

Progress Report

GRE TF AVSR

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**AVSR-05-07-
rev1e**

Task

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The task of the Task force is given by the following questions:

1. Is there a safety requirement for AV's to provide signals to indicate their status and to communicate their next intended actions?
2. If so, shall such signals
 - be visual,
 - audible,
 - or a combination of both?

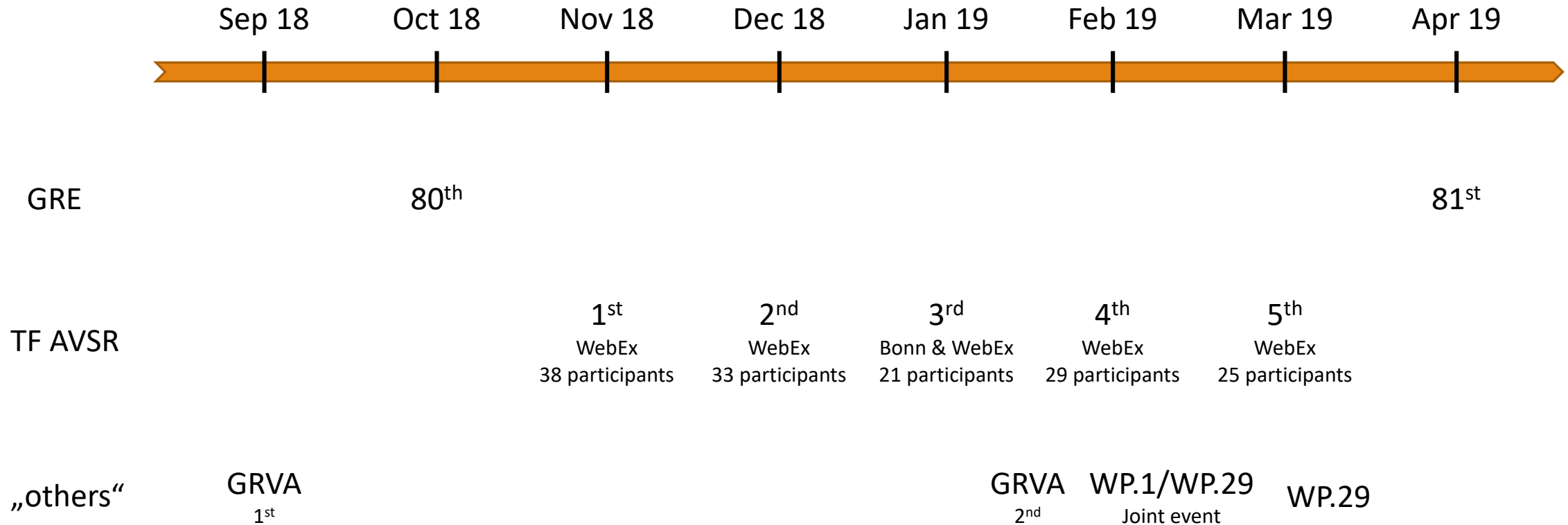
Participation

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CP	NGO's	Academia
France	CLEPA	BASt, Germany
Germany	GTB	NTSEL, Japan
Japan	IEC	RISE Viktoria, SwedenS
United Kingdom	ISO	VTTI, USA
	OICA	
	SAE, USA	

Meeting schedule

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Main steps

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- I. Meeting
First exchange on the topic and collection of available studies
- II. Meeting
Further collection and discussion on available studies
Development of questionnaire to evaluate relevance of these studies for the task of this TF
- III. Meeting
Evaluation of results from questionnaire
First draft of document to resume the outcome of discussions
- IV. Meeting
Further discussion on document for GRE-81
- V. Meeting
Final discussion on document for GRE-81 → [AVSR-05-03e](#)

Collection of available studies

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List of available studies

Short title	Full title	Origin	Filename
AVIP	Autonomous vehicles' interaction with pedestrians	Chalmers University of Technology, SE	AVSR-02-02e.pdf
CityMobil2	What do Vulnerable Road Users think about ARTS?	ITS, University of Leeds / DLR, German Aerospace, UK / DE	AVSR-02-03e.pdf
Duke Display	Evaluation of Vehicle-to-Pedestrian Communication Displays for Autonomous Vehicles	Duke University, US	AVSR-02-04e.pdf
Ghost Driver	A Field Study Investigating the Interaction between Pedestrians and Driverless Vehicles	Stanford Center for Design Research, US	AVSR-02-05e.pdf
interACT	Deliverable 1.1 Definition of interACT use cases and scenarios	DLR, German Aerospace, DE	AVSR-02-06e.pdf
SWOV	Safe interaction between cyclists, pedestrians and automated vehicles	SWOV Institute for Road Safety Research, NL	AVSR-02-07e.pdf
InMotion-Summary	Light-based communication between automated vehicles and other road users (Summary)	Chemnitz University of Technology, DE	AVSR-02-08e.pdf
Daimler-eHMI	eHMI of Autonomous Vehicles Should autonomous vehicles communicate with pedestrians, and if so, how?	Daimler AG, DE	AVSR-02-09e.pdf
ISO	AV Exterior Communications ISO TC 22/SC 39	ISO	AVSR-02-10e.pdf
GTB	Lighting for automated vehicles – Discussion on ways forward	GTB-Forum, Pernkopf / Tiesler-Wittig	AVSR-02-11e.pptx
Ford	VR light bar results	Ford, US	AVSR-02-13e.pdf
Audi-VDI	VDI-Paper_Reschke_et_al_(German_only)	Audi AG, DE	
Audi-SAE	Ideas for Next Lighting Generations in Digitalization and Autonomous Driving	Audi AG, DE	
Audi	Assistance System for Vehicle-Pedestrian-Interaction	Audi AG, DE	
InMotion	Light-based communication between automated vehicles and other road users	Chemnitz University of Technology, DE	
PIRE	Communication and Interaction between Automated Vehicles and other Road Users	Munich University of Technology, DE	
SAE	Abstract of J3134	SAE, US	
BAST_d	Statement BAST - Evaluation of state of knowledge regarding eHMI for AV (German only)	Federal Highway Research Institute, DE	
BAST_e	Statement BAST - Evaluation of state of knowledge regarding eHMI for AV (English translation)	Federal Highway Research Institute, DE	
VTTI_Ford	Evaluation of AV External Communication in the Wild	Virginia Tech Transportation Center, US	
Uni-Tueb	New colours for Autonomous Driving: An Evaluation of Chromaticities for the External Lighting Equipment of Autonomous Vehicles	University Eye Hospital Tübingen, DE	
ISO TR 23049	Technical report describing principles for visual external communication development of Automated Vehicle. Discussion on interactions between human and AV	ISO TC22 SC 39 WG8	
Light.Sight.Safety	Signalling for Automated Driving Systems	Light.Sight.Safety, BE / Tech, DE	
Light.Sight.Safety_2	Labeling of Autonomous Driving Vehicles (Phase 1)	Light.Sight.Safety, BE / Tech, DE	
BMM_d	Report of Ethics Commission - Automated and connected driving (German only)	Federal Ministry of Transport, DE	
BMM_e	Report of Ethics Commission - Automated and connected driving (English translation)	Federal Ministry of Transport, DE	

Questionnaire

Research Studies	Questions				Additional information
	Does the research shows a need for an operational state HMI (AV signal)?	Does the research shows a need for a HMI of the vehicle intent?	Which level of automation should be addressed?	Should such signal be visible or audible?	
	Possible answers				
	YES, NO, Not scope of the study	YES, NO, Not scope of the study	L3, L4, L5, ALL	Visible, Audible, both	
AVIP					
CityMobil2					
Duke Display					
Ghost Driver					
interACT					
SWOV					
InMotion-Summary					
Daimler-eHMI					
ISO					
GTB					
Ford					
Audi-VDI					
Audi-SAE					

[AVSR-05-06e](#)

[AVSR-02-25e](#)

Conclusions

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1. The Task force discussed the question #1 and came to the conclusion that the decision about this principal question is not in the mandate of this task force. The following discussion based on the assumption, that a “driving mode indicator” is needed.
2. As a consequence of the discussion about the second question the group concluded, that it should be a visible function (under normal traffic conditions and active autonomous driving).
For the visible function it must be defined, when and under which conditions this signal should be activated. In this context, e. g. interaction with police, the interaction with other road users shall be taken into account, depending from the level of autonomous driving.
This does not exclude in further discussions that audible signals, which could support e.g. handicapped peoples in communicative scenarios, may be taken into account.

This outcome should be addressed by the chairman of GRE to WP.29 and GRVA with the question whether WP.29 could support the view of the task force and to ask for further guidance to continue the work and change the status of the group from a Task force to an informal working group.

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Thank you for your attention!

The final outcome of the Task Force AVSR can be found in the following document:

<https://wiki.unece.org/download/attachments/80381146/AVSR-05-03e.docx?api=v2>

Please note that all GRE TF AVSR documents are accessible at the following webpage:

<https://wiki.unece.org/pages/viewpage.action?pageId=73925596>