

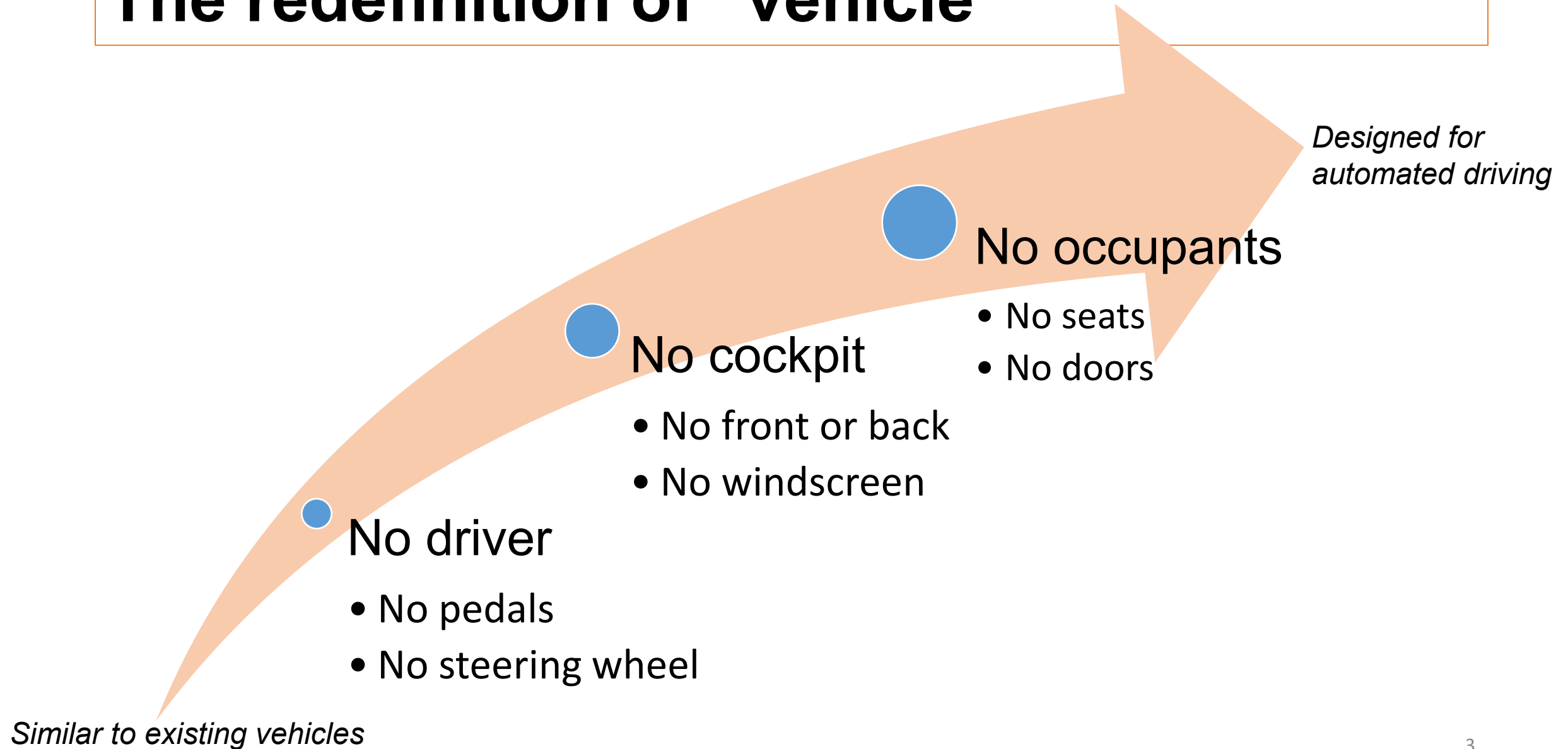
# **Reviewing UNECE Regulations and GTRs on their Fitness for ADS**

Status report for GRPE by the GRVA FADS taskforce

# Background

- WP29 manages more than 200 Regulations, GTRs and other documents concerning motor vehicles and their equipment
- Regulations rely on specific technical provisions to ensure a globally harmonised framework for performance and testing
- Most Regulations were drafted according to the traditional definition of a motor vehicle, which needs a **human to perform the driving task**

# The redefinition of “vehicle”



# Consequence on existing Regulations

- Some prescriptions need to be slightly modified

**UNECE R102** §2.2.1. “Straight line stability test”

*Vehicles shall be tested at a speed of 85 +5/-0 km/h and remain aligned. During the test, it must be possible to travel along a straight section of the road without unusual steering correction **by the driver**.*

- Other prescriptions make no sense with automated driving

**UNECE R13** §5.1.2.2. “Secondary braking system”

*The **driver** shall be able to achieve this braking action from his **driving seat** while keeping at least **one hand** on the **steering control**.*

- We need to consider both the **text** and the **spirit** of Regulations

# Mandate from WP29

- At its 186th session in March 2022, WP29 requested all its subsidiary working parties to perform a screening of the UN Regulations and Global Technical Regulations (GTR) of relevance regarding their fitness for Automated Driving Systems (ADS) until ~~March 2023~~.

*Now planned for **June 2023** to let each GR approve the results of their taskforce before WP29*

- At its 14<sup>th</sup> session in September 2022, GRVA gave additional guidance as to what kind of automated vehicles to consider, etc.

# Common work method and timeline

The taskforces of the different GRs have agreed to work on the same deliverables:

- High-level summaries for each Regulation
- Detailed files for the comprehensive reviews
- A “whitebook” for handling automated driving when drafting new Regulations

# Common work method and timeline (cont.)

**DRAFT**



Regulation applicable to Automated Vehicles/driverless vehicles:  yes  no

UN Regulation No. 79 (Steering)	UN Group: GRVA	Potential approach for application: <a href="#">no amendment required</a>   <a href="#">amendment</a>   <a href="#">new Regulation</a>
<b>Content Summary (existing Regulation)</b> <ul style="list-style-type: none"> <li>• Ensure that all components of the steering system are designed properly to ensure high level of safety:</li> <li>• No physical breakage of mechanical components (well dimensioned)</li> <li>• Steering forces are at level which can be handled by the driver, even in case of failure</li> <li>• Steering performance in nominal cases</li> <li>• Steering performance in failure cases</li> <li>• Warnings to be issued to warn the driver</li> <li>• ADAS specific requirements</li> </ul>		<b>Summary of required changes</b> <ul style="list-style-type: none"> <li>• Replacing the driver actuating the steering control with the steering demand generated by the ADS</li> <li>• Testing section to be updated</li> <li>• Warnings/failure signals to be transmitted to the ADS to ensure adequate response</li> <li>• Driver assistance content not applicable to ADS vehicles could be deleted for standalone Regulation for AV's</li> <li>• Definitions reviewed/added/amended</li> <li>• Scope</li> </ul>
<b>Content relevant for FAV's / driverless vehicles</b> <ul style="list-style-type: none"> <li>• System robustness (well dimensioned)</li> <li>• Steering performance under nominal conditions</li> <li>• Steering performance under failure conditions</li> <li>• Steering performance in „maintenance mode“</li> <li>• Warnings/failure signals to be provided to the ADS (e.g. to ensure ADS algorithm to respond adequately, to warn the operator/control tower/occupants as/if appropriate, etc.)</li> <li>• Performance considering max design speed of the vehicles, that the ADS is in control of the entire driving dynamics (safety concept incl. transfer to MRC), ...</li> </ul>		<b>Specifics for vehicles that can be driven manually and driverless:</b> <ul style="list-style-type: none"> <li>• Consider that the steering demand can be requested by the actuation of manual controls (driver) or by generation of the ADS</li> <li>• HMI</li> <li>• Warning/failure signals (system status/condition)</li> </ul>
<b>Content to be covered by (potential) ADS Regulation</b> <ul style="list-style-type: none"> <li>• Generation of steering demand by the ADS</li> <li>• Response to warning/failure signals</li> </ul>		<ul style="list-style-type: none"> <li>• HMI intended for communication with driver (control tower, occupants, etc.)</li> </ul>

*Template for a high-level summary*

# Common work method and timeline (cont.)

	R130	Lane Departure Warning System (LDWS)	Issue	Issue for fully automated vehicles?	Issue for dual mode vehicles?	vehicles without occupants?
1			OK			
43	5.3.2.	function has been deactivated. The yellow warning signal specified in paragraph 5.4.2 below may be used for this purpose.				
44	5.4.	<i>Warning indication</i>	NA			
45	5.4.1.	The lane departure warning referred to in paragraph 5.2.1 above shall be noticeable by the driver and be provided by:				
46	(a)	at least two warning means out of optical, acoustic and haptic; or				
47	(b)	one warning means out of haptic and acoustic, with spatial indication about the direction of unintended drift of the vehicle.				
48	5.4.1.1.	Where an optical signal is used for the lane departure warning, it may use the failure warning signal as specified in paragraph 5.4.2 below in a flashing mode.	OK			
49	5.4.2.	The failure warning referred to in paragraph 5.2.2 above shall be a yellow optical warning signal.	OK			
50	5.4.3.	The LDWS optical warning signals shall be visible when the ignition (start) switch is turned to the 'on' position (start) switch is in a position between the 'off' and 'on' positions (designated by the manufacturer as a check position (power-on)). This requirement does not apply to dual-mode vehicles in a common space.	D50			
51	5.4.4.	The optical warning signals shall be visible when the driver is in a satisfactory condition of the signals must be visible from the driver's seat.				

**Test Test** D50 ...

FR: Need to check how this applies to dual-mode vehicles when powering on

Reply

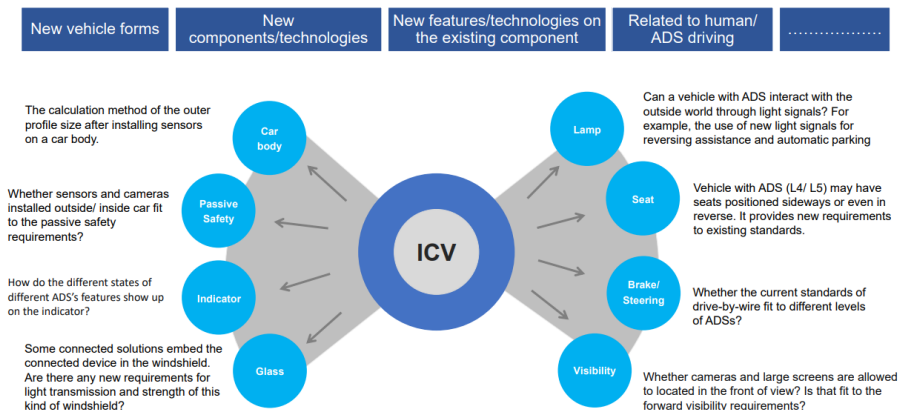
*Online collaborative environment and example of a detailed review*



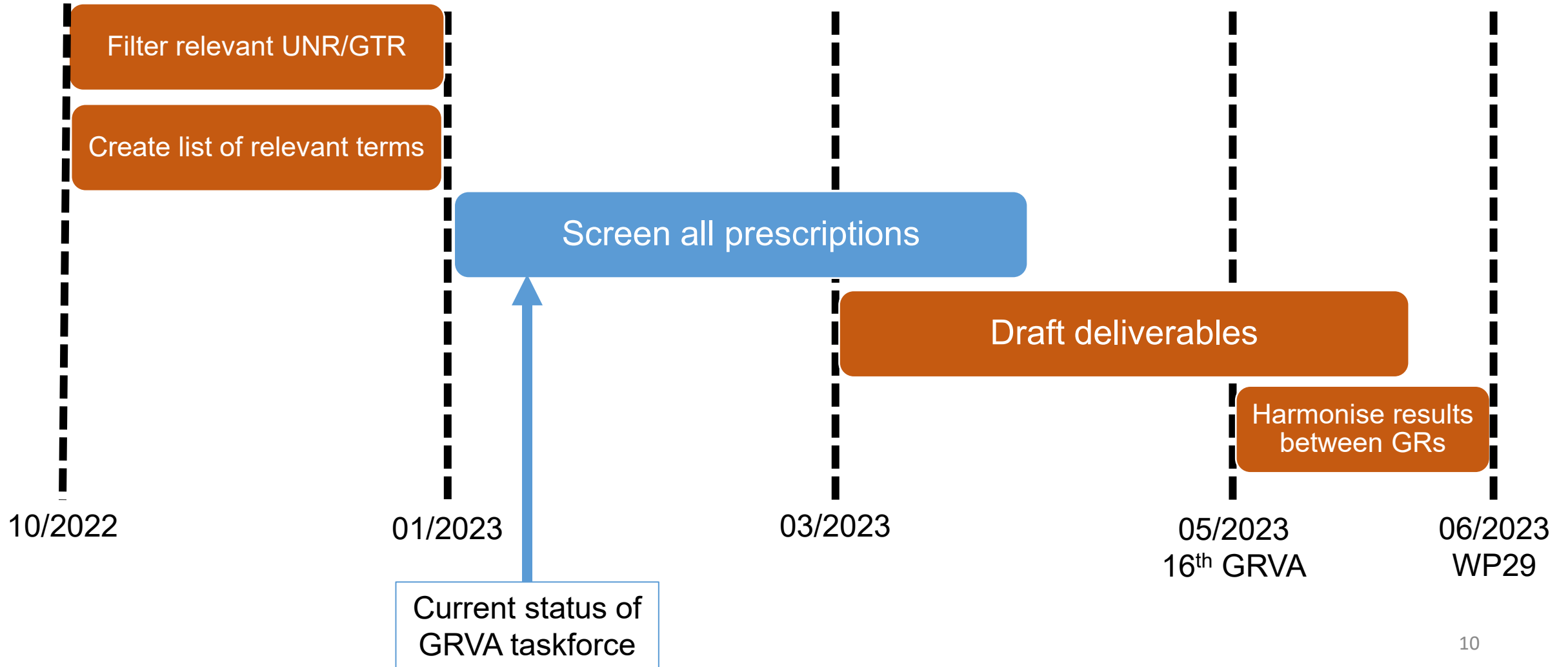
# Common work method and timeline (cont.)

- Points of interest:
  - **Use cases:** full automation, dual-mode, no occupants, etc.
  - **Possible approaches:** amending Regulations, drafting specific Regulations for automated vehicles, creating new vehicle categories, etc.
  - Consider both **explicit and implicit terms**

Relevant terms for scanning Regulations and GTRs									
Word	Variations								
Driver	Person	Passenger	Rider						
Driving seat	Seating position	R point	Driving position	H point					
Foot	Pedal								
Hand	Steering wheel	Direction	Lever	Handle	Button	Push	Pull	Press	
Eye	See	Visible	Ocular						
Hear	Audible								
Telltale	Warning	Signal	instrument pane	Display					
Steering Wheel									
Manual									
Actuate	Force	Reach	Action						
(De)Activate	(De)Activation	Override	Control	Switch					
Front	Forward	Fore	Foremost						
Rear	Rearward	Aft	Rearmost	Behind					



# Common work method and timeline (cont.)



# Initial steps for a screening taskforce

- Gather experts for all GRPE Regulations and GTRs, as well as experts in automated driving
- Filter out all Regulations/GTRs already applicable “as is” or not applicable to automated driving
  - for all other Regulations, identify high-level potential issues when applied to automated driving
- Extract prescriptions into a workable format (e.g. spreadsheet) and flag any potential issue for discussion

*The GRVA TF can help the GRPE TF with aspects related to automated driving (definitions, use cases, etc.)*

# Contact information at the GRVA taskforce

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