D9.4

TransAID Symposium

Project Acronym	TransAID	
Project Title	Transition Areas for Infrastructure-Assisted Driving	
Project Number	Horizon 2020 ART-05-2016 – GA Nr 723390	
Work Package	WP9 Dissemination, Knowledge Transfer and Exploitation	
Lead Beneficiary	Transport & Mobility Leuven (TML)	
Editor / Main Author	Sven Maerivoet	TML
Reviewers	Anton Wijbenga	MAP
	Julian Schindler	DLR
Dissemination Level	PU	
Contractual Delivery Date	M24 (Aug19)	
Actual Delivery Date	31-08-2019	
Version	v0.4	

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 723390.

Document revision history

Version	Date	Comments
v0.1	15/07/2019	Initial draft version with proposed structure
v0.2	28/08/2019	First complete draft version
v0.3	29/08/2019	Internally reviewed version
v0.4	30/08/2019	Modifications according to internal review
v1.0	31/08/2019	Final review and submission

Editor / Main author

Sven Maerivoet (TML)

List of contributors

Kristof Carlier (TML)
Péter Pápics (TML)
Yun-Pang Flötteröd (DLR)
Robert Alms (DLR)
Julian Schindler (DLR)
Yun-Pang Flötteröd (DLR)
Leonhard Lücken (DLR)
Evangelos Mintsis (CERTH)
Anton Wijbenga (MAP)
Jaap Vreeswijk (MAP)
Alejandro Correa (UMH)
Meng Lu (DYN)
Michele Rondinone (HYU)

List of reviewers

Anton Wijbenga (MAP)
Julian Schindler (DLR)

Dissemination level:

■ PU: Public
□ RE: Restricted to a group specified by the consortium (including the Commission Services)
□ CO: Confidential, only for members of the consortium (including the Commission Services)

Table of contents

Document revision history 2
Table of contents 4
1 Executive summary 5
2 Introduction 6
2.1 About TransAID 6
2.2 Purpose of this document 7
2.3 Structure of this document 7
3 Setup, location, and organisation 8
4 Presentations given 11
4.1 Programme 11
4.2 Presentations 12
5 Survey results 14
5.1 First session results 15
5.2 Second session results 16
6 Conclusions 18
Appendix A. Detailed survey results 19
A.1 First session results 19
A.2 Second session results 24
Appendix B. Photos 28

1 Executive summary

This report describes the organisation and outcome of the TransAID Symposium, held in Paris, France, on 9 June 2019, in conjunction with the IEEE Intelligent Vehicles Symposium (IV 2019), one of the major annual conferences of the IEEE Intelligent Transportation Systems Society (ITSS). In light of dissemination and obtaining stakeholder knowledge, TransAID bundled its resources with a large existing IV 2019 event to ensure a higher probability of attracting people to the workshop.

As the audience of our workshop (which targeted technologies for cooperative and automated road transport) constituted a mix of academia, researchers, and industry, we were able to foster the interactive exchange between all these parties.

The contents of the workshop comprised survey questions posed via the Mentimeter platform, invited speakers, and oral-paper presentations (which were thematically put into the two categories, of Connected and Automated driving, as well as security-related aspects of Cooperative ITS). Each time, an interactive discussion with the audience ensued, providing further insights into the authors' points of view.

The survey results revealed that about half of the participants came from academia. Interestingly, a large group was in favour of foreseeing areas where automated driving should not be allowed, thereby directly confirming that TransAID's research questions and approach are sound and sensible. A very high proportion of the participants also spoke out towards OEMs, asking them to explain the limitations of their automated vehicles. In addition, connectivity was perceived as a mandatory requirement for Level 3 or higher automated vehicles. To conclude, a discussion followed some of the results related to the question whether (connected) automated vehicles would be allowed to break the law. This was seen as moderately acceptable when optimisation of the traffic stream was called for, but definitely for the purpose of increasing traffic safety.

2 Introduction

In the following sections we first give a concise overview of the TransAID project, followed by the purpose of this document, and finally its structure.

2.1 About TransAID

As the introduction of automated vehicles becomes feasible, even in urban areas, it will be necessary to investigate their impacts on traffic safety and efficiency. This is particularly true during the early stages of market introduction, where automated vehicles of all SAE levels, connected vehicles (able to communicate via V2X) and conventional vehicles will share the same roads with varying penetration rates.

There will be areas and situations on the roads where high automation can be granted, and others where it is not allowed or not possible due to missing sensor inputs, highly complex situations, etc. Moving between those areas, there will be areas where many automated vehicles will change their level of automation. We refer to these areas as “Transition Areas”.

TransAID develops and demonstrates traffic management procedures and protocols to enable smooth coexistence of automated, connected, and conventional vehicles, especially at Transition Areas. A hierarchical approach is followed where control actions are implemented at different layers including centralised traffic management, infrastructure, and vehicles.

First, simulations are performed to find optimal infrastructure-assisted management solutions to control connected, automated, and conventional vehicles at Transition Areas, considering traffic safety and efficiency metrics. Then, communication protocols for the cooperation between connected/automated vehicles and the road infrastructure are developed. Measures to detect and inform conventional vehicles are also addressed. The most promising solutions are then implemented as real world prototypes and demonstrated under real urban conditions. Finally, guidelines for advanced infrastructure-assisted driving are formulated. These guidelines also include a roadmap defining activities and needed upgrades of road infrastructure in the upcoming fifteen years in order to guarantee a smooth coexistence of conventional, connected, and automated vehicles.

Iterative project approach

TransAID will perform its development and testing in two project iterations. Each project iteration lasts half of the total project duration. During the first project iteration, the focus is placed on studying Transitions-of-Control (ToCs) and Minimum-Risk Manoeuvres (MRMs) using simplified scenarios. To this end, models for automated driving and ToC/MRM are adopted and developed. The simplified scenarios are used for conducting several simulation experiments to analyse the impacts of ToCs at TAs, and the effects of the corresponding mitigating measures.

During the second project iteration, the experience accumulated during the first project iteration is used to refine/tune the driver models and enhance/extend the proposed mitigating measures. Moreover, the complexity and realism of the tested scenarios will be increased and the possibility of combining multiple simplified scenarios into one new more complex use case will be considered.

2.2 Purpose of this document

This report describes the organisation and outcome of the TransAID Symposium, held in Paris, France, on 9 June 2019, in conjunction with the IEEE Intelligent Vehicles Symposium (IV 2019).

2.3 Structure of this document

In this document we first describe in section 3, the setup of the TransAID Symposium, as well as its location and organisational aspects. We then elaborate in section 4, on some of the presentations given. The document then concludes with sections 5 and 6, which focus on the survey we organised during the Symposium and what its main results were, and the main conclusions.

3 Setup, location, and organisation

After careful internal deliberation, we were able to find a period, location, and time slot that would allow us to slipstream our workshop together with a large existing event such that we would have a higher probability of attracting people to our workshop.

We planned to hold our Symposium on June 9, 2018 in Paris, France, in conjunction with the IEEE Intelligent Vehicles Symposium (IV[1] 2019), one of the major annual conferences of the *IEEE Intelligent Transportation Systems Society* (ITSS). We called our Symposium the "3rd Workshop on "Connected, Cooperative, and Autonomous Driving", which targeted connected, cooperative, and autonomous technologies for cooperative and automated road transport. The workshop also featured an Industry Panel with experts from related industries, which fostered the interactive exchange of academia and industry.

> *The 30th IEEE Intelligent Vehicles Symposium (IV'19) was a premier annual technical forum sponsored by the IEEE Intelligent Transportation Systems Society (ITSS). It brought together researchers and practitioners from universities, industry, and government agencies worldwide to share and discuss the latest advances in theory and technology related to intelligent vehicles. Papers concerning all aspects of intelligent vehicles as well as proposals for workshops and specials sessions were invited for IV'19. Additionally, related technical Demonstrations and Exhibitions were welcomed.*

As our workshop was planned in parallel with other IEEE-related events we also provided a suitably tailored invitation to set ourselves aside from the other events:

> *Recent developments in telecommunications, sensor, information processing, and control technologies have enabled substantial progress in the domain of ITS. C-ITS is in a very early stage of deployment, as it is technologically achievable, but the deployment requires cooperation of multiple stakeholders. Automated driving is on the horizon, and will still need substantial and longer-term development and testing to make even the high automation levels a reality in complex situations, such as in urban environments, and in a transit period of only partial market penetration. Cooperative and automated transport are certainly complementary. They are expected to bring substantial benefits in terms of safety, comfort and (traffic and fuel) efficiency. Many challenges exist in this important domain.*

[1] https://iv2019.org/

The workshop targets the challenges for C-ITS applications, especially connected and cooperative systems towards automated driving. Competing communication technologies (e.g., peer to peer (IEEE 802.11p), cellular network, and future 5G), sensor, information processing and control technologies will be highlighted. The impacts of (C-)ITS applications will be analysed. Requirements for strong cooperation between industry, authorities and academia in different regions will be addressed.

The workshop is expected to be very interactive. Participants will have an excellent opportunity to discuss with and to challenge distinguished speakers and panellists. The technical areas to be discussed include, but are not limited to the following:

- *Connected and automated Vehicles*
- *V2X communications*
- *C-ITS deployment*
- *Standardisation*
- *5G research and testing*
- *Connected and cooperative systems*
- *Impacts evaluation of connected, cooperative, and automated transport*

The main conference organisers were on the one hand Dr. Meng Lu, Strategic Innovation Manager at Dynniq (The Netherlands), VP for the IEEE Intelligent Transportation Systems Society, and Steering Committee Member for the IEEE Future Networks (Enabling 5G and Beyond), and on the other hand Dr. Cristiano Premebida, Aeronautical and Automotive Engineering at the Loughborough University.

As speakers and panellists, we targeted academia, OEMs, suppliers, ICT infrastructure providers, authorities, standardisation bodies, and other organisations.

The workshop was moderated by Mr. Tim Leinmueller from DENSO AUTOMOTIVE (Germany).

The set of workshop partners with whom we cooperated was:

<table>
<tr><td>  </td><td>  </td><td>  </td></tr>
<tr><td>  </td><td rowspan="2">  </td><td rowspan="2">  </td></tr>
<tr><td>  </td></tr>
</table>

Our workshop presented part of the research results of TransAID, MAVEN (Managing Automated Vehicles Enhances Network), and C-MobILE (Accelerating C-ITS Mobility Innovation and depLoyment in Europe), which are funded by the European Commission Horizon 2020 Research and Innovation Framework Programme, under Grant agreements No. 723390, 690727, and 723311, respectively.

The programme and results of our workshop were also put online at:

https://www.transaid.eu/organised-events-workshop2/

4 Presentations given

4.1 Programme

Time	Event
9:00	Welcome & Introduction
	Survey questions
9:15	**Dr Meng Lu** (Dynniq, The Netherlands) - "ICT infrastructure systems for automated driving"
9:30	(paper 1) "In-Chamber V2X Oriented Test Scheme for Connected Vehicles"
9:45	(paper 2) "Optimal control based CACC: problem formulation, solution, and stability analysis"
10:00	Coffee Break (30 min)
10:30	**Dr Marc Lacoste** (Orange Labs, France) - "Connected and Autonomous Vehicle Security: Challenges Ahead for
11:00	(paper 3) "TARA+: Controllability-aware Threat Analysis and Risk Assessment for L3 Automated Driving"
11:15	(paper 4) "A Test-Driven Approach for Security Designs of Automated Vehicles"
11:30	**Dr Antonio Kung** (CEO of Trialog, France) - "Management of privacy in cooperative ITS"
12:00	**Dr Pete Thomas** (Loughborough University, UK) - "Assuring the Safety of Autonomous Vehicles"
12:30	Lunch (1h30')
	Survey questions
13:30	**Dr Julian Schindler** (DLR, Germany) - "Infrastructure-assisted automated driving in transition areas"
14:00	**Dr Michele Rondinone** (Hyundai Europe) - "Vehicle Automation"
14:30	**David Quesada** (Enide, Spain) - " Preparing the road infrastructure for the introduction of Automated Driving -
15:00	(paper 5) "Infrastructure Support for Cooperative Maneuvers in Connected and Automated Driving"
15:15	(paper 6) "Test and Evaluation of Connected and Autonomous Vehicles in Real-world Scenarios"
15:30	Coffee Break (30 min)
16:00	**Dr Henning Hamer** (Continental AG) - Enabling L3 + driving through the generation of crowd-sourced maps
16:30	**Nouhed Naidja** (VeDeCom, France) - "Base material for microscopic autonomous simulation"
17:00	Round table, concluding remarks, discussion
	Survey discussion
17:30	**Closing**

4.2 Presentations

The workshop was composed of three different types of interaction: survey questions, invited speakers, and oral-paper presentations.

- **Survey questions**
  - These were based on TransAID's D2.2 (Scenario definitions an -modelling requirements)
  - They were interactively posed and presented using Mentimeter (see also Section 5).

- **Invited speakers**
  - *ICT infrastructure systems for automated driving*
    - Dr. Meng Lu (Dynniq, The Netherlands)
  - *Assuring the Safety of Autonomous Vehicles*
    - Dr. Pete Thomas (Loughborough University, UK)
  - *Enabling L3 + driving through the generation of crowd-sourced maps*
    - Dr. Henning Hamer (Continental AG)
  - *Vehicle Automation*
    - Dr. Michele Rondinone (Hyundai Europe)
  - *Infrastructure-assisted automated driving in transition areas*
    - Julian Schindler (DLR, Germany)
  - *Preparing the road infrastructure for the introduction of Automated Driving – the INFRAMIX approach*
    - David Quesada (Enide, Spain)
  - *Management of privacy in cooperative ITS*
    - Dr. Antonio Kung (CEO of Trialog, France)
  - *Connected and Autonomous Vehicle Security: Challenges Ahead for 5G*
    - Dr. Marc Lacoste (Orange Labs, France)
  - *Base material for microscopic autonomous simulation*
    - Nouhed Naidja (VeDeCom, France)

- **Oral-paper presentations**
  - CAD
    - *In-Chamber V2X Oriented Test Scheme for Connected Vehicles*
      - Lei, Jianmei State Key Laboratory of Vehicle NVH and Safety Technology & Chon
      - Chen, Siru Beijing University of Posts and Telecommunications
      - Zeng, Lingqiu Chongqing University
      - Liu, Fangli Chongqing University;
      - Zhu, Konglin Beijing University of Posts and Telecommunications;
      - Liu, Jie China Automotive Engineering Research Institute Co., Ltd

Photos of the Symposium's presenters can be found in Appendix B.

- *Optimal control based CACC: problem formulation, solution, and stability analysis*
  - Bai, Yu Key Laboratory of Road and Traffic Engineering, Ministry Of
  - Zhang, Yu The Key Laboratory of Road and Traffic Engineering, Ministry Of
  - Wang, Meng Delft University of Technology
  - Hu, Jia Tongji University, Federal Highway Administration

- *Infrastructure Support for Cooperative Maneuvers in Connected and Automated Driving*
  - Correa, Alejandro University Miguel Hernández of Elche
  - Alms, Robert Deutsches Zentrum Für Luft Und Raumfahrt
  - Gozalvez, Javier University Miguel Hernández of Elche
  - Sepulcre, Miguel Miguel Hernández University of Elche
  - Rondinone, Michele Hyundai Motor Europe Technical Center
  - Blokpoel, Robbin Dynniq
  - Luecken, Leonhard DLR
  - Thandavarayan, Gokulnath Miguel Hernandez University of Elche

- *Test and Evaluation of Connected and Autonomous Vehicles in Real-world Scenarios*
  - Premebida, Cristiano Loughborough University
  - Asvadi, Alireza Institute of Systems and Robotics
  - Garrote, Luis ISR-UC
  - Nunes, Urbano University of Coimbra

- C-ITS
  - *TARA+: Controllability-aware Threat Analysis and Risk Assessment for L3 Automated Driving Systems*
    - Bolovinou, Anastasia Institute of Communications and Computer Systems
    - Atmaca, Ugur Ilker Warwick Manufacturing Group, University of Warwick, Coventry CV4
    - Sheik, Al Tariq University of Warwick, Warwick Manufacturing Group
    - Ur-Rehman, Obaid FEV Europe GmbH
    - Wallraf, Gerhard FEV Europe GmbH
    - Amditis, Angelos Institute of Communication and Computer Systems

  - *A Test-Driven Approach for Security Designs of Automated Vehicles*
    - Suo, Dajiang Massachusetts Institute of Technology
    - Sarma, Sanjay E. Massachusetts Institute of Technology

5 Survey results

In this section, we give the main results from a survey polled using the Mentimeter[2] platform with the audience.

We asked our questions during two different moments, one in the morning and one right after lunch. The results were then aggregated, analysed, and discussed before closing the Symposium. At the beginning of each question session, participants logged in to a specific website using their phone, tablet, or laptop. Then a series of questions was, one at a time, shown on the main screen, as well as their own devices. The question was also slowly and clearly read aloud, repeatedly if necessary. The audience members could then anonymously select various options to vote, with the poll results each time per question shown in real-time on the main screen.

To support the results from TransAID's simulations and field trials, it is necessary to get a good grasp on certain issues that require an understanding of how connected and/or automated vehicles operate on the one hand, and what the policy makers allow or require on the other hand. This forms a cornerstone to support TransAID's goal, i.e. achieve a library with applicable and scrutinised measures for transition areas. To that end, we pose questions throughout the project to several stakeholders and experts. The goal is to gain insights into legal implications, (expected) driver and/or automated vehicle behaviour and infrastructure specific aspects with respect to automated vehicles. The answers to these questions will provide some feedback on the work done so far, some of which is based on views from experts within the project consortium, and collect insights for future work.

It is within that frame of mind that TransAID organised short surveys[3]. To that end, we used the extensive list in Appendix C of TransAID's Deliverable D2.2, and selected some of the more prone questions to pose to the present audience. Both survey moments were organised efficiently, such that they did not take much time, and thus did not impose on the time available for the presentations.

The detailed, slide-by-slide results can be found in Appendix A.

[2] https://www.mentimeter.com

[3] For the surveys we made the protection of personal data compliant the EU's GDPR regulations. The execution of our surveys was in line with the ethics aspects as covered in TransAID's Deliverable D10.14. No personal data was gathered during the surveys.

5.1 First session results

Half of the 22 participants came from academia; a fifth were OEMs. The first session contained 8 questions.

Question #1	How would you rank the goals of managing traffic with (C)AVs?
Results	1. Increasing traffic safety 2. Increasing throughput 3. Decreasing emissions

Question #2	Level 3 is considered unsafe from an HMI perspective by some; should authorities forbid those vehicles?
Results	1 out of 4 would allow authorities to forbid L3 vehicles, about 2 out of 3 do not.

Question #3	Do you foresee areas in the road network where you do *not* want to allow automated driving?
Results	Over half of the people foresee areas where AD is not allowed, and 2 out of 3 are for dedicated lanes.

Question #4	Should the infrastructure provider put a limitation on the level of automated driving that it allows?
Results	Opinions are somewhat divided, with fifty/fifty percent of the people in the audience expressing pro/contra an infrastructure limitation on the AD level.

Question #5	Should OEMs explain the limitations of their automation?
Results	A large majority of 85% wants OEMs to explain their AD limitations. The other also want this, but just to some extent.

Question #6	Should OEMs be forced to report disengagements (ToCs) from automated driving to a road authority?
Results	2 out of 3 people reply positive, wanting OEMs to report disengagements; 1 out of 4 is unsure.

Question #7	Is connectivity required for some levels of automation (cf. L3 and higher)?
Results	Connectivity is perceived as a requirement for L3+ AVs (with 4 out of 5 agreeing).

Question #8	Should authorities forbid AVs of Level 3 and higher that are not connected?
Results	Only 1 out of 4 wants to forbid these vehicles (note that this is probably a strongly biased sample, as only 4 people responded).

5.2 Second session results

As some people in the audience switched workshops after lunch (ours was organised in conjunction with several others), we asked them again about their background. This time, 2 out of 3 participants came from academia; others were OEMs and service providers.

Question #1	Are road authorities allowed to give advice that will conflict with traffic regulations?
Results	A large majority of over 80% of the people agreed with the statement. However, 1 out of 10 replied negative, mostly citing safety-issues as the main reasons.

Question #2	Would (C)AVs be allowed to 'break the law' if the traffic manager wants to optimise lane changing or merging?
Results	The responses to this question were somewhat mixed. About half of the audience agreed, with a third disagreeing, and the rest being unsure. The main reason for these diverse responses was because of the difficulty in trying to understand/comprehend the question, visualising a possible traffic situation.

Question #3	Would (C)AVs be allowed to 'break the law' in order to behave as all other road users?
Results	3 out of 4 people agreed with this statement, albeit that it heavily depended on the current traffic situation and context.

Question #4	Would (C)AVs be allowed to 'break the law' if this results in a safer situation on the road?
Results	1 out of 3 people replied positive, with the rest saying no or being unsure. After discussion, this mostly stemmed from the fact that the response is highly dependent on the specific traffic situation at hand.

Question #5	Is a ToC needed when another vehicle cuts in and triggers emergency braking?
Results	2 out of 3 people do not prefer MRMs after cut-in situations, with the remainder being unsure.

Question #6	Would automated driving require the support of some sort of backend?
Results	A large majority of almost 80% of the people answered positive. Some would require no support of a backend or from an OEM back-end only.

Question #7	What should a (C)AV do in case its route is blocked?
Results	All responses were mixed, evenly distributed over the available options, i.e.: • Execute an MRM • Execute a ToC • Find another route • Ask for advice

6 Conclusions

From a perspective of dissemination on the one hand, and obtaining stakeholder knowledge on the other hand, TransAID organised its Symposium together with a large existing event to ensure a higher probability of attracting people. It was held on June 9, 2018 in Paris, France, in conjunction with the IEEE Intelligent Vehicles Symposium (IV 2019), one of the major annual conferences of the IEEE Intelligent Transportation Systems Society (ITSS).

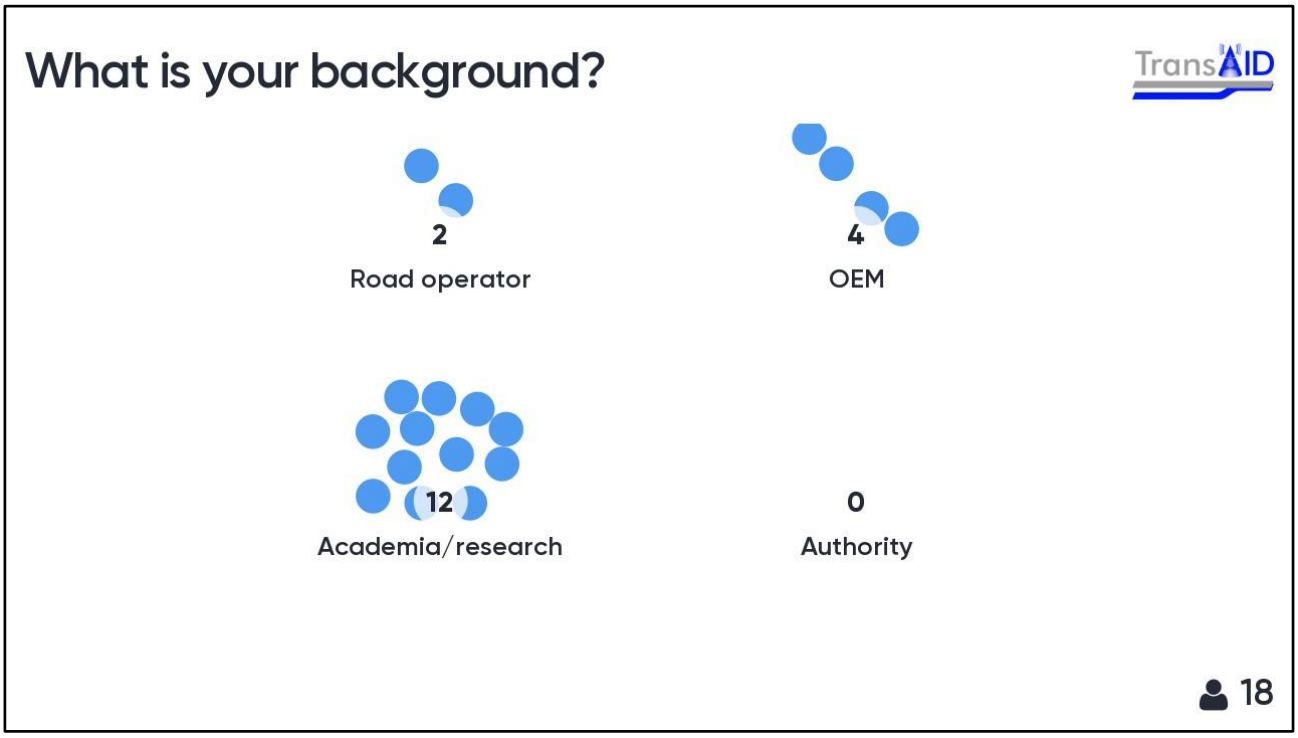
Given the audience of our workshop (targeting technologies for cooperative and automated road transport), we were able to foster the interactive exchange of academia and industry.

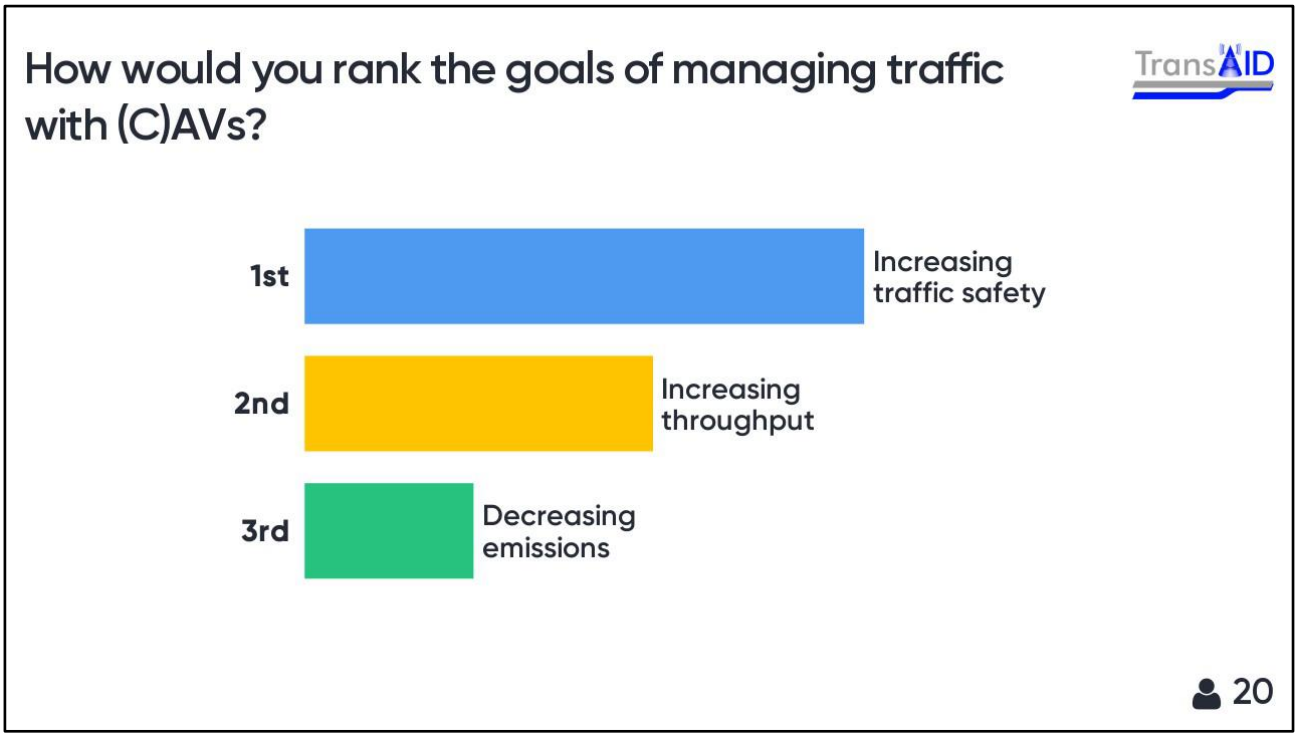
The contents of the workshop were three-fold: there were survey questions posed via the Mentimeter platform, we had a range of invited speakers, and finally we expanded the programme with oral-paper presentations. These latter fall into two categories, i.e. Connected and Automated driving, as well as security-related aspects of Cooperative ITS. Each time, an interactive discussion with the audience ensued, providing further insights into the authors' points of view.

The survey results revealed that about half of the participants came from academia. Interestingly, a large group was in favour of foreseeing areas where automated driving should not be allowed, thereby directly confirming that TransAID's research questions and approach are sound and sensible. A very high proportion of the participants also spoke out towards OEMs, asking them to explain the limitations of their autonomous vehicles. In addition, connectivity was perceived as a requirement for Level 3 or higher autonomous vehicles. To conclude, a discussion followed some of the results related to the question whether (connected) automated vehicles would be allowed to break the law. This was seen as moderately acceptable when optimisation of the traffic stream was called for, but definitely for the purpose of increasing traffic safety.

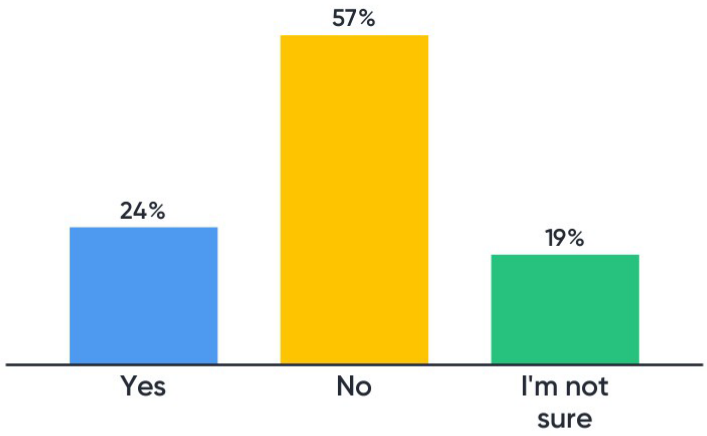
Appendix A. Detailed survey results

A.1 First session results



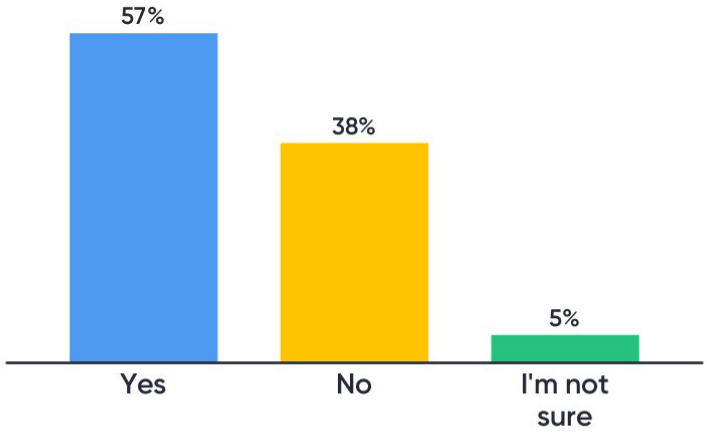


Level 3 is considered unsafe from an HMI perspective by some; should authorities forbid those vehicles?



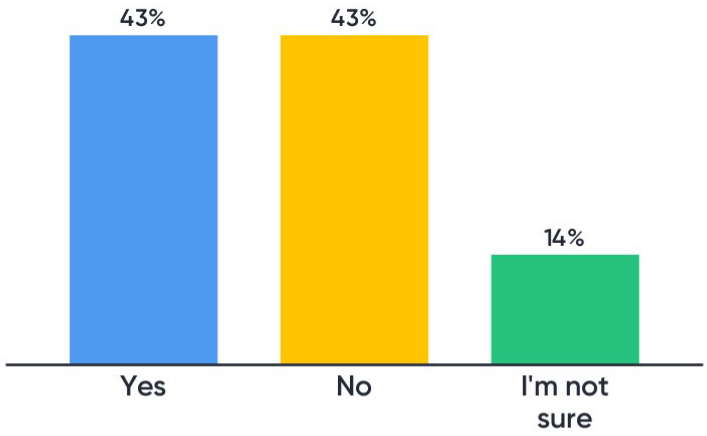
21

Do you foresee areas in the road network where you do *not* want to allow automated driving?



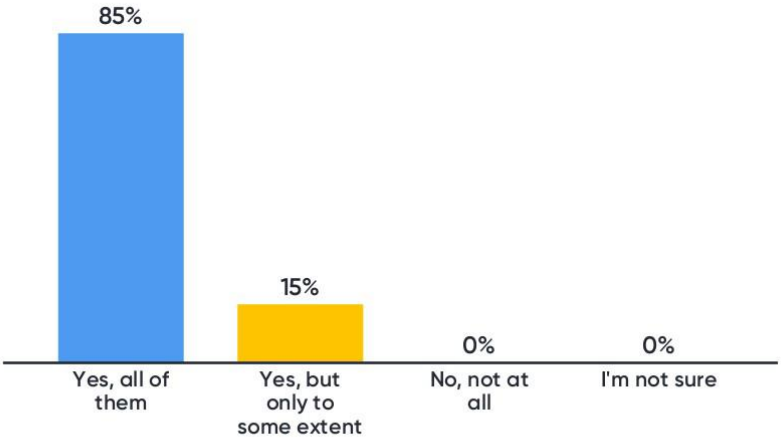
21

Should the infrastructure provider put a limitation on the level of automated driving that it allows?

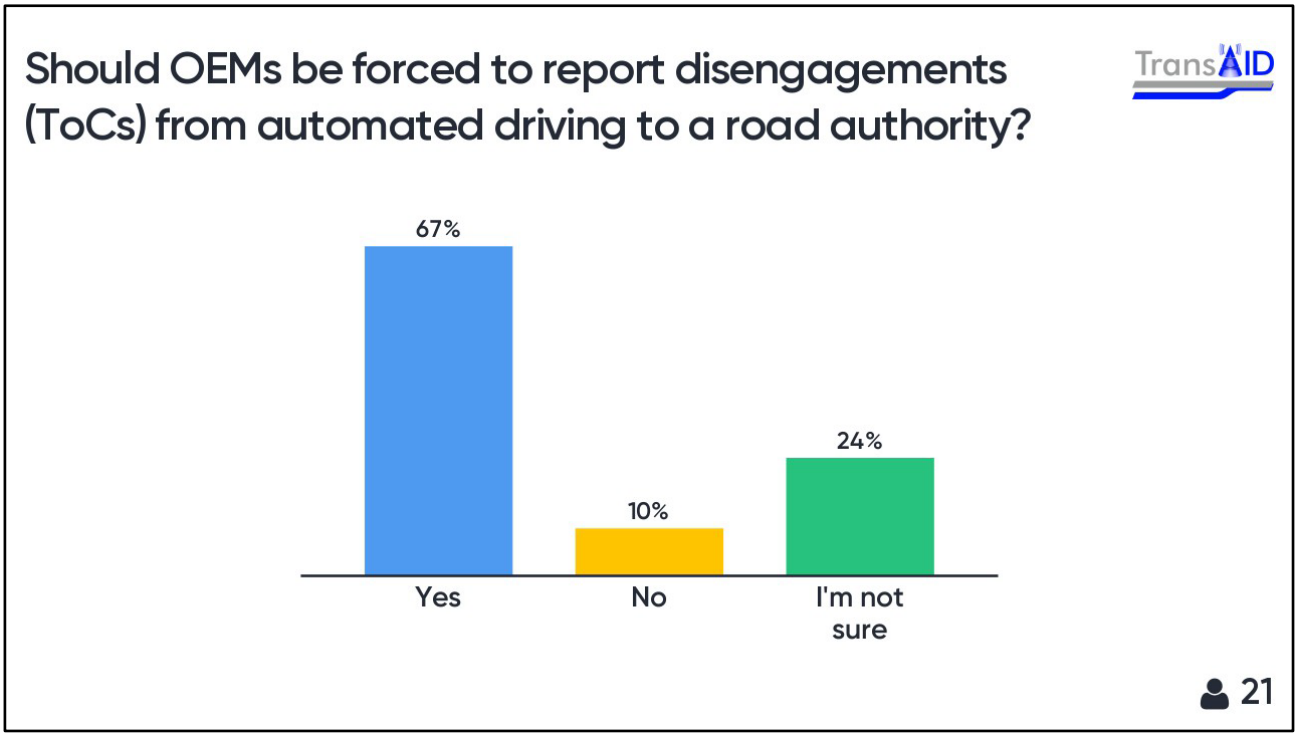


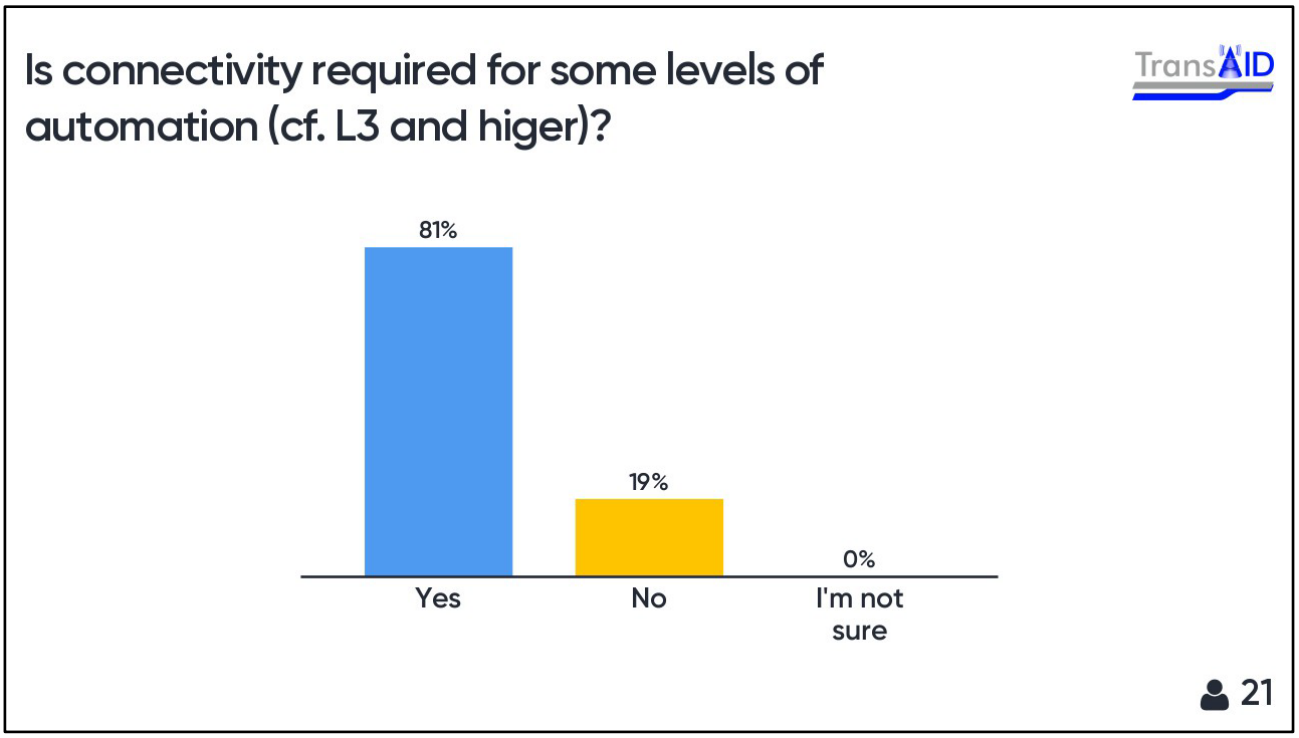
21

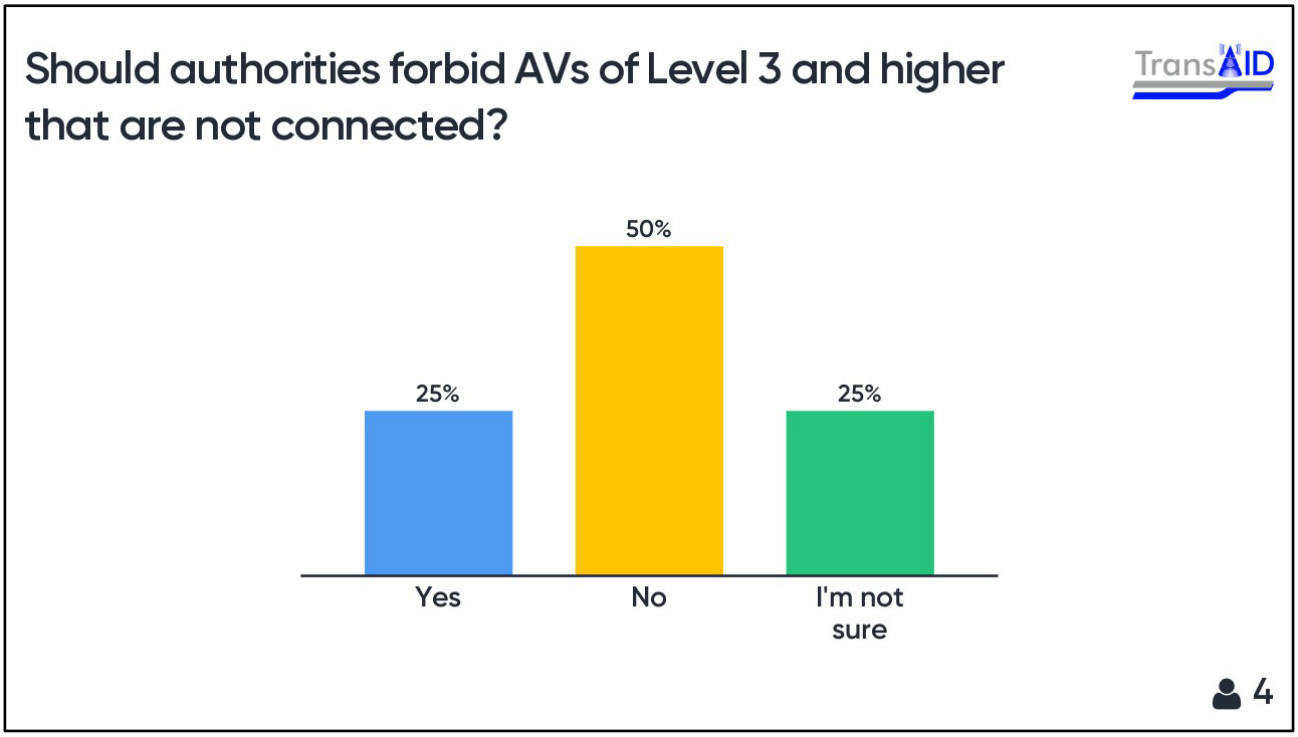
Should OEMs explain the limitations of their automation?



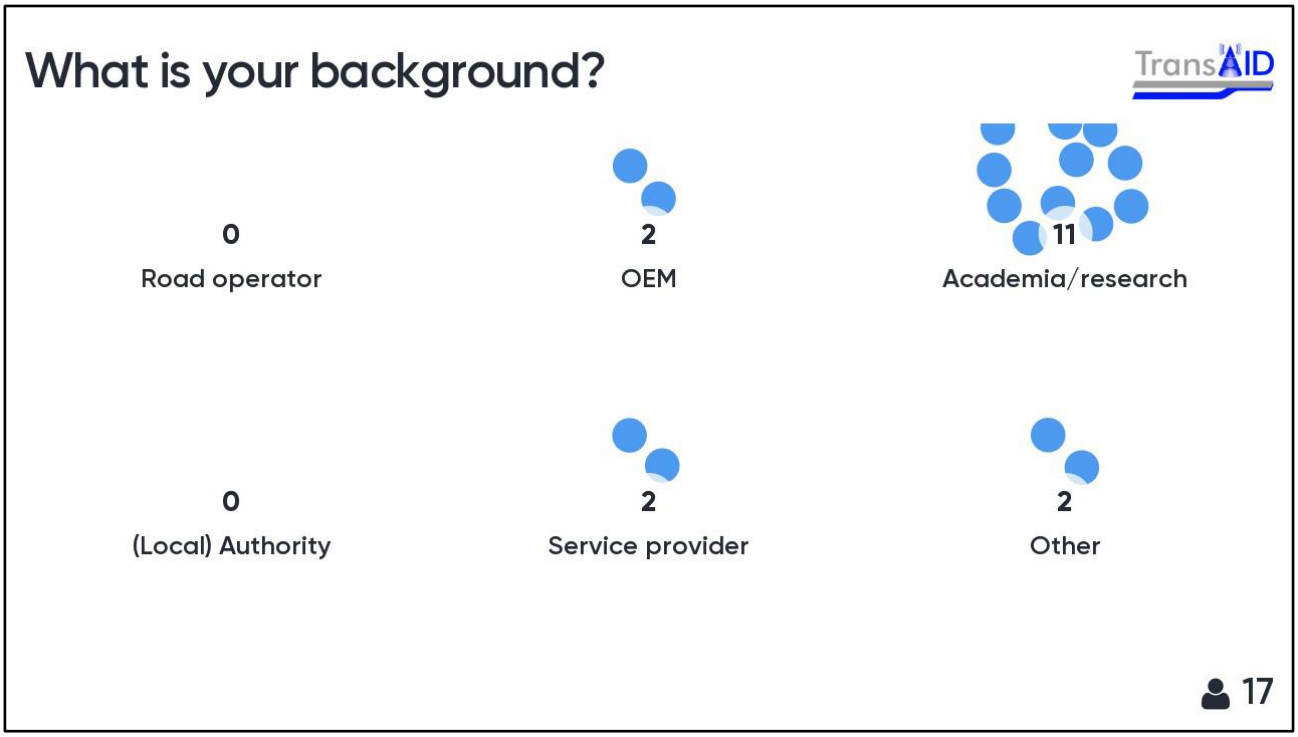
20

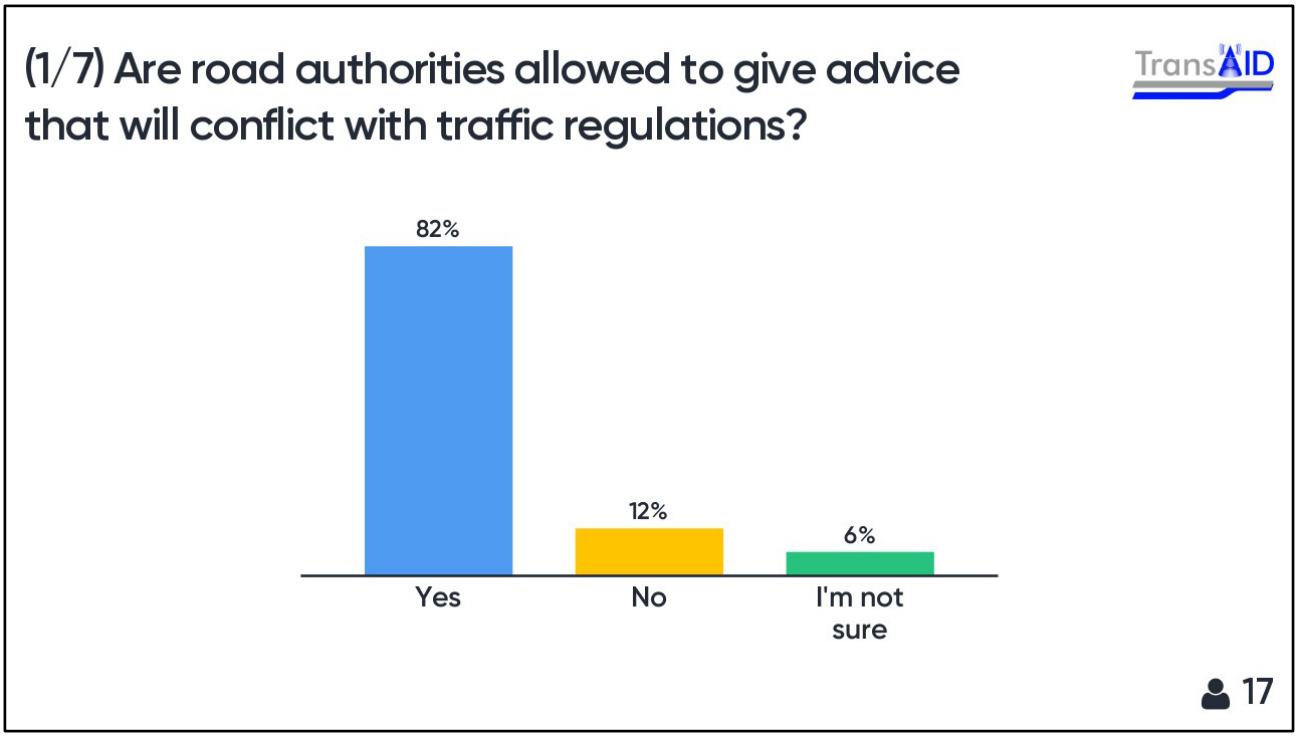

Should OEMs be forced to report disengagements (ToCs) from automated driving to a road authority?
TransAID
67%
10%
24%
Yes
No
I'm not sure
21


Is connectivity required for some levels of automation (cf. L3 and higer)?
TransAID
81%
19%
0%
Yes
No
I'm not sure
21

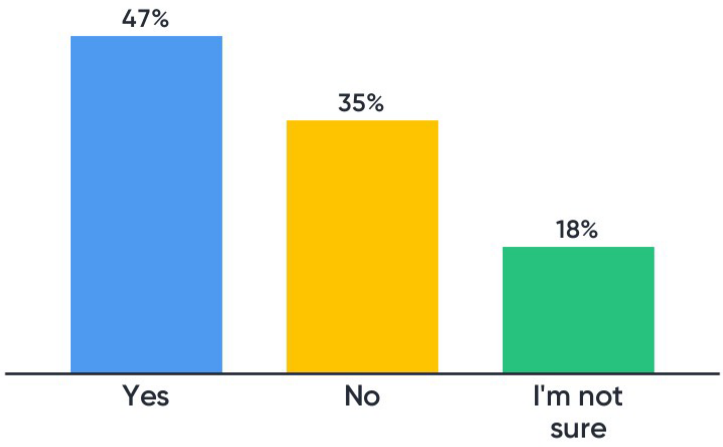

Should authorities forbid AVs of Level 3 and higher that are not connected?
TransAID
50%
25%
25%
Yes
No
I'm not sure
4

A.2 Second session results



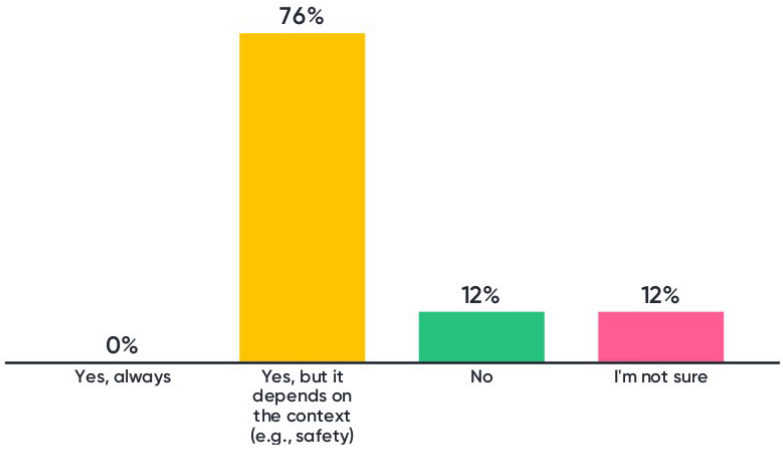


(2/7) Would (C)AVs be allowed to 'break the law' if the traffic manager wants to optimise lane changing or merging?

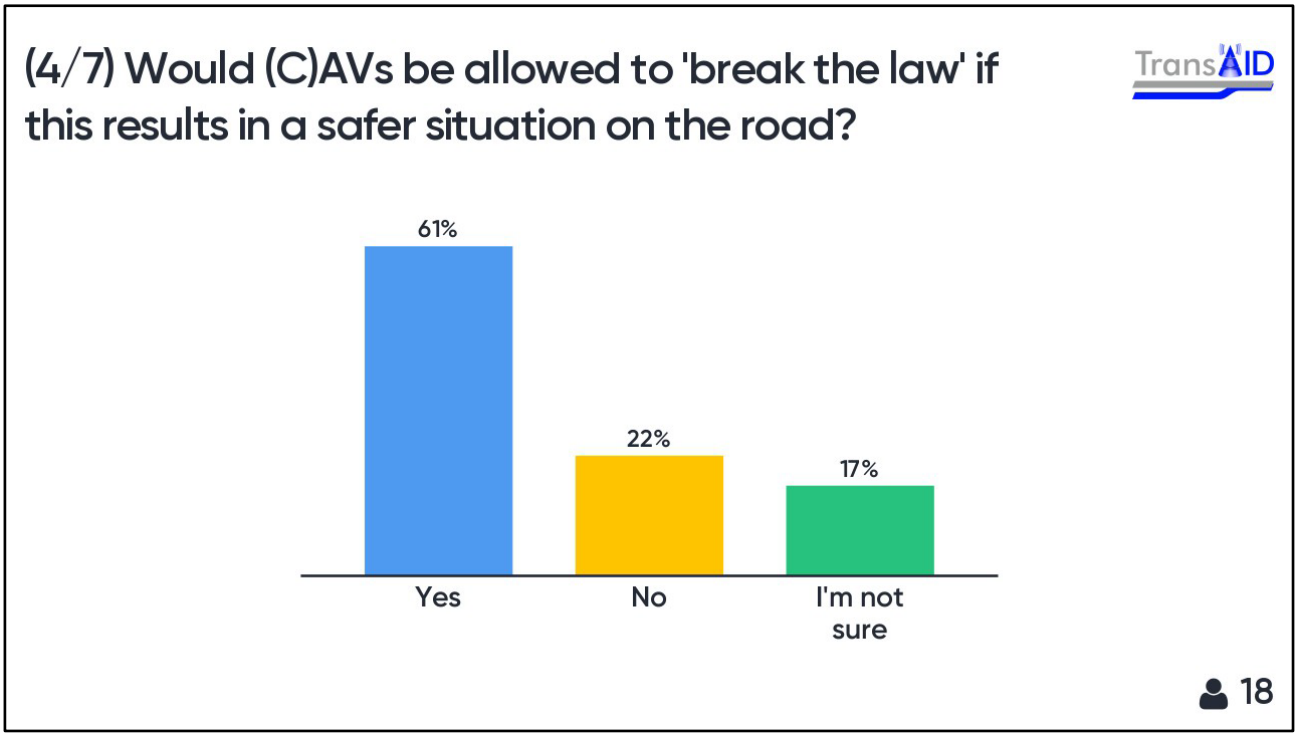


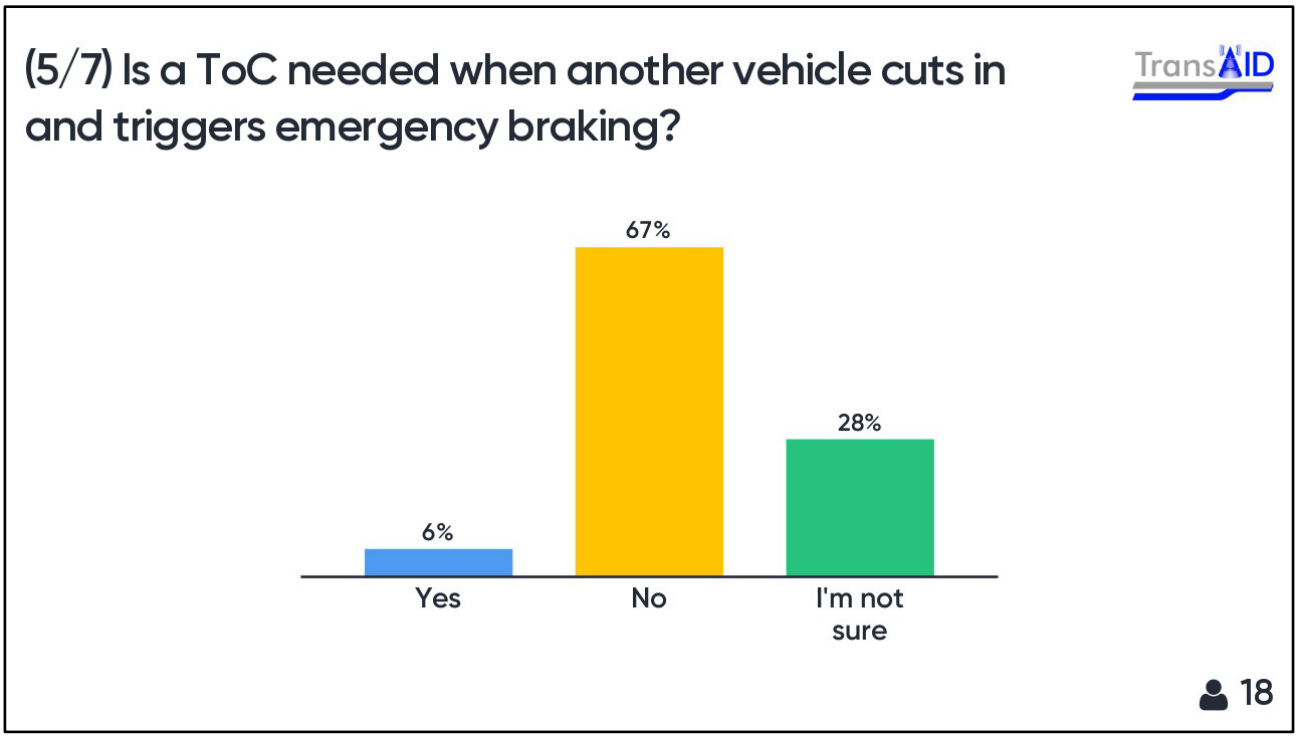
17

(3/7) Would (C)AVs be allowed to 'break the law' in order to behave as all other road users?

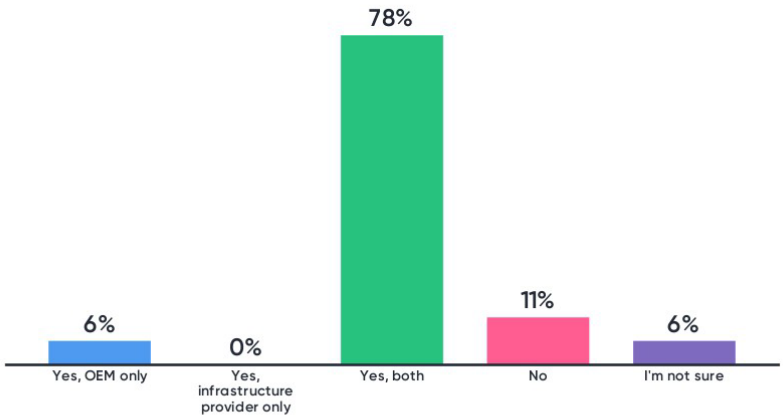


17


(4/7) Would (C)AVs be allowed to 'break the law' if this results in a safer situation on the road?
TransAID
61%
22%
17%
Yes
No
I'm not sure
18

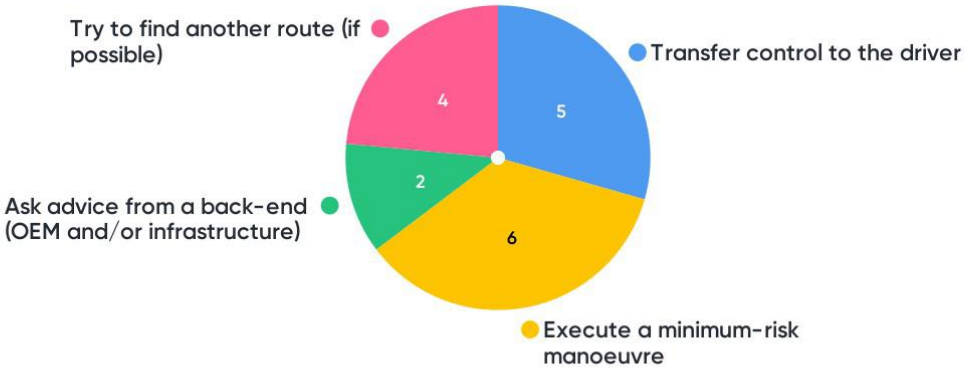

(5/7) Is a ToC needed when another vehicle cuts in and triggers emergency braking?
TransAID
67%
28%
6%
Yes
No
I'm not sure
18

(6/7) Would automated driving require the support of some sort of back-end?



18

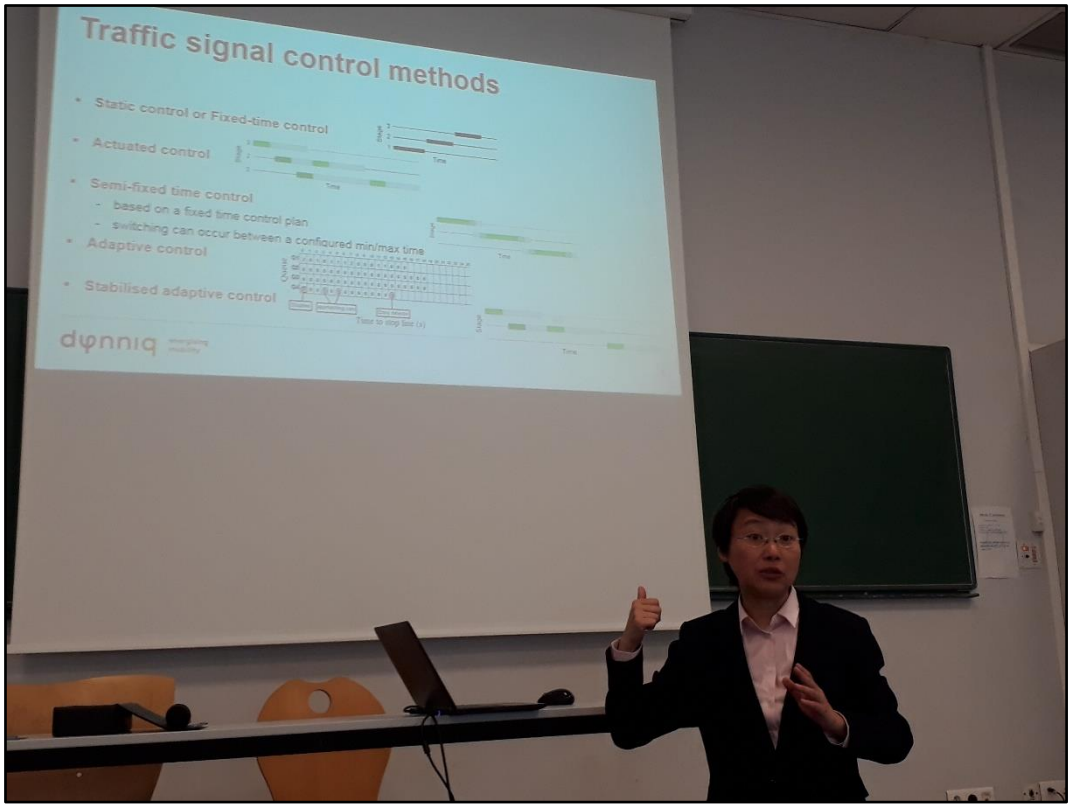
(7/7) What should a (C)AV do in case its route is blocked?



17

Appendix B. Photos

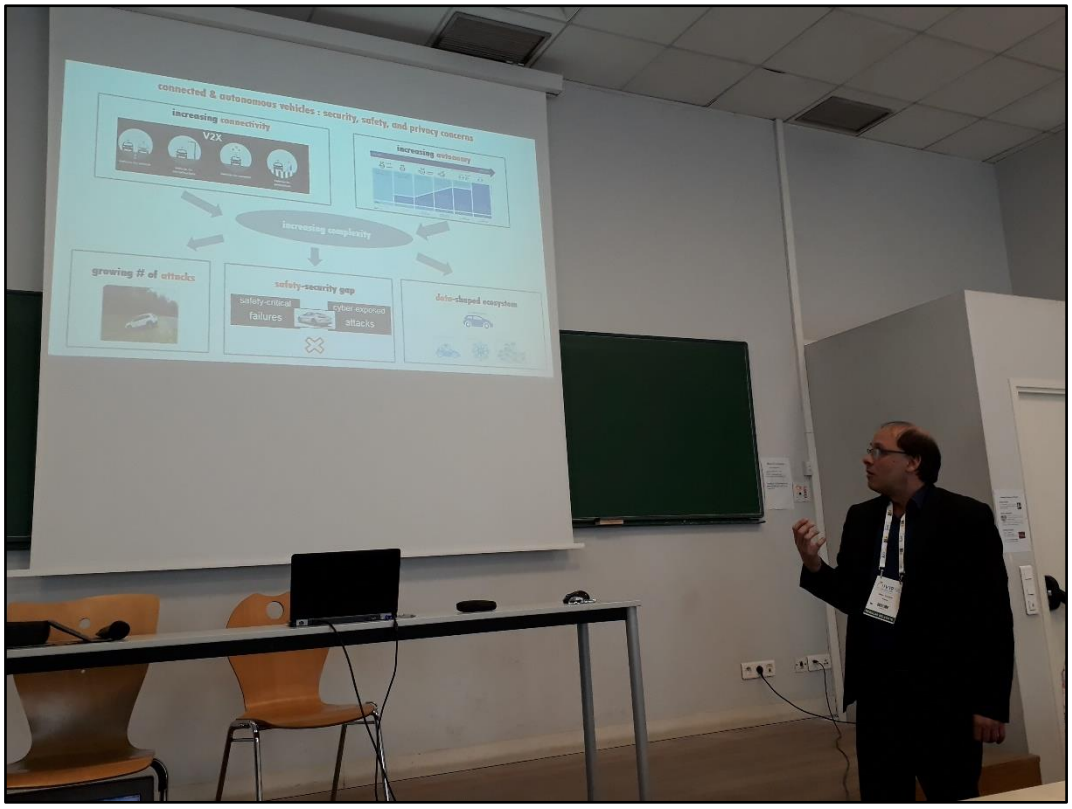

TransAID
Transition Areas for Infrastructure-Assisted Driving
TransAID @ Zagreb | 29 May 2019

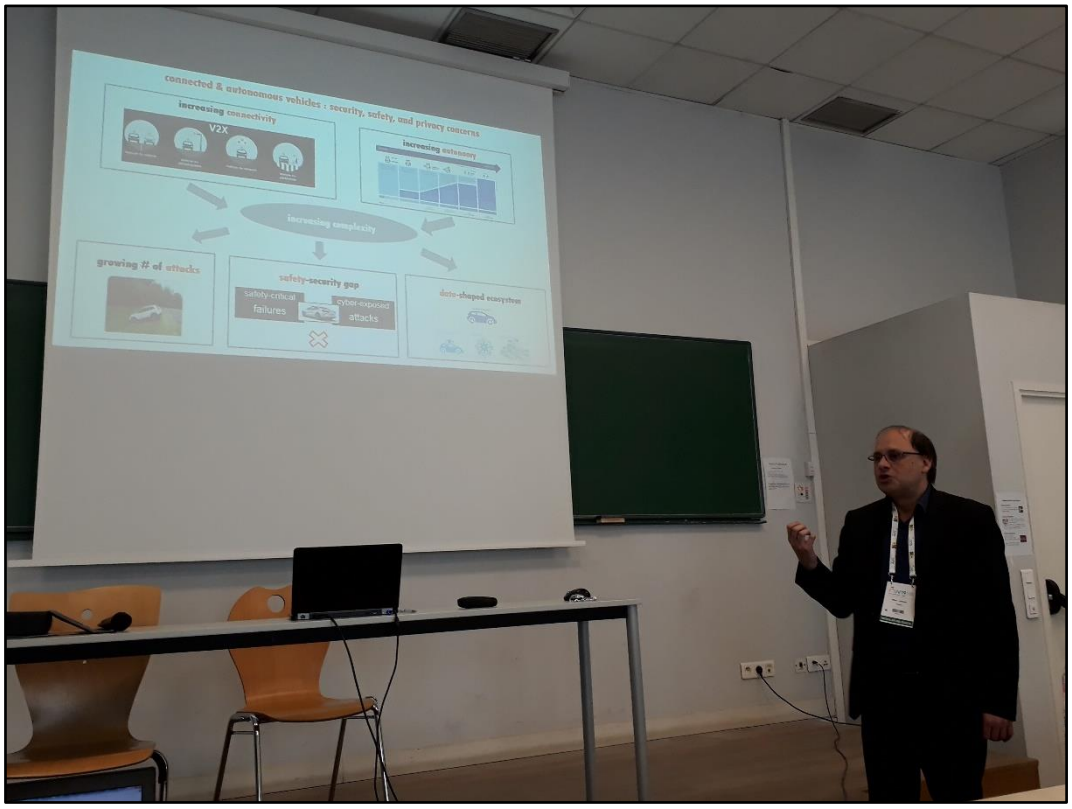

Traffic signal control methods
Static control or Fixed-time control
Actuated control
Semi-fixed time control
based on a fixed time control plan
switching can occur between a configured min/max time
Adaptive control
Stabilised adaptive control


Go to www.menti.com and use the code 59 99 42
(4/7) Would (C)AVs be allowed to 'break the law' if this results in a safer situation on the road?
64%
21%
14%
Yes
No
I'm not sure


Go to www.menti.com and use the code 19 82 13
TransAID


Policy based CACC
Low computation burden
Can be easily implemented
Normally, the local stability and string stability of the policy based CACC systems can be easily analyzed
Optimal Control based CACC
Can be designed to fulfill multiple objectives (efficiency, safety, etc.
Can achieve optimal behavior and anticipative behavior


connected & autonomous vehicles : security, safety, and privacy concerns
increasing connectivity
V2X
increasing autonomy
increasing complexity
growing # of attacks
safety-security gap
safety-critical failures
cyber-exposed attacks
data-shaped ecosystem


connected & autonomous vehicles : security, safety, and privacy concerns
increasing connectivity
V2X
increasing autonomy
increasing complexity
growing # of attacks
safety-security gap
Safety-critical failures
cyber-exposed attacks
data-shaped ecosystem


1,000
drivers
100
cars
10
countries
L3Pilot
Driving Automation


1,000
drivers
100
cars
10
countries
L3Pilot
Driving Automation


Challenges in AV security testing
• Safety and security converge
Safety team
Cyber-security
Safety
Lidar/Radar
V2V
Cybersecurity team
Camera
AV team

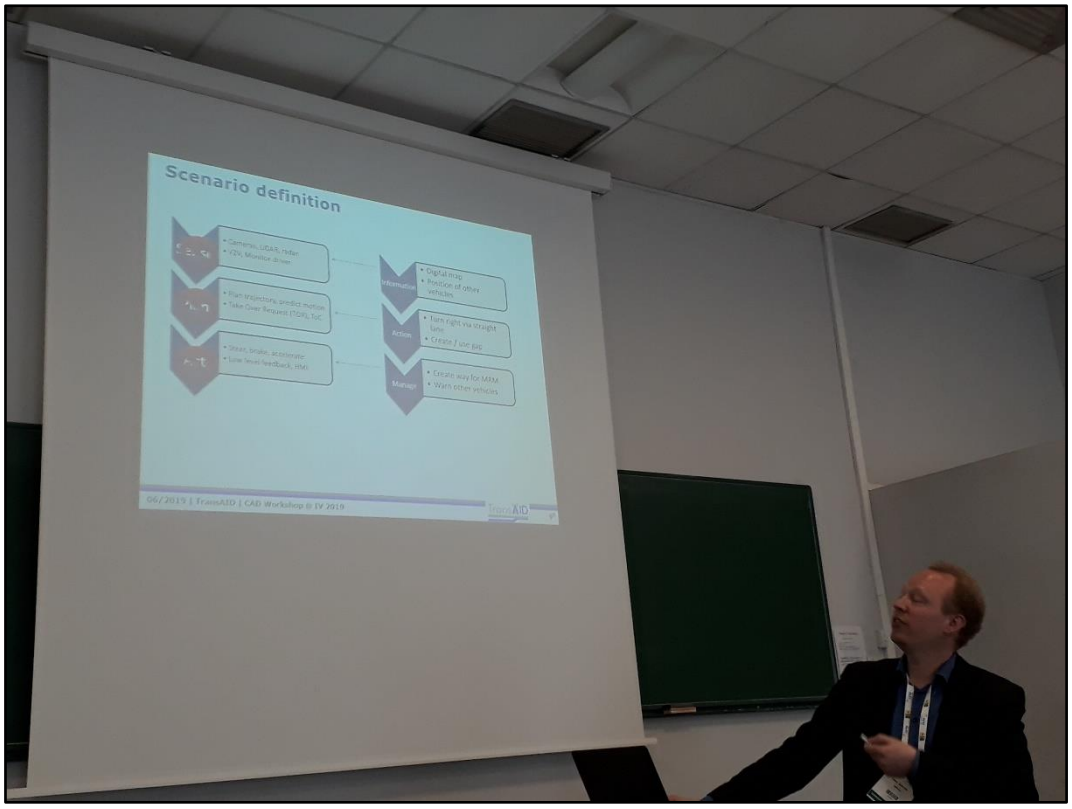

Safety vs. Security Testing
Testing scenario components
Safety
Cybersecurity
Goal
Behavior or Tactical Maneuver
Tactical, Strategic, or mission
Operational Design Domain
ODD: Operating environment (e.g., roadway type, traffic conditions, or environmental conditions).
Also account for attacker's power and capabilities
Objects or events
• Identify expected or unexpected events or objects such as Vehicles, pedestrians or infrastructure, etc.
• Define response strategies to each above.
• Identify environmental objects and events either involving malicious messages that are spoofed or tampered.
• Define response strategies to each above.
Abnormal conditions
The information "failure", whether no data, inadequate or latent data
Attacks on any components in the automated driving system that compromise data integrity
Mitigation strategies
Fail-safe or Fail-operational
Attack-Secure or Attack-Operational


PDP4E
Outline
Speaker
Policy maker viewpoint on privacy
ISO 27550 privacy engineering
Privacy management in C-ITS
Recommandations

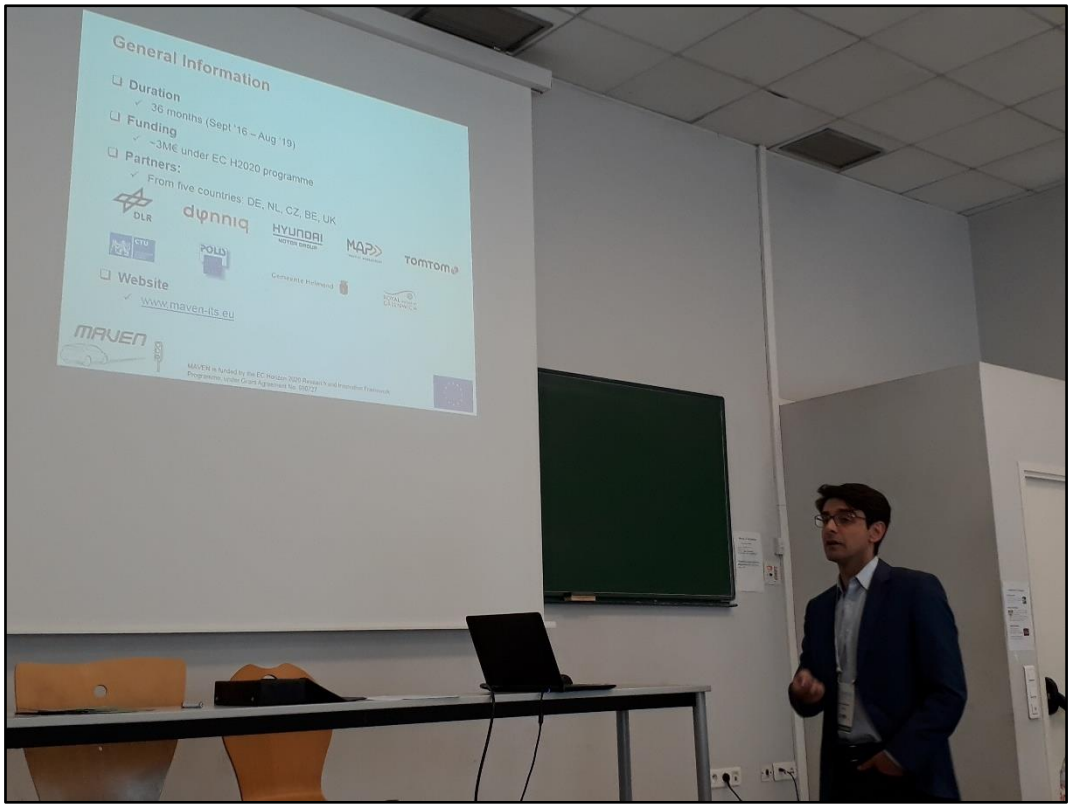

PDP4E
Outline
Speaker
Policy maker viewpoint on privacy
ISO 27550 privacy engineering
Privacy management in C-ITS
Recommandations


Current regulatory concepts
Multi Tier Measurement


Current regulatory concepts
Multi Tier Measurement

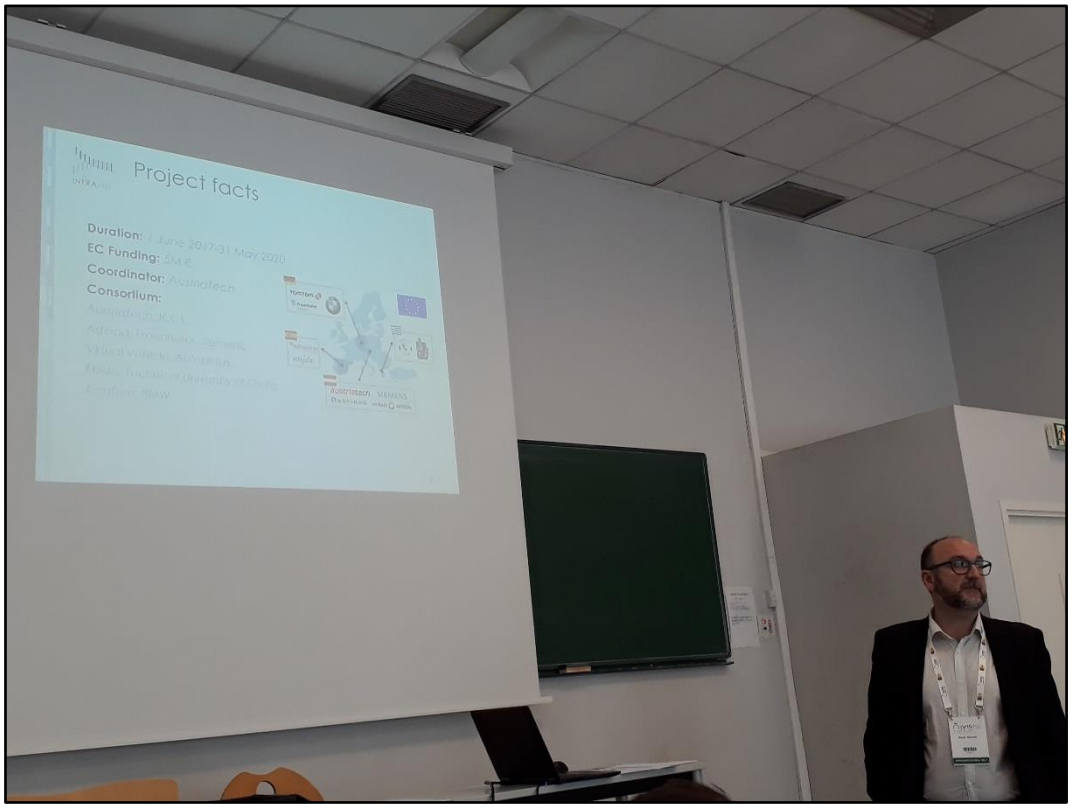

Scenario definition
Information
Action
Manage


Scenario definition


General Information
Duration
36 months (Sept '16 – Aug '19)
Funding
~3M€ under EC H2020 programme
Partners:
From five countries: DE, NL, CZ, BE, UK
Website
www.maven-its.eu
MAVEN


MAVEN


Project facts
Duration: 1 June 2017-31 May 2020
EC Funding: 5M €
Coordinator: AustriaTech
Consortium:


Project facts
Duration: 1 June 2017-31 May 2020
EC Funding: 5M €
Coordinator: AustriaTech
Consortium:


ETSI maneuver coordination approach
Based on periodic V2V exchange of planned/desired trajectories
Coordination governed by right of way rules.
Generic approach valid for all scenarios.
Example: Step 2 - CAV2 sends desired trajectory to change lane
1
2
Planned trajectory
Desired trajectory


ETSI maneuver coordination approach
Based on periodic V2V exchange of planned/desired trajectories
Coordination governed by right of way rules.
Generic approach valid for all scenarios.
Example: Step 2 - CAV2 sends desired trajectory to change lane
1
2
Planned trajectory
Desired trajectory


Motorway use-cases and C-ITS services
A9-CREL motorway
7 km length where 6 RSUs have been installed
More than 20.000 vehicles per day
Communication channel through ETSI ITS G5
Loughborough University


Goal of Electronic Horizon (eHorizon)
Expand vehicle senses through backend information
Continental


Goal of Electronic Horizon (eHorizon)
Expand vehicle senses through backend information
Continental


VEDECOM
Activities and Research Fields
VEDECOM
French Institute for Energy Transition (ITE), Public-Private Partnership, Research and Training dedicated to individual, carbon-free and sustainable mobility.
Vehicle electrification
Driving delegation and connectivity
Shared mobility and energy
SELF-DRIVING VEHICLE
VEDECOM


VEDECOM
Activities and Research Fields
VEDECOM
French Institute for Energy Transition (ITE), Public-Private Partnership, Research and Training dedicated to individual, carbon-free and sustainable mobility.
Vehicle electrification
Driving delegation and connectivity
Shared mobility and energy
SELF-DRIVING VEHICLE
VEDECOM