

Survey conducted between 13.06.2017 and 26.06.2017  
15 answers in total (almost all project partners participated)

### 1 Definition of Automated Driving

	Automated Driving
Basics	<ul style="list-style-type: none"> <li>– Computer System</li> <li>– Range of automation levels (driver assistance to full automated driving)</li> <li>– Systematization: SAE LEVELS for automation 1-5</li> </ul>
Functionality/Capabilities	<ul style="list-style-type: none"> <li>– Vehicles use processes of control to perform (some or all) (predefined) driving tasks</li> <li>– Smart and Connected (V2I, V2V)</li> <li>– Preprogrammed systems</li> <li>– Learning systems that can react to certain changes in their environment</li> <li>– Drives in mixed traffic on public roads without difficulty</li> <li>– Allows passengers to conduct other activities (e.g. sleeping)</li> </ul>
Role of Humans	<ul style="list-style-type: none"> <li>– No human driver</li> <li>– Without any human interference / human 'driver' does not and cannot interfere</li> <li>– Human operator leaves as much responsibilities as possible to the system</li> <li>– Steward as back-up</li> <li>– Human driver is supported by automation</li> </ul>
Fields of application	<ul style="list-style-type: none"> <li>– Applicable to cars, trucks and buses (for public transport)</li> <li>– Transportation of goods and people</li> </ul>

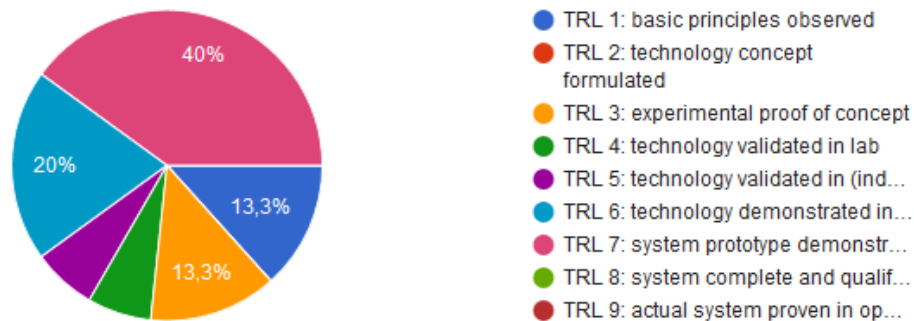
### Remarks/Questions regarding a I-AT Definition for Automated Driving

- Which SAE Level could be the reference for I-AT?
- Which specific driving tasks are included in Automated Driving? Which ones are not?
- What extent of “Learning” or “Reacting” should the I-AT definition include? There is no consensus regarding the role of humans in driving, but rather a range of possible occurrences (probably related to a very broad understanding of Automated Driving amongst the partners)
- Does “automated” mean, that humans have no possibility to influence the vehicles behavior at all?

## 2 TRL of Automated Driving in general

### 4. Based on this definition, which technology readiness level (TRL) did Automated Driving in general reach so far (as of June 2017)?

15 Antworten



Most partners see Automated Driving as a technology that has been demonstrated in an industrially relevant environment or even an operational environment (TRL 6/7 – 60 % of answers). If this is the case, the technology, if proven to be feasible and successful in an operational context, should soon be completed and deployed for commercialization. Nevertheless, there is also a group of project partners (TRL 1/2 – 15 % of answers), that see the technology only in the early stages of development.

The average TRL assessed by the project partners is 5.1. This average assessment is mostly in line with the ERTRAC Automated Driving Roadmap (2015) that envisages pilots/large scale demonstrators (TRL 5-7) for Conditional Automated Driving (SAE level 3) for 2017 and demonstrations for Automated Urban Road Transport (SAE level 4/5) for 2018.<sup>1</sup>

<sup>1</sup> [http://www.ertrac.org/uploads/documentssearch/id38/ERTRAC\\_Automated-Driving-2015.pdf](http://www.ertrac.org/uploads/documentssearch/id38/ERTRAC_Automated-Driving-2015.pdf)

### 3 Interest of Project Partners

Basics	<ul style="list-style-type: none"> <li>– General Interest in the innovative topic</li> <li>– Major trend in the development of a safer, more efficient and more sustainable traffic and transport system</li> </ul>
Knowledge	<ul style="list-style-type: none"> <li>– Automated buses as an alternative for public transport (in rural areas)?</li> <li>– Is the infrastructure ready for the future?</li> <li>– New Mobility Concepts</li> <li>– Links to Electro Mobility</li> </ul>
Project Partner Reputation/Expertise	<ul style="list-style-type: none"> <li>– Reinforcing position in research and education</li> <li>– Important topic for principals (ministries, authorities, companies, etc.)</li> </ul>
Asset for Future Business Opportunities	<ul style="list-style-type: none"> <li>– Vehicle Development/ Manufacturing</li> <li>– Consulting</li> <li>– Transportation of passengers/goods (especially last mile)</li> </ul>
Influence	<ul style="list-style-type: none"> <li>– Law and policy making process</li> </ul>

### 4 Issues

Technical	<ul style="list-style-type: none"> <li>– Sensor data fusion</li> <li>– System learning</li> <li>– Higher Speeds (&gt; 50 km/h)</li> <li>– Mixed traffic</li> <li>– Reaction time, esp. related to fast and unforeseen circumstances and movements of cyclists and pedestrians</li> <li>– Safety</li> <li>– Cybersecurity</li> <li>– Optimization of physical and digital infrastructure and</li> </ul>
Legal	<ul style="list-style-type: none"> <li>– Legal uncertainty</li> <li>– Special vehicle permissions needed</li> <li>– Current regulations do not allow for automated driving on a regular basis</li> </ul>
Human Factor	<ul style="list-style-type: none"> <li>– Interaction between humans and automated vehicles</li> <li>– How will current drivers react to this technology</li> <li>– Missing consensus on what is "safe"</li> <li>– Confidence and Acceptance of passengers</li> <li>– Social security</li> <li>– Comfort, user-friendliness and reliability</li> </ul>
Deployment	<ul style="list-style-type: none"> <li>– Diversification of risks and responsibilities between driver, vehicle owner, insurances, car producers and the state</li> <li>– New distribution of objects of regulation between car registration law and traffic law</li> <li>– Regulation for new business models (esp. in public transport)</li> </ul>
Impact	<ul style="list-style-type: none"> <li>– Traffic Safety, efficiency, sustainability and comfort</li> <li>– Crucial effects are to be expected, but project partners only have simulated ideas about impact</li> <li>– Needs further research</li> </ul>

### 5 Most important:

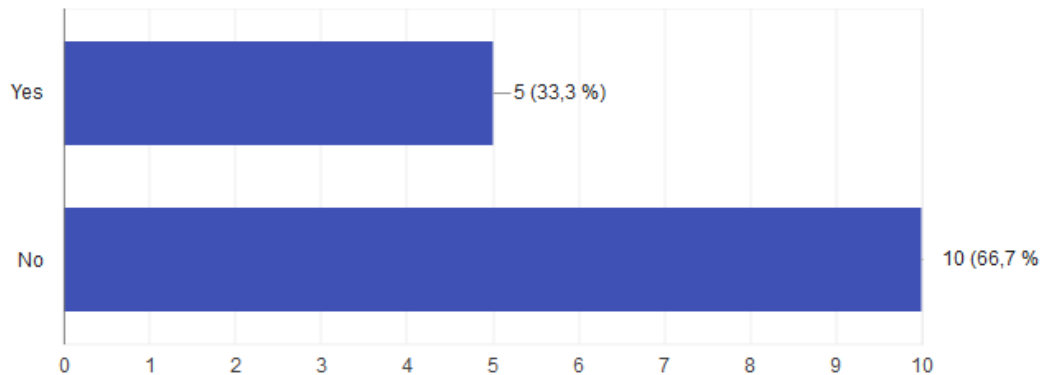
- Technical capabilities of companies involved, feasibility of autonomous driving in the next 30 years is yet unclear
- Legislation influenced by the automotive industry, hinders innovation
- Unclear definitions
- Current regulatory framework
- Managing the overall innovation process
- Safety
- Acceptance
- Sensor data fusion, deep learning
- Permissions for autonomous cars to drive on public roads
- the state of technology; more specific: the 'intelligence' of the software
- Fleet Management
- Driving Operations
- Insurance
- Optimizing the interaction between vehicle, human driver/passenger and infrastructure

The project partners name a very diverse set of issues that are crucial for their organizations which reflects the diverse composition of the partnership. Recurring issues are technical feasibility of the system in general and certain operational aspects, safety, acceptance as well as the regulatory framework.

## 6 Objections

8. In your organization/company, were there any voices that raised objections regarding the involvement in a project related to Automated Driving?

15 Antworten

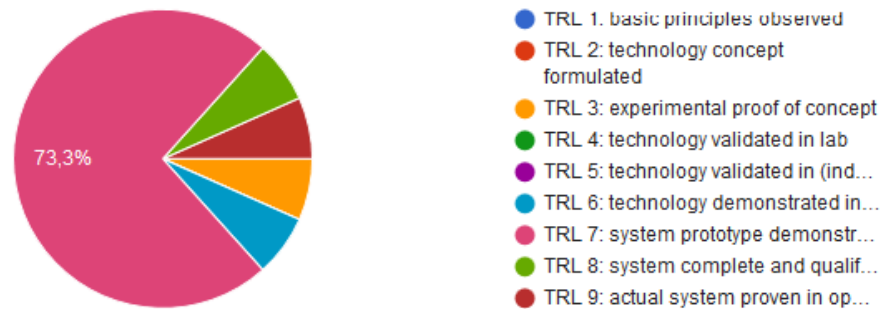


- Involvement of public authorities in technology innovation usually linked to private companies
- Feasibility of automation (in urban contexts)
- Complexity of Automated Driving
- (Risky) Technology push
- Human-out-of-the-loop issues
- Acceptance
- Future job losses through Automated Driving

## 7 Project I-AT

### 9. Which technology readiness level (TRL) of Automated Driving is addressed within the project I-AT?

15 Antworten



Almost 75 % of all project partners think that I-AT addresses TRL 7 (system prototype demonstration in operational environment) but there are also project partners that think I-AT will reach TRL 8 or 9 and prove the operability and market readiness of automated driving. Therefore, the average TRL attributed to I-AT is 6.9 – almost two levels above the TRL assessed for Automated Driving in general. Obviously, the project partners have high expectations regarding the scope and impact of the project I-AT.

## 8 Decision to participate

- General (research) focus of the company/organization
- Gaining experience/knowledge, expanding portfolio
- Build consulting service capacity
- Shape the policy- and law-making
- General Interest
- Continuation of a previous projects or research (e.g. moving from demo to functional automated transport with WEpods)
- Future business opportunity
- Transition towards sustainable mobility

## 9 Obstacles

- Financial issues, esp. related to funding in European projects (prefinancing) and procurement rules
- Current regulations are too strict
- High dependency on I-AT project declarations causes a low productivity, bad teamwork, and endangers the project result
- Involvement of local authorities takes more time than expected
- (Missing support from German authorities)<sup>2</sup>

## 10 Stakeholders

	Internal	External
Research/Development	<ul style="list-style-type: none"> <li>- Spring Innovation</li> <li>- EL-KW</li> <li>- RES</li> <li>- TU Delft</li> <li>- Han University</li> <li>- Robot Engineering</li> <li>- Robot Care Systems</li> </ul>	Other researchers
Transport Companies	<ul style="list-style-type: none"> <li>- ASEAG</li> </ul>	Other transport companies Other logistics companies
Employees	<ul style="list-style-type: none"> <li>- Staff association</li> </ul>	Trade unions
Authorities	<ul style="list-style-type: none"> <li>- Road Authority Aachen</li> <li>- City of Aachen</li> <li>- City of Vaals</li> <li>- City Region Aachen</li> </ul>	Other authorities Other politicians
Financing	<ul style="list-style-type: none"> <li>- Interreg A</li> </ul>	Other funding opportunities
Project Development	<ul style="list-style-type: none"> <li>-</li> </ul>	Other project developers
Customers/Clients	<ul style="list-style-type: none"> <li>-</li> </ul>	Users/Passengers possible future Clients with related issues Other vehicle operators Other vehicle manufacturers Other service providers

<sup>2</sup> Answer given was non-distinctive



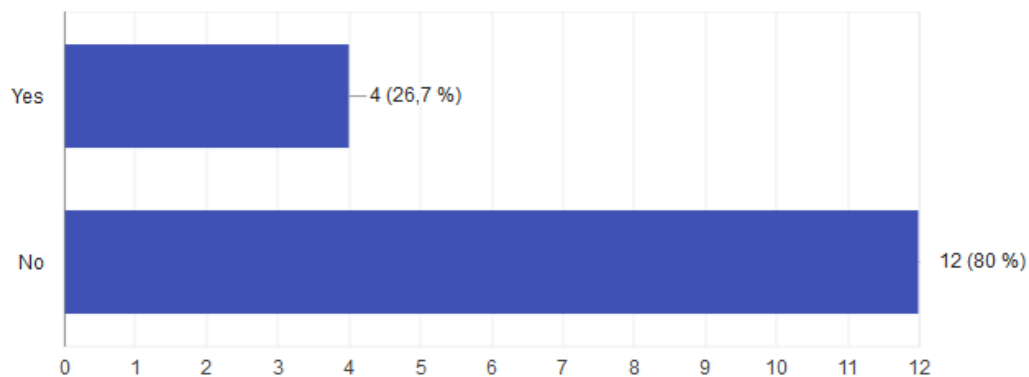
## 11 Stakeholder cooperation within I-AT so far

Project partners overwhelmingly consider the cooperation with stakeholders to be good, constructive and collaborative. Some state the exchange of relevant information works well but that there also have been some hard discussion with stakeholders (no further details given).

## 12 Stakeholder Issues

12d. Did the stakeholders address specific issues or did they raise objections related to Automated Driving in general or the project I-AT?

15 Antworten

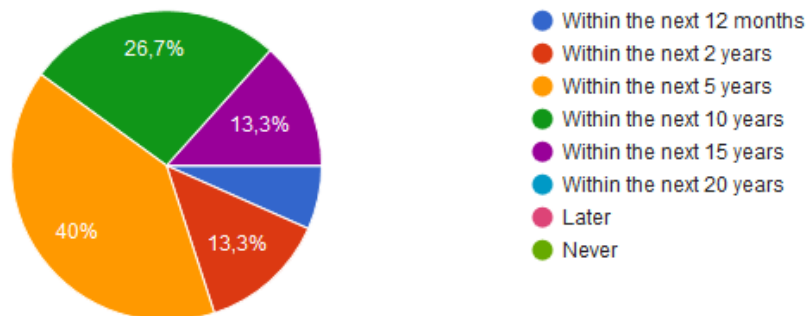


	Internal	External
Project management	<ul style="list-style-type: none"> <li>– Ongoing discussions about responsibilities</li> <li>– Exact project goal, relation to full autonomous driving</li> </ul>	
Deployment	<ul style="list-style-type: none"> <li>– Types of roads where automated driving is feasible</li> <li>– Interaction between automated vehicles and other road users</li> </ul>	

## 13 Market Introduction

13. According to your assessment, when do you expect a technology readiness that allows for a successful and broad market introduction of Automated Driving?

15 Antworten



The majority of project partners expect autonomous driving to be ready for market introduction within the next 5 or 10 years. This assessment aligns more or less with the project partners' views regarding the current TRL of Automated Driving in general as well as the goals for I-AT.

**14 Requirements for market introduction**

		Remarks/Questions
Technical	<ul style="list-style-type: none"> <li>– Reliable and able technology</li> <li>– Safety in an expanding range of roads, traffic densities and weather conditions</li> <li>– successful pilot projects with a fleet of vehicles</li> </ul>	
Legal	<ul style="list-style-type: none"> <li>– Adjustment of the legal framework (esp. possibility to drive without driver/steward)</li> </ul>	
Human Factor	<ul style="list-style-type: none"> <li>– Acceptance</li> <li>– Favourite choices of users</li> </ul>	
Deployment	<ul style="list-style-type: none"> <li>– Costs for the automated system must be cheaper than using human drivers</li> <li>– Needs a reliable company as a one stop service provider (responsible for vehicle, software, hardware, etc.)</li> <li>– Affordability</li> <li>– Quality of automated vehicles</li> </ul>	
Impact	<ul style="list-style-type: none"> <li>–</li> </ul>	

### 15 Possibilities and Risks of Automated Driving for project partners

	Possibilities	Risks
Basics	–	<ul style="list-style-type: none"> <li>– Underestimating the importance of research in the implementation process</li> <li>– Bankruptcy of partners</li> <li>– Failure to achieve project objectives</li> <li>– Bad press for the project</li> <li>– Interdependency among project partners</li> </ul>
Knowledge	<ul style="list-style-type: none"> <li>– Vehicle Automation</li> <li>– New forms of mobility</li> </ul>	<ul style="list-style-type: none"> <li>– Investing in a technology that will not be successful in the end</li> <li>– technology may advance too slow</li> </ul>
Project Partner Reputation/Expertise	<ul style="list-style-type: none"> <li>– Funding opportunities from research grants and industrial funding</li> <li>– Deploying automated vehicles as launching customer</li> </ul>	<ul style="list-style-type: none"> <li>– Some partner input will only be visible if there is enough budget to materialise it</li> </ul>
Asset for Future Business Opportunities/Funding	<ul style="list-style-type: none"> <li>– Need for further research</li> <li>– Use knowledge to create specific business cases (esp. in consulting and engineering)</li> <li>– More flexibility for customers</li> <li>– Cost-saving in public transportation</li> </ul>	<ul style="list-style-type: none"> <li>– Insufficient profit from technology</li> <li>– New competitors in (public) transportation (e.g. Carsharing)</li> <li>– Managing demand/growth</li> </ul>
Influence	<ul style="list-style-type: none"> <li>– Participation in the legislative process</li> <li>– Creating a look and feel for services</li> </ul>	<ul style="list-style-type: none"> <li>– Internal resistance against Automated Driving (e.g. from staff associations)</li> </ul>

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