Document FRAV-31-08
31st FRAV session
13-15 September 2022

31st Session User working stream

Detroit / Hybrid meeting

13 - 15 September 2022

Paris July 2022

- Status overview work User group
- Following actions:
  - **"User workstream will provide a proposal in September for a path to feasible verifiable requirements/recommendations, including proposal on whether requirements should have a logical structure and if so, what structure (e.g., how to break down into subsets of requirements that can be objectively applied to various ADS configurations/use cases). Review Table 1 detailed requirements to bring into main body of D5."**

1

2

3

Proposals

- No User group meeting during summer holidays. Small group (ETSC, RDW, Dutch Ministry) prepared current propsals

1)....proposal for a path to feasible verifiable requirements/ recommendations....

- We used the previously created excel file to link detailed provisions to VMAD pillars

		VMAD pillars	Requirement needs	Remarks
User interaction with and the interface of ADS (features) shall have a high-level commonality of design.	· The ADS should be designed to foster a level of trust that is aligned with its capabilities and limitations to ensure proper use of the system. · The operation of the interaction shall have in common: o [use of common sequence of states in the transition/activation/overriding/…] · The interaction should be simplified: o [Limit the number of roles] o [Limit the number of potential transitions] o [Limit the number of settings] o [Limit the number of different interaction modes]	Audit	There is currently no general specification to be able to check whether there is a high level of commonality. If such a commonality exists then a checklist would suffice.	
The ADS HMI shall provide clear and unambiguous information to the user.	· The vehicle shall indicate its ADS capabilities in terms of their automated [features] and their ODD. · The ADS shall inform the user on the current conditions: o ADS status information o The availability of ADS features o User Role o Responsibility o Permitted NDRA o Potential roles to activate o "Standard" information: § Vehicle speed, range and Time to Fuel o ADS failure information · The ADS shall inform the user on the upcoming conditions: o ODD boundaries o Upcoming actions or change in roles o Oncoming decisions/manoeuvers o Estimated time until take over in normal conditions o Transition related communication. · The ADS shall ensure that safety related information is prioritized and presented in a clear and unambiguous manner.	Audit; test track or real world with a wide diversity of typical drivers (this is an extensive test); human out of the loop simulation.	For the audit it should be ensured that a user centred design process in the development of an ADS is implemented and followed. Such a user centred design process should be developed. Some of the detailed provisions can be checked through a checklist; Standardisation on icons/earcons is needed (relates to commonality).	Whether the information is indeed clear and unambiguous should also be checked through driving on test track or real world with a wide diversity of naive drivers (this is quite an extensive test). The correct functioning of the HMI can be tested through human out of the loop simulation.

- We made a distinction between available criteria, tentative criteria and criteria to be developed.
- For each detailed provision we have indicated to our knowledge what the current status is:

available criteria	
tentative criteria	Logically derived criteria (expert interpretation)
criteria to be developed	specifications & criteria need to be developed

- Excel document available on UNECE FRAV 31

1)....proposal for a path to feasible verifiable requirements/ recommendations....

			Verifiable criteria	VMAD pillars	Requirement needs	Remarks
6.	User interaction with and the interface of ADS (features) shall have a high-level commonality of design.	· The ADS should be designed to foster a level of trust that is aligned with its capabilities and limitations to ensure proper use of the system. · The operation of the interaction shall have in common: o [use of common sequence of states in the transition/activation/overriding/…] o ... · The interaction should be simplified: o [Limit the number of roles] o [Limit the number of potential transitions] o [Limit the number of settings] o [Limit the number of different interaction modes]		Audit	There is currently no general specification to be able to check whether there is a high level of commonality. If such a commonality were to be specified then a checklist would suffice.	

1)....proposal for a path to feasible verifiable requirements/ recommendations....

			Verifiable criteria	VMAD pillars	Requirement needs	Remarks
7.	The ADS HMI shall provide clear and unambiguous information to the user.	· The vehicle shall indicate its ADS capabilities in terms of their automated [features] and their ODD. · The ADS shall inform the user on the current conditions: o ADS status information o The availability of ADS features o User Role o Responsibility o Permitted NDRA o Potential roles to activate o "Standard" information: - Vehicle speed, range and Time to Fuel o ADS failure information · The ADS shall inform the user on the upcoming conditions: o ODD boundaries o Upcoming actions or change in roles o Oncoming decisions/manoeuvers o Estimated time until take over in normal conditions o Transition related communication. · The ADS shall ensure that safety related information is prioritized and presented in a clear and unambiguous manner.		Audit; test track or real world with a wide diversity of typical drivers (this is an extensive test); human out of the loop simulation.	For the audit it should be ensured that a user centred design process in the development of an ADS is implemented and followed. This specific user centred design process needs to be detailed (see ISO 9241-210:2019(en) Ergonomics of human-system interaction — Part 210: Human-centred design for interactive systems). Some of the detailed provisions can be checked through a checklist; Standardisation on icons/earcons is needed (relates to commonality).	Whether the information is indeed clear and unambiguous should also be checked through driving on test track or real world with a wide diversity of naive drivers (this is quite an extensive test). The correct functioning of the HMI can be tested through human out of the loop simulation.

1)....proposal for a path to feasible verifiable requirements/ recommendations....

			Verifiable criteria	VMAD pillars	Requirement needs	Remarks
10.	An ADS which permits a transition of control shall be designed to assure safe transitions of control.	· The interaction shall follow a common sequence of actions and states in the Transition of control (change of user roles): o Common sequence to be a pass/fail criterion. · Transition of control shall return to a common default user role (to prevent mode confusion and other risks): o This shall normally be a fully engaged driver (conventional driver). o Common default user to be a pass/fail criterion. · The ADS shall continuously verify whether the user is available for the transition of control and warn the user if not available when required. · The ADS shall verify that the driver is in stable control of the vehicle to complete the transfer of control to the user. · During transition, the ADS shall remain active until the transition of control has been completed or the ADS reaches a minimal risk condition.	see ISO	Audit; real world; test track; In Service Monitoring (ISMR); human out of the loop simulation.	A user centred design process should be detailed.	Real world/test track: needs to be tested with a wide diversity of typical drivers. Expanding on the ISO proposal --> could be part of commonality.

1)....proposal for a path to feasible verifiable requirements/ recommendations....

			Verifiable criteria	VMAD pillars	Requirement needs	Remarks
11.	The ADS shall be designed to assure a safe user-initiated takeover.	· The user is allowed to initiate a take over process of the ADS · The deactivation should follow a common sequence. o Common sequence to be a pass/fail criterion. · The ADS may momentarily delay deactivation of driving control when immediate human resumption of control could compromise safety. · The ADS should provide a clear feedback of the successful user initiated takeover. o The clear feedback should be a pass/fail criterion. · The user-initiated takeover should return to a common default user role (to prevent mode confusion and other risks) o This shall normally be a fully engaged driver without any control assistance systems with the exception of mandated systems (conventional driver) o Common default user role to be a pass/fail criterion.	see ISO	Audit; real world; test track; ISMR; human out of the loop simulation.	A user centred design process should be detailed.	real world/test track: needs to be tested with a wide diversity of naive drivers; Expanding on the ISO proposal --> could be part of commonality. The correct functioning of the HMI can be tested through human out of the loop simulation. Take over request to be acknowledged by HMI

2).... proposal on whether requirements should have a logical structure....

- A pre-regulatory recommendations document
  - The result is an adopted reference document from WP29
  - Recommendations are no requirements
  - Recommendations are valid when applicable
- It may be questionable whether any structure will fit all (future) ADS possibilities (the downside of the generic recommendations)
- If needed add to D5, something like:

If a requirement doesn't apply, this needs to be indicated and justified.

- So we propose a common practical approach
  - If this approach is accepted we may need to revisit the wording of the SRs and DPs (e.g., An ADS ~~which permits a transition of control~~....)

3).... detailed requirements to bring into main body of D5....

- Request of co-chair / GRVA chair
  - Put all DPs into D5 in [ ]
  - Document on UNECE FRAV 31

4.2.6. An ADS which permits user takeovers of control shall be designed to ensure safe user-initiated takeovers.

4.2.6.1 [The user is allowed to initiate a take-over process of the ADS]

4.2.6.2 [The deactivation shall follow a common sequence of actions and states in the transition of control (change of user roles)

a) Common sequence to be a pass/fail criterion (see Annex ??)]

4.2.6.3 [The ADS may momentarily delay deactivation of driving control when immediate human resumption of control could compromise safety.]

4.2.6.4 [The ADS shall provide clear, specific feedback of the completion of a user initiated take over.

a) The clear and specific feedback shall be a pass/fail criterion]

4.2.6.5 [The user initiated take over shall return to a common default user role being the driver.

a) This shall normally be a fully engaged driver without any control assistance systems with the exception of mandated systems (conventional driver)

b) Common default user role to be a pass/fail criterion]

4.2.7. The use of the ADS shall be supported by documentation and tools to facilitate user understanding of the functionality and operation of the system.

4.2.7.1 [The ADS manufacturer / vehicle manufacturer (as appropriate) should create documentation available for audit on:]

4.2.7.1.2 [Its intended educational approach:

a) Theoretical and practical training

b) How its HMI design aligns with common HMI and interaction]

4.2.7.1.2 [Owner's manual describing at least:

a. An operational description of ADS' (features) capabilities and

Suggestion to-be-do

- 2023:
  - Formal GRVA Jan 2023
  - Informal WP29 March 2023 (with optional improvements)
  - Formal WP29 June 2023
- Work through the green items with VMAD till March 2023
- Work on the state diagram for activation, de-activation (take-over), and transfer of control
  - Outcome could be a 0.0 version
  - Commonality related to this topic
  - High level assessment
  - Some functional tests

Developments

- User Centred Design Process
  - There is an ISO standard: Ergonomics of human-system interaction — Part 210: Human-centred design for interactive systems ISO 9241-210 (2019)
- International Conference on Traffic and Transport Psychology (https://www.icttp7.se/)
  - The (im)possibilities of eye movement measurements
    - relevant for driver monitoring & engagement
  - Research on driving in different vehicles with ADAS (commonality)
  - Driver training for ADAS / ADS (one paper together with an OEM)
  - Quite a number of papers on interaction
  - Validation of HMI (was unfortunately cancelled)
  - Human Automation Collaboration

Done