

**HF-group: Proposed detailed HF-related requirements**

	Performance Topic	Detailed Requirements	Measurable / Verifiable Criteria
The ADS should interact safely with the user			
9	ADS (features) should be designed according to Harmonized/Common HMI principles to support the mental model	<ul style="list-style-type: none"> <li>• The ADS (features) should use harmonized interfaces</li> <li>• The design of the interaction should be harmonized:                             <ul style="list-style-type: none"> <li>○ [use of common sequence of states in the transition/activation/overriding/...]</li> </ul> </li> <li>• The interaction should be simplified:                             <ul style="list-style-type: none"> <li>○ [Limit the number of roles]</li> <li>○ [Limit the number of potential transitions]</li> </ul> </li> </ul>	
10	The ADS should provide clear and unambiguous information to the user	<ul style="list-style-type: none"> <li>• The ADS should present information to the user on the current conditions:                             <ul style="list-style-type: none"> <li>○ Status information</li> <li>○ User Role</li> <li>○ Responsibility</li> <li>○ Permitted NDRA</li> <li>○ “Standard” information                                     <ul style="list-style-type: none"> <li>▪ Vehicle speed, range and Time2Fuel</li> </ul> </li> <li>○ ADS failure information</li> <li>○ Availability of automated features</li> </ul> </li> <li>• The ADS should present information to the user on the upcoming conditions:                             <ul style="list-style-type: none"> <li>○ ODD boundaries</li> <li>○ Potential roles to activate</li> <li>○ Oncoming decisions/maneuvers</li> <li>○ Estimated time to overtake in normal conditions</li> <li>○ Warning for upcoming transition request</li> <li>○ Confirmation request for upcoming transition</li> </ul> </li> <li>• The ADS should present the information so as to assure a safe interaction:</li> </ul>	

		<ul style="list-style-type: none"> <li>○ Timing requirements</li> <li>○ Priority requirements</li> <li>○ Saliency requirements</li> </ul>	
11	The ADS should prevent misuse and errors in operation	<ul style="list-style-type: none"> <li>● The ADS should be designed to prevent inadvertent activation or deactivation</li> <li>● The ADS controls should be clearly distinguishable from other controls</li> <li>● The ADS should be designed to avoid activation of an ADS outside its ODD</li> <li>● The ADS should be designed to avoid illegal settings</li> <li>● The ADS should provide feedback when the user attempts to enable not allowed functions</li> </ul>	
12	The ADS should assure a safe ADS feature activation	<ul style="list-style-type: none"> <li>● The ADS should inform the user that preconditions for activation are met</li> <li>● The activation should follow a common sequence                             <ul style="list-style-type: none"> <li>○ Common sequence to be in requirements</li> </ul> </li> <li>● The ADS should provide confirmation that the system is activated</li> </ul>	
13	The ADS should assure a safe Transition Of Control	<ul style="list-style-type: none"> <li>● The interaction should follow a common sequence in the transition of control (change of user roles)                             <ul style="list-style-type: none"> <li>○ Common sequence to be in requirements</li> </ul> </li> </ul>	

		<p>Figure 2 — System-initiated transition from automated to manual driving <sup>1</sup></p> <ul style="list-style-type: none"> <li>• Transition of control should return to a common default user role (to prevent mode confusion)             <ul style="list-style-type: none"> <li>○ This should normally be fully engaged driving (conventional driver)</li> </ul> </li> <li>• The ADS should verify that the user is available for the transition of control (MRM to be specified elsewhere)</li> <li>• The ADS should verify that the driver is in stable control of the vehicle to complete the Transfer of Control to the user</li> </ul>	
14	The ADS should assure a safe user initiated take over	<ul style="list-style-type: none"> <li>• The ADS should provide a clear feedback of the successful user initiated take over</li> <li>• The user initiated take over should return to a common default user role (to prevent mode confusion)             <ul style="list-style-type: none"> <li>○ This should normally be fully engaged driving (conventional driver)</li> </ul> </li> <li>• The ADS should warn a user for an user initiated take over that will lead to an unsafe situation and prevent this (consider if a first attempt prevention is enough or the ADS has a better overview of complex traffic situations)             <ul style="list-style-type: none"> <li>○ This should be in a requirement</li> </ul> </li> </ul>	
15 (new)	The OEM should provide tools for the user to learn about system functionality and operation.	<i>On the general mental model (common understanding):</i>	

<sup>1</sup> Reference: ISOxxx

		<ul style="list-style-type: none"> <li>• OEM should describe the possible educational approach:             <ul style="list-style-type: none"> <li>○ Theoretical and practical training</li> <li>○ How it aligns with common HMI and interaction</li> </ul> </li> <li>• OEM should provide documented information on ADS (features) capabilities and limitations (the information should also refer to specific scenarios)</li> <li>• OEM should provide documented information on roles and responsibility of Driver/user and ADS when ADS (feature) is on/off</li> <li>• OEM should provide documented information on allowed transition of roles and procedure for the transition (activation/deactivation, ToC, Override)</li> <li>• OEM should provide a list of NDRA allowed when an ADS feature is active</li> </ul> <p><i>On the applied mental model (understanding the ADS-specifics)</i></p> <ul style="list-style-type: none"> <li>• The ADS supports the user in correct operation (coaching)</li> <li>• The ADS gives prompt feedback on erroneous operation</li> </ul>	
16	<p>ADS vehicles that may operate without a <b>[user-in-charge/in-vehicle driver]</b> should provide means for occupant communication with <b>[a remote operator/user-in-charge/human driver/remote assistance personnel]</b></p>	<p>This needs separate attention.</p>	

**SECOND PART: Detailed Requirements**

	<b>Performance Topic</b>	<b>Detailed Requirements</b>	<b>Measurable / Verifiable Criteria</b>
The ADS should interact safely with the user			
9	Activation of an ADS feature should only be possible when the conditions of its ODD have been met	- The ADS needs to inform the user of the (non-) availability of the ADS-features. -	
10	The user should be informed about the ADS status (when the ADS is activated) with regards to ODD		
11	The user should be permitted to take over control from the ADS, if the ADS is designed to request and enable intervention by a human driver		
12	The ADS should safely manage transitions of control to the user		
13	The ADS should safely respond to user input errors		
14	The ADS should provide feedback to the user on its operational status		
15	The ADS should warn the user of failures to fulfill user roles and responsibilities		
16	ADS vehicles that may operate without a <b>[user-in-charge/in-vehicle driver]</b> should provide means for occupant communication with <b>[a remote operator/user-in-charge/human driver/remote assistance personnel]</b>		

Submitted by the User Roles/Human Factors workstream pilot

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