

Proposal for User Role Definitions for Users of Vehicles with Automated Driving Systems

UNECE - FRAV
6/7 May 2021

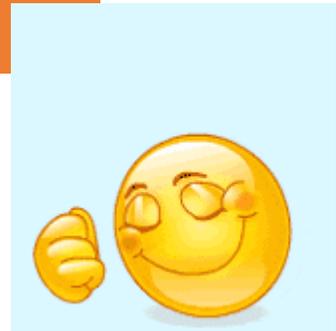
User Role Definitions

Initial proposal

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Follow-up

Updated by comments of 'FRAV-ers' provided in two on-line meetings (22 and 29 April 2021)



Scope

- To come up with an agreed set of user role definitions for users of vehicles with ADS



- Set consists of:
 - user name
 - user definition

The approach



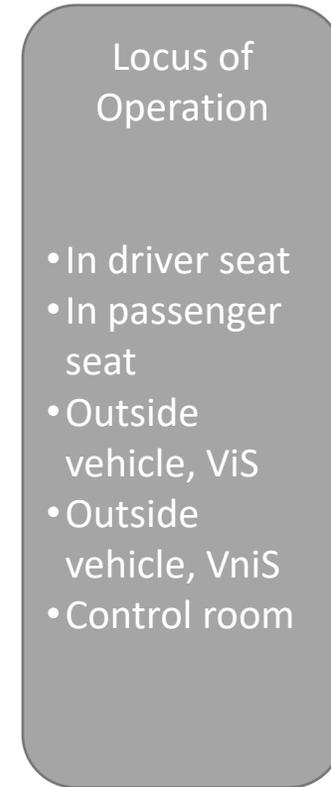
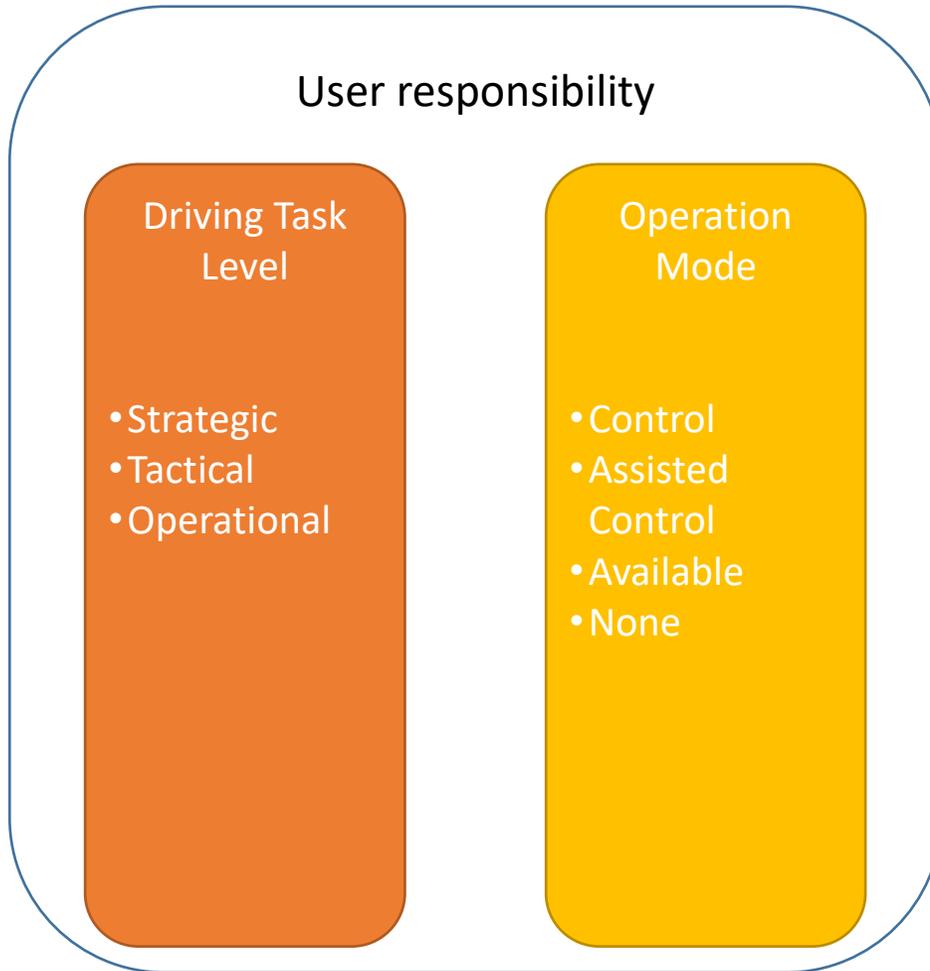
The 'ingredients'

- “To ensure that all possible user roles are included we start with listing the various dimensions underlying the different roles a user of a vehicle with ADS can or may have to perform.”
- In other words “What are the ingredients that make up such a role?”

Four dimensions

- We distinguish four dimensions to differentiate the user roles:
 - Number of vehicles (#)
 - The number of vehicles a user 'controls'.
 - Driving Task Level (DTL)
 - Which part of the driving task is performed by the user*
 - Operation Mode (OM)
 - How is the user involved
 - Locus of Operation (LoO)
 - Where is the user?

* At the moment we have not considered the perception and decision levels that can be distinguished at different DTLs



Nine hundred and sixty

- In total there are $3 \times 4 \times 4 \times 4 \times 5 = 960$ combinations
- However, not all result in a user role and not all combinations make sense

DTL executed by ADS	DTL (partly) executed by User
None	Operational, Tactical and Strategic
Operational	Tactical and Strategic
Operational and Tactical	Strategic
Operational, Tactical and Strategic	Strategic

- Don't try to read the next slide

Important Remarks

- A user is a human being. So the user role is performed by a human being.
- A user role for a vehicle with ADS is defined as a role in which the user is directly involved in the possible use of the ADS. Directly = in real-time.
- Users perform a specific role depending on the ADS! So depending on the available ADSs *a single person can switch users roles during a drive.*
- We propose to call a user a driver when the user has full control / assisted control at the tactical and/or operational level of the driving task.
- At the moment we have not considered the duration of a role. Nor required qualifications for a specific role.

Questions? Remarks? Suggestions?



User Roles Single Vehicle I

User roles for single vehicles with ADS						
#	User Role Regulatory	Description	Example user	Example ADS	Example ADAS	SAE defined role
1	Conventional Driver	User performs unassisted the operational and tactical level. Level of strategic control may differ between users.	car drivers (full strategic control); taxi, long haul bus drivers, and truck drivers (shared strategic control); city bus drivers (no strategic control)	No ADS feature	No ADAS	Conventional driver
2	Operational Assisted Driver	User is only assisted with the longitudinal and lateral control (operational level).	car drivers (full strategic control); taxi, long haul bus drivers, and truck drivers (shared strategic control); city bus drivers (no strategic control)	No ADS feature	ACC	Human driver
3	Tactical Assisted Driver	User is assisted with manoeuvres (tactical level) and the longitudinal and lateral control.	car drivers (full strategic control); taxi, long haul bus drivers, and truck drivers (shared strategic control); city bus drivers (no strategic control)	No ADS feature	ACC, LKS, BLIS	Human Driver
4	Fallback-ready Driver	User decides and executes manoeuvres. The ADS performs the longitudinal and lateral control but the user has to be available.	car drivers (full strategic control); taxi, long haul bus drivers, and truck drivers (shared strategic control); city bus drivers (no strategic control)	ALKS without lane change	No ADAS	Human driver
5	Tactical Assisted Fallback-ready Driver	User is assisted with manoeuvres. The ADS performs the longitudinal and lateral control but the user has to be available.	car drivers (full strategic control); taxi, long haul bus drivers, and truck drivers (shared strategic control); city bus drivers (no strategic control)	ALKS without lane change	ACSF category C or D	Human driver

User Roles Single Vehicle II

User roles for single vehicles with ADS						
#	User Role Regulatory	Description	Example user	Example ADS	Example ADAS	SAE defined role
6	Fallback-ready User	User has to be available for controlling the vehicle. The ADS performs the tactical and operational task.	car drivers (full strategic control); taxi, long haul bus drivers, and truck drivers (shared strategic control); city bus drivers (no strategic control)	ALKS with lane change	No ADAS	Fallback-ready User
7	Limited Automation Driver	User has to perform manoeuvres if wished or needed. The longitudinal and lateral control is fully automated and the user doesn't have to be available.	car drivers (full strategic control); taxi, long haul bus drivers, and truck drivers (shared strategic control); city bus drivers (no strategic control)	ALKS+ without lane change	No ADAS	Human driver
8	Tactical Assisted Limited Automation Driver	User is assisted with manoeuvres if wished or needed. The longitudinal and lateral control is fully automated and the user doesn't have to be available.	car drivers (full strategic control); taxi, long haul bus drivers, and truck drivers (shared strategic control); city bus drivers (no strategic control)	ALKS+ without lane change	ACSF category C or D	Human driver
9	ADS available user	User is available for manoeuvres and has no involvement in the lateral and longitudinal control.	car drivers (full strategic control); taxi, long haul bus drivers, and truck drivers (shared strategic control); city bus drivers (no strategic control)	ALKS+ with lane change ACSF cat E	No ADAS	Fallback-ready User
10	ADS user	User activates the ADS and if necessary indicates directions.	car drivers (full strategic control); taxi, long haul bus drivers, and truck drivers (shared strategic control); city bus drivers (no strategic control)	ALKS+ with lane change	No ADAS	Passenger

User Roles Single Vehicle I

User roles for single vehicles with ADS						
#	User Role Regulatory	Description	Example user	Example ADS	Example ADAS	SAE defined role
11	Proximity Remote User	User is outside the vehicle with the vehicle in sight and engages the ADS or operates through a device the ADS. User may need to monitor environment for safety.	car drivers	Parking system with app	No ADAS	Remote driver
12	Distant Remote User	User engages and/or instructs the ADS to perform a specific task.	car drivers	Valet parking system	No ADAS	Remote driver
13	Safety Steward	User has to start the system and indicate the route it has to follow. User also has to manage the pod in difficult traffic situations	Shuttle pod assistant	Shuttle pod	No ADAS	Human driver

Questions? Remarks? Suggestions?



Still to do

- Fleet
- Platoon
 - Platoon Leader mimics the single vehicle roles plus communication with followers
 - Roles of Platoon Followers seemed to be difficult to define

Final remarks

- The proposed user roles and definitions can be revisited
- The list can be expanded with user role names that are more user friendly