THE DRIVERLESS REVOLUTION:
outcomes of the Interactive Symposium on Research & Innovation for Connected and Automated Driving in Europe

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Dear Reader

Welcome to our 6th issue of the CAD newsletter!

This issue features special coverage of The Interactive Symposium on Research & Innovation for Connected and Automated Driving in Europe which took place on 19-20 April 2018, in conjunction with the TRA Conference in Vienna.

It has been a time of intense activity for CARTRE consortium: continuous exercise and the work done during the last few months saw partners involved in a magnificent “knowledge summit”, in which meetings, workshops and conferences
fostered consolidation in the nine main CAD thematic areas. As a result, the hard work finally yielded good results, and proven by the success of last month’s event.

Co-organised by the CARTRE and SCOUT initiatives and supported by the European Commission as well as the ERTRAC European Technology Platform, The Interactive Symposium on Research & Innovation for Connected and Automated Driving hosted 220 participants coming from different sectors, both public and private: automotive and telecom industries, users, researchers, operators, regulators, public authorities, representatives from EU Member States and outside Europe. The event aimed to explore and analyse the specific thematic areas related to the development and deployment of Connected and Automated Driving in Europe. Organized in nine different sessions, for each thematic area, a panel of high-level speakers from different fields shared and discussed positions, visions, and interact with the audience regarding challenges and research needs entailed.

There have been two particularly intense days with debates, presentations, final conclusions and networking activities, thanks to which participants were given the opportunity to confront each other, and to discuss the future of connected automated driving which seized the interest and passions not any more to a limited and a restricted expert circles, but more and more to extended spheres of society, everyone sharing the common goal of reaching a more sustainable, safer and smarter mobility.

I wish you a good read and see you next year for the next EUCAD2019 event in Brussels on 2-3 April 2019.

**Beatrice Tomassini**
**CLEPA**
Project name: “Coordination of Automated Road Transport Deployment for Europe” - CARTRE

Project type: CSA

Call: H2020 ART-06-2016, Coordination of activities in support or road automation

Starting date: 01.10.2016

Project duration: 24 months

Total budget: 3M€

Coordinator: ERTICO – ITS Europe

Partners: 36 partners

Project objectives:

- Establish European leadership through public-private collaboration for development and deployment of Automated Road Transport (ART)
- Support international cooperation activities in the area of road automation at global level, in particular with the US and Japan
- Support Strategic alignment of national action plans for automated driving
- Ensure that stakeholders are well informed of past, current and future ART activities through a comprehensive knowledge base on project result
- Actively support ART pilots and test beds
- Report on progress of ART projects on enablers and thematic areas
- Facilitate exchange of data, experience and knowledge for comparing and deploying results from pilots
- Foster a common evaluation framework across ART projects
- Describe possible deployment alternatives and evaluate their impacts
- Reach out to stakeholders, decision makers and wider public
- Establish annual international conferences, and workshops in Europe
Project name: “Safe and Connected Automation in Road Transport” – SCOUT

Project type: CSA

Call: H2020 MG-3.6b-2015, Safe and connected automation in road transport

Starting date: 01.07.2016

Project duration: 24 months

Total budget: 1M€

Coordinator: VDI/VDE Innovation + Technik GmbH

Partners: 12 partners

Project objectives:

- Capture expectations and concerns regarding connected and automated driving (C&AD) from users, technology, infrastructure and service providers and public authorities
- Explore feasible use cases for C&AD in accordance with the EU strategies for transport and digital markets, societal goals and challenges
- Analyse gaps and risks for the take-up of C&AD from the domains of automotive technology, communication infrastructure & reliability, legal frameworks, standardisation, testing, safety, security and privacy
- Identify sustainable business models for C&AD, also considering telecommunication, data driven services and novel mobility concepts
- Create common cross-sectorial roadmaps and advise policies and regulatory frameworks with support of a stakeholders network
- Communicate and discuss results with the general public
- Monitor international trends to detect opportunities & threats abroad
- Tie-in the results of European funded R&D projects and activities
Shared mobility services are an important use case for automated vehicles as they may fill the gap between collective public and individual private transportation in an efficient and cost-effective manner. The example of a self-driving shuttle or pod providing ride sharing services in a city may be the most appealing one from a planning perspective as it could contribute to reducing the overall traffic load on the roads – at the same time it is also the most challenging from a traffic safety standpoint. The same applies to goods delivery via self-driving vehicles.

The session on “Shared and Automated Mobility Services” explored new scenarios for shared mobility services that promise to maximize individual and societal benefits of road automation.

The panelists agreed that shared automated vehicles would complement public transportation and offer particular benefits for providing inclusive mobility on the country side, an aspect MLIT is exploring in different locations in Japan, currently. At the same time, concerns were raised considering regulation and missing business models as serious bottleneck for connected and automated driving to be mature and safe enough for urban use. In particular the case of self-driving shuttles was faced with skepticism since a top-down
safety concept would be needed, at least in the highly complex urban environment. Operators were called to be aware of their responsibility for drivers, passengers, and people on the road. Hence, such vehicles needed to adapt to and be included in traffic management systems.

The panelists of this session concluded that, prior to considering new shared services, the citizens’ and cities’ opinions had to be better understood in order to assess the acceptance of connected automated driving and the expected level of safety. Afterwards, demonstrations and pilots would be needed to make connected and automated driving real and provide citizens with personal experiences.

**Speakers**

Iain Macbeth, Transport for London  
Guido di Pasquale, UITP  
Sofia Löfstrand, VOLVO  
Sami Sahala, Forum Virium  
Shinji Itsubo, Ministry of Land, Infrastructure, Transport and Tourism, Japan (MLIT)

**Moderator**

Nadège Faul, VEDECOM

**Organiser**

#EU Goes Driverless / THE NEWSLETTER OF THE CONNECTED AUTOMATED DRIVING IN EUROPE INITIATIVE
Role of “In-Vehicle Technology Enablers” to realize Automated Driving aims to eliminate driver from the driving loop altogether thus aiming to improve road safety and reduce fatalities. In order to realize this goal, the vehicles of the future need to become more intelligent. Replacing the eyes and ears, brain and nervous system of human drivers with sensors, embedded computing platforms and fail-operational architecture is quite challenging. In other words, the technologies inside the vehicle need to become reliable, fault-tolerant and stable irrespective of the operating conditions.

This session explored how different In-Vehicle Technologies can contribute to realize Automated Driving and to develop new functions replacing the driver human activities by improving vehicle security.

The panelists agreed that In-vehicle technologies are key enablers for connected and automated driving (CAD), with main challenges stemming from the high complexity within the domain, and its interdependencies with other technical and non-technical fields. Future developments will have to emphasize collaboration among systems, components and partners to develop cutting-edge, robust, and reliable solutions. It is expected that as the solutions continue to advance, additional complexities will emerge, further challenging the domain.
Stakeholders involved will need to consider the ramifications of quantity vs. quality of data as well as defining verification vs. validation techniques.

The panelists of the session concluded that in order to address the above-mentioned challenges, it will be key to establish standards for all functions and partners within the ecosystem in close collaboration with regulatory bodies. It is also imperative to consider the overlap with other fields, including, but not limited to, security and safety.

**Speakers**

David Weidenfelder, BOSCH  
Ulrich Koehler, Hella  
Armin Gräter, BMW  
Prasant Narula, Aptiv

**Moderator**  
Armin Gräter, BMW
Currently there are many open issues regarding the deployment, operation and maintenance of physical and digital infrastructure (PDI) for connected and automated driving transport. The roles and responsibilities of multiple stakeholders, likely deployment scenarios and time plans need to be agreed upon by the stakeholders from both – the demand and supply side of the infrastructure.

The session on Physical & Digital Road Infrastructure addressed open issues such as the importance of vehicles interacting with the road infrastructure. The panelists addressed different themes related to this field such as: Operational Design Domain (ODD), the road operator prospective, the impacts of automated vehicles on roads and I2V applications for cooperative automated driving and traffic management.

The panelists agreed that coverage and continuity of ODDs are important for use and user acceptance. There is a need for solutions to prevent and manage transfer of control between automated and manual modes. Most participants expect the automated vehicle to deal with all current roads and the need to explore parameters defining ODDs for each automation use case, and their threshold values was also prioritized.
Some of the themes that emerged during this discussion include these:

- Stakeholders need to work together to agree on the roles and responsibilities for determining the ODDs, and to identify the optimal way to accomplish them.
- The need for real life tests to explore impacts and to fully understand the capabilities of automated vehicles.
- The role and uses of connectivity in automation needs to be verified in such tests, today mostly focusing on autonomous vehicles.
- Problems related to tyre wander have to be solved for trucks and cars. Research is needed to produce reliable pavement design models to cope with the impacts of CAD and other future challenges.
- Development of the digital infrastructure is needed to support automated driving by providing and extending the V2X messaging.

The question of who should pay for the digital and physical infrastructure and the related research raised discussion. A special road use charge for automated vehicles or truck platoons was proposed as one solution.

**Speakers**

Timo Saarenketo, Roadscanners  
Manfred Harrer, ASFINAG  
Risto Kulmala, Traficon  
Jaap Vreeswijk, MAPtm

**Moderator**

Jacqueline Erhart, ASFINAG
Socio-Economic Impacts

Assessing socio-economic impacts and sustainability of automated driving provides valuable insights for drivers/users, fleet operators, transport authorities and road authorities making decisions about investments. To make well-reasoned decisions on future developments, a good understanding is needed of how the benefits for society, sustainability and transport will be reached with increased automation. Furthermore, numerical estimates of benefits need to be provided for the cost-benefit analyses.

The session on Socio-Economic Impacts focused on impact mechanisms, feasibility to assess and estimate impact for selected areas. The use of evaluation results for industry and policy perspectives was also discussed.

The panelists addressed different themes related to this field:
- Automated driving from the city view
- The impacts of vehicle automation on traffic flow and capacity
- The market penetration information as essential input to socio-economic impact assessment

The interactive session, engaged the
The panellists agreed that intended consequences of automation need to be defined, i.e. what desirable outcome would be, as well as desirable behaviour of AVs (user perspective vs. efficiency perspective). Current status needs to be known (baseline), but also a lot of new inputs are needed for the scaling up. The role of policy/authorities who led shared automated mobility, could enhance many positive impacts, although research activities on motivating people to sharing their mobility is needed.

The panellists agreed that in order to ensure common views on goals and how to achieve them, there will be a need to start testing different concepts of automation and to learn how cooperate with the local transport operators.

**Speakers**

**Torsten Geissler,**
Federal Highway Research Institute (BASt)

**Iain Macbeth,** Transport for London

**Kerry Malone,** TNO

**Moderator**

**Satu Innamaa,** VTT

**Organiser**
Human Factors & User Awareness

This session addressed challenges associated with the introduction of automated vehicles in mixed traffic environments, and outlines current progress as well as future research needs. Fundamental Human Factors challenges are to ensure safety, ease of use, trust, acceptance and comfort, for users/passengers of automated vehicles. Likewise, a safe and acceptable interaction with other road users including pedestrians and cyclists needs to be established.

In the session, researchers and industrial representatives within the CARTRE Network from ongoing research initiatives and international experts discussed the state-of-the art of Human Factors and User Awareness & Acceptance research for automated vehicles, current design guidelines and evaluation methodologies.

The Session addressed five key topics:

- New HMI developments for AVs
- Driver state monitoring
- Interaction with other road users
- Societal acceptance
- Testing/Validation procedures
The panellists considered as one of the main challenges for Human Factors & User Awareness is the difficulty to conceptualize the SAE Level 4 HMI user requirements; personalization is key. The importance for driver state monitoring was addressed: it should be a must but not to fully rely on to avoid driver misuse. Focus should be on all road vehicles. The interaction with other road users is also an important issue to address and in particular the pedestrian behaviour who could over-rely on (or take advantage of) the AD vehicle, needs to be taken into consideration. The question of whom has access to the data, if the automated car has a black box was raised and protection of personal data was prioritized. Concerning testing/validation procedure, it was agreed that human related behaviour should be included in SAE Level 3 test procedures.

**Speakers**

Evangelos Bekiaris, CERTH  
Satoshi Kitazaki, AIST  
Andreas Eustacchio, Attorney at law  
Riender Happee, TU Delft  
Olivier Lenz, FIA  
François Fischer, ERTICO  
Arjan van Vliet, RDW

**Moderator**  
Anna Schieben, DLR

**Organisers**
Vehicle validation

CAD vehicle validation still presents a methodological challenge and one of the major cost factors for automation deployment. Scenario-based safety validation seems a promising approach to reduce these costs. Nevertheless several topics e.g. cross-border testing and international collaboration and harmonisation are also crucial for competitive speed.

The session aimed at exploring different approaches for vehicle validation through the presentation of current European and National initiatives.

- The use of scenario-based simulation
- Building a model of real world driving by collecting real world data
- Pilot testing for the CAD impact assessment
- Current plans for consumer testing and features looking at the user awareness of their vehicles safety capabilities.

In order to make progress to learn how we can provide full coverage validation, the panellists agreed that virtual validation plays an important role and needs to be validated (in terms of reliability and completeness)
and accepted by regulators (more used to physical testing approaches). It is essential to improve procedures to obtain scenarios, however data sharing (at international level) would certainly reduce costs but there is a challenge in terms of property and local differences. It is important to consider also that it is not just about the safety of the function, but how the driver makes use of the vehicle and the evaluation of safety in relation to other road users/elements.

In conclusion, sharing of scenarios can hugely reduce costs but technical and organisational issues need to be solved. Stakeholders need FOTs / Pilots to obtain relevant, real world data that supports the improvement of physical/virtual validation tools and methodologies.

**Speakers**
Richard Schram, Euro NCAP
Jürgen Holzinger, AVL
Felix Fahrenkrogh, BMW
Annie Bracquemond, Vedecom

**Moderator**
Simon Edwards, RICARDO
Overview of achievements, remaining legal challenges and solutions for the deployment of AD systems in Europe. This session aimed at making an overview of achievements and remaining legal challenges and solutions for the deployment of AD systems in Europe. The Status of Vienna and Geneva Conventions, the special case of the German Road Traffic Act, the implications of the General Data Protection Regulation, the impact of AI on Civil and Criminal liability regimes as well as the insurance companies’ perspective was discussed.

The panelists presented short statements about International Conventions on Road Traffic, current and future technical vehicle regulations, modifications of the Road Traffic Code in Germany, liability issues and perspective from the insurers.

The main conclusions addressed for this session are as following:

• Main goal of regulation is safety and protection for consumers and producers
• Modification of German Traffic laws allowing SAE L3 functions under conditions (intended purpose, driver vigilant enough)
• New technical regulation paradigm: a new regulation – A new product
• Civil liability is not expected to change much. Insurance will pay. Recourse actions will be made more complicated
Concerning data recording, a series of questions were raised such as who was in charge of driving in case of a crash and who is requesting to drive? Why did the crash occur? Access to data is an issue.

Next steps
- UNECE WP1 to create a resolution on deployment of HFAV and also a discussion paper on side activities
- Technical regulation: horizontal regulation (physical test, audit, test drive) is coming
- What should an AD data recorder do and who should have access to?
- Ideally, apply the tables of law of a trustworthy company (especially the 8th: mitigates harm in the event of failure)

We have a high collective responsibility, let’s be aware of it!

Speakers
Joel Valmain, Vice-Chair UNECE/WP 1
Tom Gasser, Bast
Thierry Latelise, Renault
Jessica Uguccioni, Law Commission, UK
Peter Blumer, Allianz

Moderator
Arjan Van Vliet, RDW

Organiser
Validation of AI and AI for validation

In the form of machine learning, AI presents the indispensable technology for the development of autonomous driving functions. The validation and successful implementation therefore hinges on the availability of training data and the effectiveness of the training depends on both the quantity and the quality, i.e. diversity, of test scenarios. To validate AI-based functions, and to thereby reach the necessary safety levels that can foster user acceptance, practical driving experience must be supplemented with driving simulations. The availability of training data can be greatly improved through active data exchange or the use of shared and open platforms. In the preparation/

extraction of these training sets and scenarios, AI techniques are also required for the analysis of collected and shared Big Data, e.g. for the annotation of raw data.

To approach the session topic, the current role of AI in autonomous driving and the prospects and challenges ahead were initially discussed. The talk covered the challenges encountered when employing AI, as an end-to-end black box solution trained via a trial-and-error approach, including life-critical applications. The speakers stressed the necessity to complement real-world testing with simulation for AI training, since this provides opportunities to significantly increase the scope, diversity and completeness as well as the speed of testing.
Validation and subsequent certification of AI functions were further discussed in the second part of the session. It was explained how to train and validate an AI CAD function using synthetic data and showed how synthetic data can be generated from real-world models and when it is considered sufficient to ensure safe and reliable operation. This procedure can be used as a basis for the benchmarking of development processes, which may be accelerated using open architectures for model and simulation integration. In this context, the talk also underlined the importance of a collaborative Pan-European approach to AI research.

Speakers
Arpad Takacs, Almotive
Philipp Slusallek, DFKi

Moderator
Hala Elrofai, TNO

Organisers
This thematic area identified the future needs for connectivity of higher levels of automation. Vehicle-to-everything (V2X) connectivity, in its various forms, will act as an additional enabler for the highly and fully automated vehicles. Industry efforts to develop V2X for highly and fully automated vehicles have accelerated significantly and will eventually lead to 5G. The development of viable business models will be as essential to successful V2X deployments. This session uncovered the key European activities and plans on how connectivity will eventually contribute to a sound and safe deployment of CAD.

This session included presentations on connectivity seen from the perspectives of an OEM, a Road operator and a telecommunication supplier as well as presentations from European projects currently running and dealing with the topic.

Panelists concluded that connectivity is already in the cars today. Current apps are based on cellular communication and are addressing navigation and guidance, technical services (e.g. remote diagnostics) or social networks. Vehicle clouds, as an extension of the vehicle on-board sensor platform and their interfaces to the service clouds will offer a viable solution to the connectivity with traffic managers, road operators and other services of public interest.

Data privacy, cyber security and data access
should be addressed in cooperation with ICT especially IoT communities.

Current C-ITS standards do not yet answer the needs for automated driving and safety critical applications, in particular for higher levels of automation. Standards need to be updated for example due to requirements from authorities regarding cybersecurity. Some groups and EU-funded projects are already working on the extension of V2X messages.

The session concluded on a unanimous statement that there is a need to focus on services required by the user, not on technology, and that it is essential to continue data-driven assessment in real conditions and to increase public awareness.

**Speakers**

Mikael Fallgren, ERICSSON  
Francois Fischer, ERTICO  
Jaime Moreno, DGT  
Angelos Amditis, ICCS  
Christian Rousseau, RENAULT

**Moderator**

Maxime Flament, ERTICO – ITS Europe

**Organiser**

ERTICO – ITS Europe
News and Events

EUCAD2019 conference
2-3 April 2019 – Brussels

AVS Automotive Vehicle Symposium
9-12 July 2018 – San Francisco

http://www.automatedvehiclessymposium.org/home
International workshop on strategies for sharing data and knowledge

17 September 2018  Copenhagen, Denmark,
in conjunction with the ITS World Congress 2018

ITS World Congress
17-21 September 2018 – Copenhagen

https://itsworldcongress.com/

Autonomy & The Urban Mobility Summit
18-20 October 2018 - Paris

https://www.autonomy.paris
Interested in the development of automated road transport technologies?
Join our stakeholder community:
www.connectedautomateddriving.eu

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