of regulatory requirements to support testing automated vehicles and their entry to the market. They are currently examining the regulatory issues that may inhibit the testing of automated vehicles. The authorization of experimental testing on roads of partial and highly automated vehicles is targeted for the beginning of 2015.

Driverless cars must improve road safety and allow the driver, in complete safety, a new moment of free or productive time. They should also help:
- to improve traffic flow;
- to develop new flexible public transport services that are adaptable based on the flow;
- to make transport more accessible to people with disabilities, the elderly and the most vulnerable of the public.

It now appears that the first tests on French roads will be launched early this year (perhaps within the first quarter). The government’s objective is to market these driverless cars in 2020 at an affordable price.


France has established the VeDeCom Institute, a public-private initiative focused on sustainable mobility. Their stated aim is to “deliver to the market an affordable autonomous car for all before 2020.”

Source: Automated Vehicles: Strategic Overview by Bishop Consulting for Rijkswaterstaat

- **Role national automobile and touring club**

- **Automobile Club**

For the moment the Automobile Club is not involved in any particular project, but follows all of the developments on the subject since it has a major impact on society (technological barriers, French and European regulatory framework, road safety, etc.).
Germany

In 2012, the Federal Highway Research Institute published a report summarizing the situation with respect to automated vehicles and current German regulations. The report concluded that existing levels of automation are compatible with German regulatory law since the driver has constant availability of control over the vehicle. Highly and fully automated vehicles do not currently comply with the German law.

In November 2013 a round table on automated driving was inaugurated. This round table can be considered as a national platform where all relevant stakeholder groups (Federal Ministries involved, public authorities, industry, insurance companies, user associations, technical inspection, research institutes) are represented. The operational work is done by the working groups ‘Legal Issues’, ‘Driver/Vehicle’ and ‘Research’. The objectives are to build a consensus on the core issues of automated driving, thereby creating basic preconditions to implement highly automated driving. This national platform also acts as an advisory board to the Federal Ministry of Transport and Digital Infrastructure. This ministry is looking at the next steps in the areas of the law, drivers and cars, and research requirements. The round table was due to report first findings at the end of 2014.

Currently each federal state in Germany can grant exemptions from the technical requirements of the German Road Traffic Licensing Regulations. This allows a vehicle to operate autonomously on public roads, provided there is a driver in the driver’s seat who has full legal responsibility for the safe operation of the vehicle. There have been a number of vehicles tested on German roads with varying levels of automation. In January 2015, Germany’s transport minister announced that the A9 autobahn between Munich and Nuremberg would be fitted with technology to allow driverless cars to use the road and communicate with other vehicles and the road infrastructure.

To ADAC’s knowledge there are as yet no plans for major field tests like those in Sweden. Nevertheless, all OEMs and Tier1 are currently carrying out their own tests with test cars on public roads.

Role national automobile and touring club

ADAC

ADAC believes there is a great market potential for automated driving because it enhances driver comfort and productivity. Plus, it is expected to positively affect road safety and the efficiency of road traffic. ADAC promotes user-friendliness and legal certainty and takes the following position in this discussion:

- Drivers should constantly be aware of the car’s level of automation and their responsibilities to take action and monitor the car;
- Drivers of partially automated cars are required to permanently monitor the car. Currently, drivers are not allowed to take their eyes off the road for a continued period of time. Partially automated systems should be designed (e.g. temporary activation) to prevent a critical decrease in attention;
- Drivers are not required to permanently monitor conditionally automated cars. Conditionally automated driving features should therefore comply with verifiable technical minimum requirements. Drivers are allowed to engage in activities not related to driving as long as they are able to assume the driving task at the vehicle’s request within a period of time adequate to the situation. Drivers of conditionally automated cars who show a typical standard user behaviour should not be subject to sanctions and be indemnified against any and all liability;
• Technical measures should be introduced to prevent foreseeable and dangerous misuse of automated driving features (e.g. sleeping, leaving the driver’s seat);
• System operations and driver interventions should be recorded so that they can be used as evidence to clarify whether or not a driver of an automated car is liable for an incident. Data protection and data security as well as transparency should be ensured for the user;
• Roadworthiness testing should uses interfaces and schemes to assess the operability and safety of automated driving features. However, this should not result in a significant increase in the cost.
Spain

The Spanish Road Code still contains the statement: “Drivers should at all times be in a condition to control their vehicles”, which could be problematic for autonomous vehicles. Platooning trials have already been undertaken, with more planned for autumn 2016, as well as a trial testing an automated vehicle on 100 kilometres of highway. The government has invested in an outdoor test track for testing the most advance technologies. Spain hosted the SARTRE FP7 project for open-road platooning. FP7 projects Citymobil and Citymobil 2 hosted demonstrations of automated transport in Castellon, Leon and San Sebastian. The Spanish government has also supported a project that saw the open road test of an automated vehicle on 100 kilometres of a highway without requiring input from a driver. The government has invested in building offices and an outdoor test track for testing the most advance driving technologies. Scania is working with a Spanish test laboratory (IDIADA) to test their entire platooning system on Spanish roads in autumn 2016.

Barcelona in particular seeks to be one of top cities in urban self-driving, for which they have the support of the city council support. A Barcelona Board of Cooperative and Automated Driving has been formed with the aim of creating a supportive ecosystem and infrastructure for testing. They have chosen Cituadella Park for a ‘Self Driving Urban Lab’.²

Role national automobile and touring club

RACC

RACC is involved in an initiative of the city of Barcelona aimed at testing cars with automated functionalities in real-traffic conditions. The role of the RACC is to provide private user testers, provide end-user requirements (for HMI, for instance), validate results and end-user satisfaction and acceptance as well as the social impact of automated driving. So far, there is no documentation that can be shared.

Switzerland

Thus far there are no known plans about completely driverless cars in Switzerland.

Role national automobile and touring club

TCS

Together with other partners TCS is in AG Fahrzeugsicherheit, a national consortium founded by the government. Activities from all partners are presented twice a year. In addition, TCS tests new cars and their systems; together with their partners, they are also preparing a report on the results of how a driver’s knowledge of safety influences driver-assist systems. They have tested two systems with different drivers and their knowledge of these systems: Adaptive Cruise Control ACC and Emergency Braking System EBS. Reports about these tests will be available after the project is finished this spring.

² Automated Vehicles: Strategic Overview by Bishop Consulting for Rijkswaterstaat
Belgium

The Flemish government will set up pilots beginning in 2015. The governmental department of Mobility has announced that autonomous Tesla vehicles will drive on the Belgian public motorways this autumn. The Tesla software update 6.2 enhances the cars’ active safety features, bringing the Model S closer to autonomous capabilities.


Role national automobile and touring club

TCB

TCB is not involved and has not yet decided on a potential role for the club.

Finland

Finland is currently preparing experimental legislation to run for five years, starting in 2015, that will enable automated vehicles to drive within restricted testing areas and at certain times on public roads once they have been issued with a permit. Between 2013 and 2015 they will assess this technology’s business potential, legislative requirements and potential profitability for the transport sector.

Greece

In 2013 the Greek Ministry of Infrastructure, Transport and Networks, in cooperation with stakeholders in the country (e.g. ICCS, eTricala), began discussions about allowing driverless vehicles within the Greek transport network. The occasion for starting this discussion was the possible CITYMOBIL2 pilot. The ministry has encouraged discussion between all relevant actors in different European countries; for this purpose, they convened a meeting in Athens in May 2014 with representatives from other foreign ministries to discuss different approaches ([www.e-trikala.gr/node/448](http://www.e-trikala.gr/node/448)). The participating countries were Greece, France, Italy, Finland, Spain, Sweden, Germany, UK, Poland, Malta and Cyprus. As a result, a legislative act has been prepared and will be proposed to the Greek Parliament. The act states that pilot trials of automated vehicles on public roads are allowed under specific conditions (mainly a thorough analysis of the proposed routes, supervision by appropriate research or academic bodies and the active support of local authorities).

Austria, Bulgaria and Bosnia and Herzegovina

No developments have been reported in Austria, Bulgaria or Bosnia and Herzegovina.
**USA**

**In general**

Several automakers, automotive suppliers and, most famously, Google are all involved in driverless-car development and testing. In May, the Department of Transportation’s National Highway Traffic Safety Administration (NHTSA) issued a preliminary statement of policy on autonomous vehicles that has since helped frame everyone’s understanding of the various degrees of automation. Stanford University’s Center for Internet and Society publishes a website on which it tracks public policy activity regarding autonomous vehicles.

**In detail**

**Legislation**

North America was the first country to introduce legislation to permit the testing of automated vehicles, but only four states have done this. California began issuing licenses in the autumn of 2014.

State-by-state laws vary significantly and, according to one source, no state has fully determined how existing traffic laws should apply to automated vehicles. Fifteen states are reported to have rejected bills related to automated driving.

In May 2013 NHTSA (National Highway Traffic Safety Administration) issued a ‘preliminary statement of policy concerning automated vehicles’. Aimed at levels 3 and 4 automation for testing purposes only it recommended that:

- License drivers to operate self-driving vehicles for testing;
- Require proof of safe operation of self-driving vehicles;
- Limit tests to locations suitable for self-driving vehicles;
- Establish reporting requirements to monitor self-driving technology performance;
- Ensure that the process for transitioning from self-driving mode to driver control is safe, simple and timely;
- Require self-driving vehicles to have the capability to detect, record and inform the driver that the automation system has malfunctioned;
- Ensure that self-driving vehicle technologies do not disable any required safety features or systems;
- Ensure that all information about the status of the automated control technologies is recorded in the event of a crash or loss of vehicle control.

Those states permitting automated vehicle testing each have their own set of requirements, which vary from one another.

Examples of requirements set out by the four states include an insurance or surety bond up to the value of $5 million and testers being required to have either a specific permit or special vehicle license plates.

**Google**

Google plans to deploy a test fleet of Roush-built prototypes in 2015. On closed courses the cars will be able to operate without a steering wheel, brakes or accelerator -- and drive

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3 Gabriel Weiner and Bryant Walker Smith, Automated Driving: Legislative and Regulatory Action, cyberlaw.stanford.edu/wiki/index.php/Automated_Driving:_Legislative_and_Regulatory_Action
themselves without a human passenger. Due to California regulations, controls will be added and a test driver will be behind the wheel when the car travels on public roads.

Internet giant Google Inc. has started talks with most of the world’s top automakers and assembled a team of global suppliers to speed its push to market self-driving cars. The suppliers named by Google included Bosch, which supplies power electronics and long-range radar to Google; ZF Lenksysteme, which supplies a new steering gear; LG Electronics, which supplies the batteries; Continental; and Roush.

Google did not ask a large automaker to build this car, but intends to do so in the future when it seeks to commercialize its technology.

- **Audi**
  In January 2015, Audi demonstrated the A7 prototype, which drove unassisted from San Francisco to Las Vegas, a distance of 550 miles, using radar sensors for long-range and 360-degree views, as well as LiDAR laser scanners at the front and back. It also used a new, high-resolution 3D video camera to take a wide-angle view from the front, combining the data from four other cameras around the car.

  All of the data was managed by the advanced driver assistance systems (ADAS, such as lane departure warning, advanced cruise control, traffic sign recognition, pedestrian and object detection, forward collision warning and reversing prevention), but these are all key algorithms for the self-driving car. Indeed, these emerging devices already support autonomous emergency braking, and are also being designed for the ISO26262 automotive safety standard.


- **Mercedes**
  Mercedes unveiled the Mercedes-Benz F 015 Luxury in Motion concept vehicle at the 2015 International CES on 5 January. Inside, there are six digital display screens so passengers can interact with the car by touch. LED displays on the front and rear (and a frontal laser projection system) allow the car to sense traffic.

  The vehicle is also eco-friendly: the car has an electric-hybrid system that runs close to 700 miles on pure electric power with no emissions.

  The F 015 allows passengers to take control if they want, but also gives them the opportunity to sit back and relax – and look super cool while doing so.

  The design will probably force other car and tech companies to consider what future consumers might be looking for in their driverless cars.

● Delphi
On 22 March 2015, an autonomous car by Delphi successfully set out from the Golden Gate Bridge toward New York for a 3,500-mile drive. The company built a self-driving car based on a 2014 Audi SQ5 and packed with the sensors and computers that Delphi developed to replace humans: A camera in the windshield looks for lane lines, road signs, and traffic lights. Delphi installed a midrange radar system, with a range of about 80 metres, on each corner. There is another radar at the front and a sixth at the rear. All of this is in addition to the long-range radars on the front and back, which look 180 metres ahead and behind.
“What we expect to do is be able to create better sensors and more sensors, and then the software algorithms as well, which the automakers will need as they take more steps along that journey to automated driving,” said Delphi CTO Jeff Owens.

Why the road trip? It is about collecting data. Delphi says it has covered hundreds of miles in the past year or so around Silicon Valley and Las Vegas, both on the highway and on city streets. Going from California to New York provides terabytes of information on how the sensor suite detects the world around it and how the car drives. With that data, Delphi can continue to improve its technology, tweaking software and hardware alike to make the car’s driving more reliable. Delphi plans to make the trip in eight days, driving at most eight hours a day.

The rolling catalogue of automotive expertise arrived in the Big Apple on the eve of the New York auto show, showing the public and automakers what the future holds.

Source: www.wired.com/2015/03/delphis-self-driving-car-taking-cross-country-road-trip/?mbid=social_fb

● Nissan and NASA
NASA’s Ames Research Center and Nissan North America have signed a Reimbursable Umbrella Space Act Agreement and the first annex to that agreement. The umbrella agreement allows for partnerships in autonomous vehicle systems, robotics, human-machine interface, software analysis/verification and network-enabled applications. The first annex to this agreement initiates cooperative research and the development of algorithms, concepts and integrated prototypes for self-driving cars.

Ames and Nissan have extensive expertise and interest in autonomous vehicles. Ames will assist in reimbursed design, development, testing and assessment of Nissan’s autonomous vehicles, including limited use of Ames’s campus for testing. These tests will build toward a proof-of-concept remote operation of autonomous vehicles to transport materials, goods, payloads or humans, which NASA parallels to the way it remotely operates planetary rovers from a mission control centre.

Lessons learned from integration, testing and demonstrations will enable Nissan North America to better plan for the development and commercialization of autonomous vehicles and applications.
• **University of Michigan**
  Last September, the University of Michigan founded the Mobility Transformation Center, a new connected-vehicle testing and research institution. The MTC is planning several future large-scale laboratory and real-world testing projects with government and industry partners.

  Source: [www.mtc.umich.edu](http://www.mtc.umich.edu)

• **Role national automobile and touring club**

• **AAA**
  AAA is not currently involved in any self-driving vehicle tests. That is the exclusive domain of the companies developing the technologies. AAA has been closely monitoring all of these developments and has taken advantage of numerous opportunities for engagement. For instance, representatives from Google have met with AAA repeatedly over the last few years to provide updates on their self-driving car project.

  The Automobile Club of Southern California has been supportive of state legislation to expand the regulatory framework for the operation of these cars on public roads.

  The Auto Club Group participated in a Florida Automated Vehicle Summit last month.

  AAA has also been invited to participate in upcoming meetings to create a uniform state law for the regulation of these technologies.
In general

The Centre for Road Safety, New South Wales (NSW) is conducting a Cooperative Intelligent Transport Initiative (CITI) trial of vehicle-to-vehicle and vehicle-to-infrastructure communications systems utilizing 5.9GHz DSRC. The trial is being conducted on a 42-kilometer route from the Hume Highway to Port Kembla on the coast. The focus of this trial is to determine truck positions and speed and send alerts about incidents or potential crashes back to truck drivers to improve safety. The roadside units will also transmit traffic signal conditions so that vehicles can be alerted to stop. Further information is available at – the website: [www.nrspp.org.au](http://www.nrspp.org.au)

The State Road Authority in Victoria, VicRoads, has released an industry framework for trialling road freight intelligent systems on Victorian roads. This framework is calling for proposals from industry to trial technology solutions to improve freight access and productivity. The information below describes the background of the proposal.

The freight and logistics sector contributed between $19 billion and $23 billion to Victoria’s Gross State Product (GSP) in 2011, representing up to eight per cent of the Victorian economy. Because freight and logistics plays such a critical role, the efficiency of the sector’s operations is a key driver of productivity throughout the broader economy.

Freight and logistics efficiency not only drives direct costs for freight operators but influences how readily these businesses can reorganize to achieve productivity improvements. Improved freight and logistics efficiency enables businesses across many sectors to consolidate warehousing facilities, reduce inventory costs, increase geographical market reach and create higher-value services and products.

Intelligent Transport Systems (ITS) and other associated technologies can provide significant benefits to the freight and logistics sector by improving efficiency, reliability and safety.

The Victorian Government and VicRoads are committed to facilitating and partnering with industry to drive innovation and have developed this framework to support the research and development of new technologies.


Role of national automobile and touring clubs

In general

Brian Negus, GM Public Policy at RACV, is also the chair of the Intelligent Transport Systems Committee and is the spokesperson for all clubs on this issue.

RACQ

RACQ is not aware of any trials or development activity that is currently underway in Queensland for self-driving cars. They are keeping an eye on this topic.

RACV

RACV is aware of the two trials as part of its membership of Intelligent Transport Systems, Australia (ITS Australia). ITS Australia is an independent non-profit membership organization representing ITS suppliers, government authorities, academia and transport businesses and users. It promotes the development and deployment of advanced technologies to deliver safer, more efficient and environmentally sustainable transport across all public and private modes – air, sea, road and rail.
Japan (JAF)

In general

The first public road test of an automated vehicle on a Japanese highway was conducted in November 2013 with Prime Minister Shinzo Abe in the car. The Nissan Leaf was awarded a registration plate for use on the public road in September 2013.

Japan has argued that European regulations need to be updated to allow further development of automated vehicle technologies. However, this review was not able to find firm information regarding Japan’s own plans to review or introduce new national regulations.

Hosted by the Parliamentary Vice-Minister of Land, Infrastructure, Transport and Tourism, the ‘Study Panel for Autopilot systems’ has been set up to discuss the challenges that Japanese car manufacturers are facing with regard to building autonomous systems enabling autonomous driving on expressways.

Preparations are underway for the 2020 Olympics in Tokyo; the government plans to implement the next generation of the Urban Transportation Systems. This is considered the first milestone of launching automation into the megacity.4

In detail

There is a ‘Research & development plan for the self-driving car’ led by the Cabinet Office. Consult the following link and for the outline of the plan.

A proposal for a dynamic map (DM) has been presented.

- Create a detailed driving route based on precise map information and traffic regulation information
- Recognize an accurate vehicle position by comparing GPS with DM
- Grasp condition of vehicle surroundings by combining map and traffic / road information

All by public and private sectors collaborate. Researchers would like to receive reliable outside information by using a double source: map and on-board sensors.

The DM prototype will be prepared and tested by the end of this fiscal year (March 2015). The test area includes busy traffic on an ordinary road, busy intersections, shopping streets, expressways, several highway interchanges and tall (ETC) gates.

Expected schedule:

- 2014: Preliminary investigation phase

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4 Automated Vehicles: Strategic Overview by Bishop Consulting for Rijkswaterstaat
- 2015-16: Development phase
- 2017: Practical use

Source: [www.sip-adus.jp/archive/index.html](http://www.sip-adus.jp/archive/index.html)

**Toyota**
Toyota has said that it is focusing its efforts on ‘infrastructure-cooperative’ automated driving, but has admitted to recently developing an automated vehicle that uses on-board sensors. Public road experiments are being initiated.

**Nissan**
Nissan is aiming to be the leader in the introduction of automated features. It has stated that it will market more than one fully automated vehicle by 2020 with lower levels of automation being released from 2016 onwards. Nissan is building a dedicated automated vehicle proving ground in Oppama, Japan.
China

Like the UK, China has not ratified the Vienna Convention.

This review was unable to find any official plans for testing automated vehicles in China. However, it has been reported that Baidu, the Chinese internet search engine group, started developing a 'highly automated' car in 2014. Baidu reportedly signed an agreement with BMW to research automated vehicle technology to develop a semi-autonomous vehicle within three years.

Organizations wishing to test automated vehicles in China require a Chinese number plate and Chinese driving licenses for the test drivers.

Singapore

In August 2014, the Land Transport Authority (LTA) in Singapore announced it was setting up the Singapore Autonomous Vehicle Initiative (SAVI) in collaboration with the Agency for Science, Technology and Research. Singapore has also stated that public road testing will begin in January 2015.

A 200-hectare area has been selected as the first area for testing and will contain light and heavy traffic test routes. Companies wishing to test must have "safety procedures including immediate manual over-ride to take full control of the vehicle at any point in time" as well as comprehensive third-party insurance.

Several trials are currently underway, including a fleet of autonomous golf buggies as a car-sharing concept as well as a driverless car. Nanyang Technological University is also testing and optimizing a driverless Induct NAVYA shuttle that can seat up to 10 people. Two further trials in Singapore are also ongoing.

Republic of Korea

Hyundai-KIA, Renault Samsung and GM-Daewoo are all believed to be actively researching automated vehicle technologies. Hyundai-Kia Motors started a biennial competition for autonomous vehicles in Korea in 2010.

SsangYong Motor has also signed a memorandum of understanding with the Korea Automotive Technology Institute (KATECH) to develop a self-driving car, stating, “the self-driving system has emerged as one of core competences for the future automobile industry.”

In July 2014 Hyundai released a video demonstrating a combination of existing technologies that allowed a convoy of vehicles to circulate their test circuit with no driver present.

Research is ongoing on both second-generation vehicles featuring lower cost sensors and the demonstration of the safe operation of the vehicle in a dense urban area where GPS signals may be unreliable. Research is also being conducted on Automatic Guidance Systems (AVGS).
Experiments on autonomous and automated driving: an overview 2015

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<tr>
<th>Country</th>
<th>Vienna convention</th>
<th>Geneva Convention</th>
<th>Project</th>
<th>Description</th>
<th>Type of vehicle</th>
<th>Type of road</th>
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<tbody>
<tr>
<td>Netherlands, The</td>
<td>8-11-2007 *</td>
<td>19-09-1952 **</td>
<td>WE-pods</td>
<td>Fully automated pods between Ede-Wageningen railwaystation and Wageningen University and Research Centre (WUR).</td>
<td>Pods</td>
<td>Public</td>
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<td></td>
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<td>DAF/TNO</td>
<td>Truck platooning with linked trucks.</td>
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<td>Public</td>
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<td>DAVI</td>
<td>Test program for tests with automated vehicles.</td>
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<td>8-11-1968</td>
<td>Not ratified</td>
<td>VENTURER</td>
<td>Test of driverless cars in the Bristol region.</td>
<td>Autonomous</td>
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<td>GATEway</td>
<td>Three trials of different types of zero-emission automated vehicles set in Greenwich.</td>
<td>Passenger shuttles</td>
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<td>UK Autodrive</td>
<td>LUTZ Pathfinder programme is overseeing a trial of three autonomous pods in Milton Keynes.</td>
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<td>Sweden</td>
<td>25-07-1985 **</td>
<td>25-02-1952 **</td>
<td>Drive Me</td>
<td>Large-scale autonomous driving pilot project with 100 self-driving Volvo cars.</td>
<td>Volvo</td>
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<td>Italy</td>
<td>02-10-1996 **</td>
<td>15-12-1952 **</td>
<td>VSLab</td>
<td>Platooning’ automated van following lead vehicle (automated but with some input from human driver) from Italy to China.</td>
<td>Van</td>
<td>Public</td>
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<td>France</td>
<td>29-12-1971 **</td>
<td>15-09-1950 **</td>
<td>A9 autobahn</td>
<td>Autobahn A9 between Munich and Nuremberg fitted with technology to allow driverless cars to use the road and communicate with other vehicles and the road infrastructure.</td>
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<td>Bulgaria</td>
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<td>Trucks</td>
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<td>Japan</td>
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<td>07-08-1964 *</td>
<td>Research &amp;</td>
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* First signing
** Ratified

All mentioned projects can be found in the document ‘Experiments on autonomous and automated driving: an overview 2015’. No rights can be derived from this document.