Research **Brief**

Ready for the robot car

Silicon Valley is making headlines with robot cars. These innovative vehicles have sparked interest in the Netherlands as well. Up to now, however, Dutch policy has focused on a different innovation approach in which self-driving cars are linked to other smart cars and to smart roads. In its report *Converging roads,* the Rathenau Institute recommends maintaining that approach and fitting the autonomous robot car into it.

Google's autonomous robot car has attracted global interest. The Dutch government is also preparing for the introduction of the self-driving car, but up to now has followed a different innovation approach to that of the autonomous robot car.

There are in fact two approaches: the autonomous robot car, which finds its way using on board sensors, and the cooperative (connected) car, which can communicate with other cars and with the road infrastructure. The Netherlands chose the latter, given the contribution that cooperative cars can make to road safety, improved traffic flow, and cleaner mobility – important Dutch policy goals.

But the rapid advance of the autonomous robot car is threatening to interfere with the Dutch approach: the robot car contributes less to reducing congestion and environmental pollution, and the investments made in cooperative cars can't be turned to profit.

For the Netherlands, the robot car is disruptive, but it shouldn't be ignored because its technology is also useful for the cooperative car. The Rathenau Institute therefore advocates imposing conditions for the robot car so that it also becomes 'connected'.

Self-driving cars will bring about drastic change in the mobility system. There will be a proliferation of data, raising a range of questions regarding privacy, ownership and reuse of data. Responsible innovation is only possible if a clear framework is created that clarifies what is and is not permitted. In the view of the Rathenau Institute, it is essential for public and civil-society organisations to be involved in the innovation process to a greater extent than at present.

RECOMMENDATIONS

Autonomous or cooperative cars?
Make a clear distinction in policy between the two innovation approaches for the self-driving car: autonomous robot cars and cooperative cars.

Continue developing cooperative systems
Continue the Dutch cooperative approach because of the benefits for congestion reduction, safety, and the environment, as well as the opportunities for Dutch industry. This requires:

- public-private cooperation to enable communication between cars and between cars and road infrastructure;
- consolidation of the Dutch position as a leading country in vehicle testing (see the memorandum to the Dutch House of Representatives regarding 'large-scale testing of self-driving cars', 16 June 2014, No. 31305-210);
- optimal investment conditions, from fiscal and legal perspectives.

Set conditions for the robot car
Ensure that the autonomous robot car also becomes a 'connected' vehicle by imposing conditions for vehicle communication and by active involvement in developing international standards.

Regulate mobility data
Create an agenda for issues raised by data-driven mobility, for example privacy, the protection, ownership and management of data, and the reuse of data (for example in law enforcement).

Involve stakeholders
Ensure participation of the public and civil-society in the innovation process so that the self-driving car becomes socially accepted.
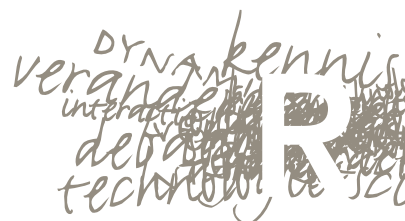
Link the self-driving car to public goals

The self-driving car has strong potential for improving traffic flow, road safety, and reducing the environmental impact of traffic. The Netherlands wants to be actively involved in its development. Dutch companies play an important role as suppliers of systems and components for the automotive industry, and the country is also strong in communication technology and intelligent traffic management systems.

Where development of the self-driving car is concerned, the Dutch focus has been on improving communication between cars and between cars and road infrastructure. The ultimate goal is a self-driving car that smoothly connects to a platoon of cars on the motorway and that responds to warnings transmitted by smart infrastructure, for example about icy conditions, mist, or unexpected obstacles.

However – as explained in *Converging roads* – the rapid advance of the autonomous robot car is threatening to interfere with the Dutch approach, which is heavily dependent on public-private cooperation. The autonomous robot car has onboard sensors that enable it to guide itself safely. But it does not communicate with other cars or with the road infrastructure, and is therefore not equipped for platooning. And precisely platooning brings the most benefits for efficient driving, i.e. saving energy and reducing congestion.

The autonomous robot car is interesting for the automotive industry because it does not depend on other cars or the road infrastructure. There is a risk that private parties will focus on the development of the autonomous robot car at the expense of cooperative systems

such as those being developed by the Netherlands.

In the view of the Rathenau Institute, efficient development of the self-driving car requires convergence of the two approaches – autonomous and cooperative. In order to benefit from the technical advantages from both approaches, and to achieve public goals as regards road safety, traffic flow and the environment, it is important that the robot car is compatible with cooperative systems. This means that it must be able to connect to other cars and to traffic management systems. The Dutch government can play a role in this by imposing requirements for vehicle communication and by influencing international standards.

Self-driving cars will bring about drastic changes in the mobility system. The Rathenau Institute therefore advises both government and industry to pursue increased participation of the public and civil-society organisations in the innovation process. The more vehicles and roads are equipped with smart technology, the greater will be the stream of data that they exchange. That data can be used for new applications and new revenue models, but it also raises questions regarding privacy, ownership, and reuse. What should car manufacturers be permitted to do with that data? What about insurance companies? And should the authorities be allowed to use this data in investigations? Now that self-driving cars are leaving the confines of the test circuit, it is essential or public and civil-society organisations to be involved in the innovation process.

SUMMARY

The self-driving car provides an answer to problems such as dangerous roads, traffic congestion, and environmental pollution. However, that only applies to self-driving cars that are 'connected', and that can communicate with one another and with the road. This approach has been central to Dutch policy and industry.

- Silicon Valley has come up with a different approach however, involving a self-driving car operating autonomously, guided by on board sensors and communication with remote servers. Because it does not communicate with other cars or with the road, this kind of self-driving car contributes less to the Dutch policy goals than the cooperative self-driving car.

- To achieve public goals, benefit from investments and retain opportunities for its own industry, the Netherlands must continue its policy of cooperative cars. Through international cooperation on vehicle communication, the Dutch government can ensure that the robot car will fit in the Dutch cooperative system.

- Self-driving cars will bring about drastic change in the mobility system. The increasing amount of data will lead to new services, but also raises questions regarding privacy, ownership, and reuse of data. The social embedding of the self-driving car demands greater involvement on the part of public, and civil-society organisations.

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