EU Initiatives and Research for Automated Driving and Occupant Safety

3rd International VDI Conference
Düsseldorf
May 16, 2018

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European Commission
Mobility & Freedom... Reality...
Mobility & Freedom…

Reality…
Improve Road Safety –
A European policy objective

…halving road deaths by 2020

... move close to zero deaths and serious injuries by 2050
Connected & Automated Cars... Why?

- Increased road safety and less fatalities
- Less traffic jams
- Better traffic management
- Lower fuel consumption and environmental impact
- More efficient use of existing road infrastructure
- Less need for urban parking spaces
- Reduced costs of future infrastructure and equipment
- Better accessibility for certain user groups
- More individual comfort for users
The Reality - What Causes Accidents?

- Inattention (up to 93%)
- Traffic Environment
- Vehicle Related

Source: Virginia Transportation Institute
• Enable – Policy
• Find solutions -- Research
• Try out in reality
… It is only on the basis of detailed knowledge about the performance of different parts of the system that activity can be focused where it is most effective in reducing deaths and serious injuries…
Automated mobility
I \ \textbf{SHARED OBJECTIVES}

\textbf{SUPPORTING} the following objectives:

\begin{itemize}
\item[a.] to work towards a coherent European framework for the deployment of interoperable connected and automated driving, which should be available, if possible, by 2019;
\item[b.] to bring together developments of connected and automated driving in order to reach their full potential to \textit{improve road safety, human health, traffic flows, and to reduce the environmental impact of road transport};
\item[c.] to adopt a “learning by experience” approach, including, where possible, cross-border cooperation, sharing and expanding knowledge on connected and automated driving and to develop practical guidelines to ensure interoperability of systems and services;
\item[d.] to support further innovation in connected and automated vehicle technologies to strengthen the global market position of European industry; and
\item[e.] to ensure data protection and privacy.
\end{itemize}

II \ \textbf{JOINT AGENDA}
Horizon 2020
Work Programme
for Research & Innovation

#InvestEUresearch

Societal challenges

8. Health, demographic change and wellbeing
9. Food security, sustainable agriculture and forestry, marine and maritime and inland water research and the bioeconomy
10. Secure, clean and efficient energy
11. Smart, green and integrated transport
Societal challenges

3. ROAD

MG.3.1-2014. Technologies for low emission powertrains
MG.3.2-2014. Advanced bus concepts for increased efficiency
MG.3.3-2014. Global competitiveness of automotive supply chain management
MG.3.4-2014. Traffic safety analysis and integrated approach towards the safety of Vulnerable Road Users
MG.3.5-2014. Cooperative ITS for safe, congestion-free and sustainable mobility
MG.3.6-2015. Safe and connected automation in road transport
HORIZON 2020 - Work Programme 2016 - 2017
Smart, green and integrated transport

3. SAFETY

MG-3.1-2016: Addressing key issues...
MG-3.2-2017: Protection of people...
MG-3.3-2016: Safer waterways ...
MG-3.4-2016: Transport safety strategies ...
MG-3.5-2016: Behaviour of road users ...
MG-3.6-2016: Euro-African projects ...

Call - 2016-2017 Automated Road Transport

ART-01-2017: ICT infrastructure to enable the transition towards road transport automation
ART-02-2016: Automation pilots for passenger cars
ART-03-2017: Multi-Brand platooning in real traffic conditions
ART-04-2016: Safety and end-user acceptance aspects of road automation in the transition period
ART-05-2016: Road infrastructure to support the transition to automation and the coexistence of conventional and automated vehicles on the same network
ART-06-2016: Coordination of activities in support of road automation
ART-07-2017: Full-scale demonstration of urban road transport automation
ART-04-2016: Safety and end-user acceptance aspects of road automation in the transition period

Specific Challenge: Automated vehicles will be accepted by customers and society only when they will be deemed easy-to-use and fully reliable and safe regarding the planned manoeuvres and their execution. A key challenge is to ensure safe vehicles handling with reduced driver attention. Especially for level 3 automated driving systems an effective interaction between

—Reducing the number of accidents caused by human errors, such as inattention and distraction. Research will therefore help to achieve the European policy objective of halving road deaths by 2020, and, in the longer term, the Transport White Paper "Vision Zero" objective by preventing road accidents caused by human errors.

—Maintaining the leadership position in developing user-centric, safe and reliable vehicle automation systems by the European vehicle manufacturers and their suppliers.
ART-04-2016: Safety and end-user acceptance aspects of road automation in the transition period
ART-02-2016: Automation pilots for passenger cars

Specific Challenge: It is expected that automated vehicles at automation level 3 (Conditional Automation) will enter the market by 2020 to 2025. In the past years, there have been significant efforts in research to develop the technologies for vehicles and infrastructure to enable automated driving functions. However, substantial challenges remain on the path to European wide deployment. There is a great need to demonstrate the technological readiness.

Expected Impact: Actions are expected to demonstrate the technological readiness, reliability and safety of the automated driving functions in a large scale pilot at European scale. They will test automated vehicles at automation level 3 (including possible additional functions towards automation level 4) in mixed traffic situations. Actions are expected to demonstrate
Pilot across Europe

- Austria
- Germany
- Italy
- Belgium
- Germany
- Netherlands
- Finland
- Sweden
- France
- Germany
- Netherlands
- BE / Brussels / NL
- DE / Aachen
- DE / Munich
- DE / Offenbach
- DE / Wolfsburg
- FR / Paris and other regions
- IT / Turin and Trento
- LU / NL
- SE / Gothenburg
- UK / Coventry
- Toyota
- Ford
- BMW
- Honda
- VW
- REN / PSA
- CRF
- Delphi
- Volvo
- JLR
Use Cases

Motorway  Traffic Jam  Urban  Parking

1,000 drivers  100 cars  10 European countries
Objectives:

- technical aspects,
- user acceptance,
- driving and travel behavior,
- impact on traffic and society.

Develop tools for effective analysis and evaluation of field data
Enhance impact assessment simulation tools

for Automated Driving:
- a comprehensive guideline
- hands-on checklists
- best practices for functions development

Include safety aspects and methods to confirm a safe operation of Automated Driving functions
ART-01-2017: ICT infrastructure to enable the transition towards road transport automation

ART-03-2017: Multi-Brand platooning in real traffic conditions

ART-07-2017: Full-scale demonstration of urban road transport automation

Specific Challenge: Fully automated road transport systems have the potential to revolutionize urban transport offering high quality public transport services which are not feasible with conventional public transport systems. Low speed full automation systems have been demonstrated in several European cities. However full-scale demonstrations are still necessary to prove the reliability, safety and robustness of fully automated road transport systems in complex scenarios in urban areas. In addition, it is necessary to address the remaining
Horizon 2020
Work Programme
for Research & Innovation
2018-2020
MG - AREA 2
Safe, integrated and resilient transport systems

2018 Total EU contribution: **EUR 73 Mio**

<table>
<thead>
<tr>
<th>Topic</th>
<th>Title</th>
<th>Action type</th>
<th>Stages</th>
<th>Budget 2018</th>
<th>Budget 2019</th>
<th>Budget 2020</th>
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<tr>
<td>MG-2-1</td>
<td>Human Factors in Transport Safety</td>
<td>RIA</td>
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<td>Marine Accident Response</td>
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Human Factors in Transport Safety

Challenge:
Human factors largest cause of accidents
Use automation to reduce impact of human factors

Scope: (one of the following sub topics):
A. Investigate safe human performance, demographic diversity, develop recovery/mitigation solutions, improve compliance with/formulation of safety rules

Cross-modal transfer. Authorities e.g. EASA can be involved

Expected impact:
Significant decrease in human factor related incidents.
Improve rules, selection and training of operators.
Contribute to UN’s ICAO, IMO, SusDev and EMSA goals

Estimated EC contribution per proposal: € 4-8 million

InCo-related: Encouraged (incl. collaboration with neighbouring countries)
Safety in an evolving road mobility environment

Challenge:
A changing road mobility environment – e.g. increasing automation
Safety systems need to adapt to future potential collisions, future occupant positioning

Scope:
• Develop robust solutions in the context of the changing environment, leading to dramatic improvements in transport users' and road workers' safety.
• Articulate traffic safety in terms that are relevant for connected & automated transport systems.
• Develop tools and models simulating traffic scenario’s expected changes over time
• Design of (active/passive) protection systems for future collision scenarios
• Develop (physical & digital) infrastructure, on-vehicle solutions, education & training

Expected impact:
>10% reduction in injuries and fatalities in road accidents
Optimal protection systems enabling occupants’ new positions & perceive benefits with automation
Safer use of vehicles, effective education and training schemes

Estimated EC contribution per proposal: € 3-6 million
**WP 2018 Call: Automated Road Transport (ART)**

2018 Total EU contribution: **EUR 15 Mio**

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<th>Budget 2019</th>
<th>Budget 2020</th>
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<td>Testing, validation and certification procedures for highly automated driving functions under various traffic scenarios based on pilot test data</td>
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Human centred design for the new driver role in highly automated vehicles

Challenge:
SAE automation level 4 dramatically changes the traditional driver role
Develop solutions to ensure
• safe transfer between use cases with different automation levels and
• that drivers always have a very clear understanding about the degree of automation enabled in each situation.

Scope:
• Design of safe human-machine interfaces for SAE level 4 driving functions, and safe, controlled transfer to/from use cases with lower SAE level - for all types of drivers.
• Characterise driver role, update models and tools
• Demonstration of functionality in real world situations

Expected impact:
Innovative solutions for drivers/operators to be adequately alerted and engaged
Reduction of risks for driver behaviour related incidents
Contribution to Vision Zero casualty reduction targets.

Estimated EC contribution per proposal: € 4-8 million
Testing, validation and certification procedures for highly automated driving functions under various traffic scenarios based on pilot test data.

Challenge:
- How can we prove that new automated driving functions are really safe and reliable?

Scope:
- Develop testing and validation procedures of highly AD functions for different use cases in various traffic scenarios
- Research on merging simulation/virtual testing with real tests
- Common criteria for model-based validation and simulation on vehicle, components and V2X communication systems level

Expected impact:
- Comprehensive testing, validation and certification procedures for highly AD functions to pave the way for accelerated implementation of highly automated vehicles in Europe

Estimated EC contribution per proposal: EUR 4-6 Mio

InCo-related: Yes
Road Safety in Horizon 2020

- **2014**: Accidentology
- **2015**: Distraction
- **2016**: Influence of behaviour in Transport Safety
- **2017**: Protection of all road users in crashes
- **2018**: Human Factors in Transport Safety
- **2019**: Safety in an evolving road mobility environment

Automated Road Transport

- 2014: Safety & end user acceptance
- 2015: Testing & Validation
- 2016: Networking activities & impact assessment

Research and Innovation
Thank you for your attention!