

Simplification of Lighting and Light-Signalling Regulations

Stage 2

1. Introduction to Stage 2
2. The GTB Vision for “Global “ Harmonisation of Technical Requirements
3. Fundamentals of a work plan to facilitate discussion

Note: Items 1 and 2 are intended to provide background information for new experts joining the stage 2 process

Introduction to Stage 2

Extracted from from Annex VIII of the official report of GRE-72 (ECE/TRANS/WP.29/GRE/72

*“Adopted **Terms of Reference** and Rules of Procedure for the Informal Working Group "Simplification of the Lighting and Light-Signalling Regulations”*

Develop a proposal to:

<p>Provide a structure that limits to a minimum the number of parallel amendments necessary to achieve a regulatory change;</p>	<p>Stage 1</p>
<p>Reduce ambiguity in the provisions to provide consistent interpretation</p>	
<p>Define the essential requirements in performance (technology neutral) terms to provide opportunities for innovation.</p>	
<p>Determine whether the current regulatory text presents barriers to innovation and whether safety considerations are addressed</p>	<p>Stage 2</p>
<p>Develop, as far as possible, performance-based and technology-neutral requirements to ensure freedom for technical innovation within a framework of safety principles.</p>	

*Informal document GRE-75-05
75th GRE, 5-8 April 2016 (Page 7)*

In addition to simplifying the UN Regulations and removing unnecessary barriers to innovation there are wider benefits to be exploited

- Encouraging more countries to join the 1958 agreement
- Overcoming the objections of the US NHTSA to the current UN Regulations that are deemed to be unsuitable as a basis for a self certification system and its enforcement. *(note; current work by NHTSA and SAE to introduce ADB into the FMVSS108)*
- Synchronisation of the technical requirements of the individual mandatory national standards with the UN regulations. (e.g. China, Republic of Korea, India, Brazil)
- Development of technical requirements that may provide a firm basis for development of GTR's for lighting and light signalling.

1. Concentrate on what is achievable within the deadline to be agreed.
2. Concentrate on the aspects of the Regulation that will deliver improved safety
3. Differentiate between the aspects that are “must have’s” and those that “maybe nice to have”
4. Ensure that the outcomes of the GRE IWG-VGL are taken into account
5. Clearly define what functions can be allowed and those that shall not be included
6. Clearly define the process within the IWG-SLR to develop the proposals for Stage 2.

(The IWG-SLR will be developing four regulations and it may be necessary to create four taskforces to work in parallel to respect the timing constraints of the programme)

In addition to providing the secretariat, GTB is ready to actively support the technical work of the IWG-SLR in the Stage 2.

GTB proposals will be developed by its working groups, focussed on:

- Installation
- Front Lighting (RID)
- Light Signalling (LSD + RRD)
- Photometry (experts from technical services)
- Light Sources
- Safety and Visual Performance (Cooperating with universities)
- Strategy (Company leaders responsible for technical budget and innovation priorities)

Many GTB experts are also members of other NGO's and Contracting Parties that will also be providing their input to the work of the Informal Group.

**The GTB Vision
for “Global “ Harmonisation of Technical Requirements**

- UN WP.29** Stage 1 - Whole package on GRE-79 Agenda (April 2018).
Stage 2 – The GRE IWG-SLR will start detailed discussions in January 2018
- China** Programme to simplify the GB mandatory standards by the end of 2020.
C-GTB and GTB are closely collaborating via the GTB RCNC (Regulatory Cooperation and National Coordination) WG.
- USA** Ground-breaking work by NHTSA and SAE to develop requirements for ADB. This provides a good basis for development of a GTR.
(The USA has been an active GTB member from the 1960's)

- ❖ Use of regulation as barrier to trade is no longer appropriate
 - ❖ Trade Partnerships - Regulatory Implications
 - ❖ Renewed interest by US NHTSA – Focus on adaptive technologies
 - ❖ Increasing pace of innovation of adaptive lighting systems - Digitalisation
 - ❖ New lighting demands for ADS (Automated Driving Systems)
 - ❖ Outcomes of panel sessions at DVN Regulatory Workshops in USA, Japan, China, France, India and South Korea
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- Recurring theme is the need to harmonise / synchronise the technical requirements of the various type approval / certification/ self certification systems

Contribution of DVN Workshops

Countries coloured green are signatories to the UN 1958 agreement
Countries coloured orange are signatories to the UN 1998 agreement



2012-2017 - 12 Driving Vision News Regulatory Sessions
Next Workshop in Tokyo 05/06 June 2018

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- Overcoming the objections of the US NHTSA to the current UN Regulations that are deemed to be unsuitable as a basis for a self certification system and its enforcement.

(note; current work by NHTSA and SAE to introduce ADB into the FMVSS108)

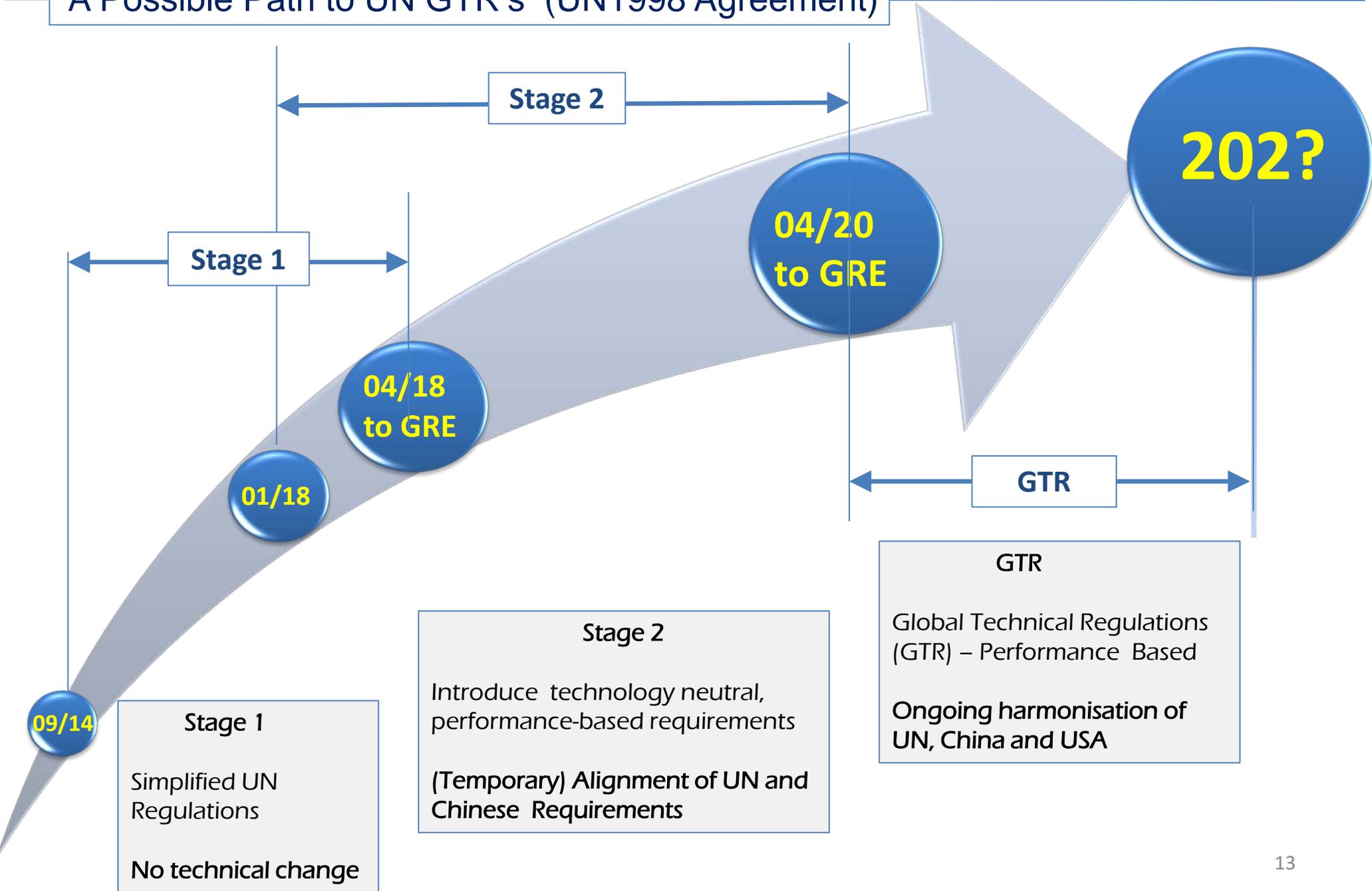
Challenges:

- If UN and Chinese Technical Requirements are synchronised after Stage 2, how can this synchronisation be maintained when technical requirements are occasionally amended?
(Assuming China will not join the UN 1958 agreement)
- How to define an approach acceptable to the USA

Solution:

- Start working to develop UN GTR's for M1 and N1 vehicles based upon the outcome of the Stage 2 Simplification
 - Installation
 - Road Illumination Devices (RID)
 - Light-Signalling Devices (LSD)
 - Retro-Reflective Devices (RRD)

A Possible Path to UN GTR's (UN1998 Agreement)



Fundamentals of a work plan for Stage 2 for discussion

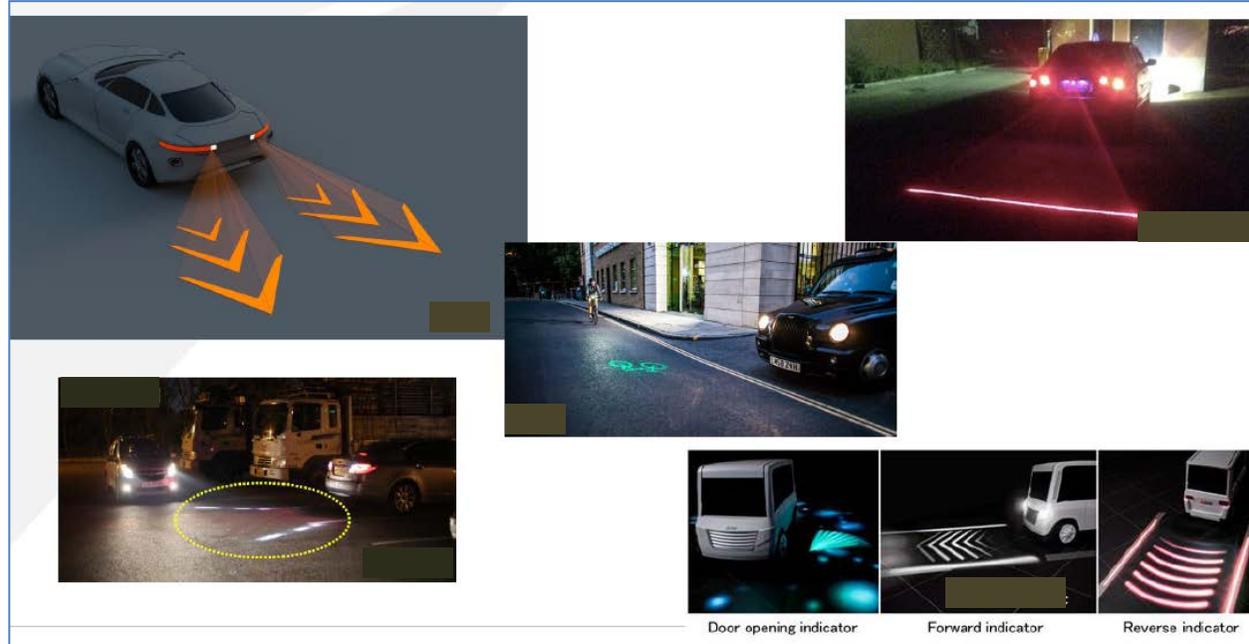
Now the detailed discussions can start!

1. Stage 2 Simplification shall be focused on the “need to have” not the “want to have”
2. Follow the disciplines associated with the development of GTR’s that are based upon objective requirements supported by independent research and safety benefit / cost analysis and taking account of existing regulatory requirements.
3. Define what is intended by the terms “Technology Neutral”, “Performance Based” and “objectively testable”
4. Define what can be allowed and what is not allowed
5. Fundamental analysis of the existing technical requirements to identify and remove unnecessary technology barriers
6. Define robust testing regimes (suitable also for self certification purposes and not dependent upon interpretations and judgement of the type approval authorities)
7. Identify new functions that shall be regulated (perhaps associated with external lighting requirements for autonomous vehicles and new driver assistance functions resulting from the development of digitisation of light). This shall be considered in the context of the principle of “need to have” not the “want to have”(See item 1, above)
8. Priority to use results of existing research, but also establish cooperation with research institutes for new research to verify proposals

Driver Assistance



Signals to other road users



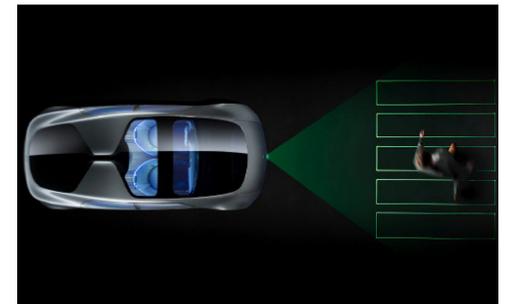
AUTONOMOUS CARS. COMMUNICATION WITH OTHER TRAFFIC PARTICIPANTS.

Using the car as a display



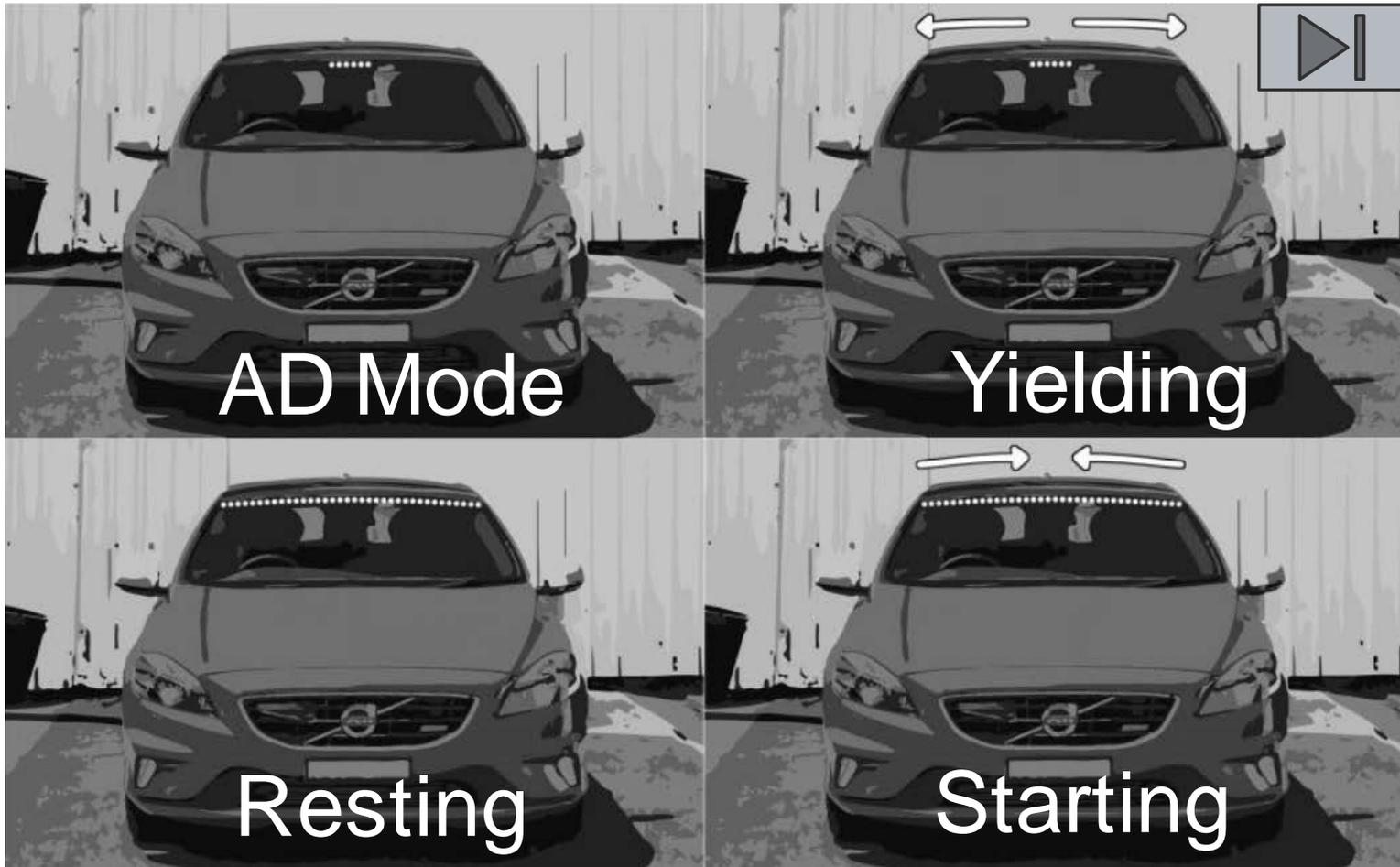
> LED fields in the front show, if the car is driving autonomously (blue) or is controlled manually (white)

> A laser system at the front of the car projects a virtual crosswalk



New Light and Light Signalling Innovations | BMW AG | February 2017

Dynamic LED appearance on windshield



HMI Concept AVIP - Lagström & Lundgren (2015)

1 Agree upon the deliverables and the timing deadlines

2 Agree upon the fundamental Issues

3 Agree upon which functions are allowed to be installed on the vehicle

4 Establish focus groups of experts to develop detailed proposals

5 Focus Groups specialising on:
➤ Installation
➤ Road Illumination
➤ Light-Signalling

➔ Detailed proposals

6 Draft proposals to amend the Regulations

7 Regular submission of individual elements to GRE

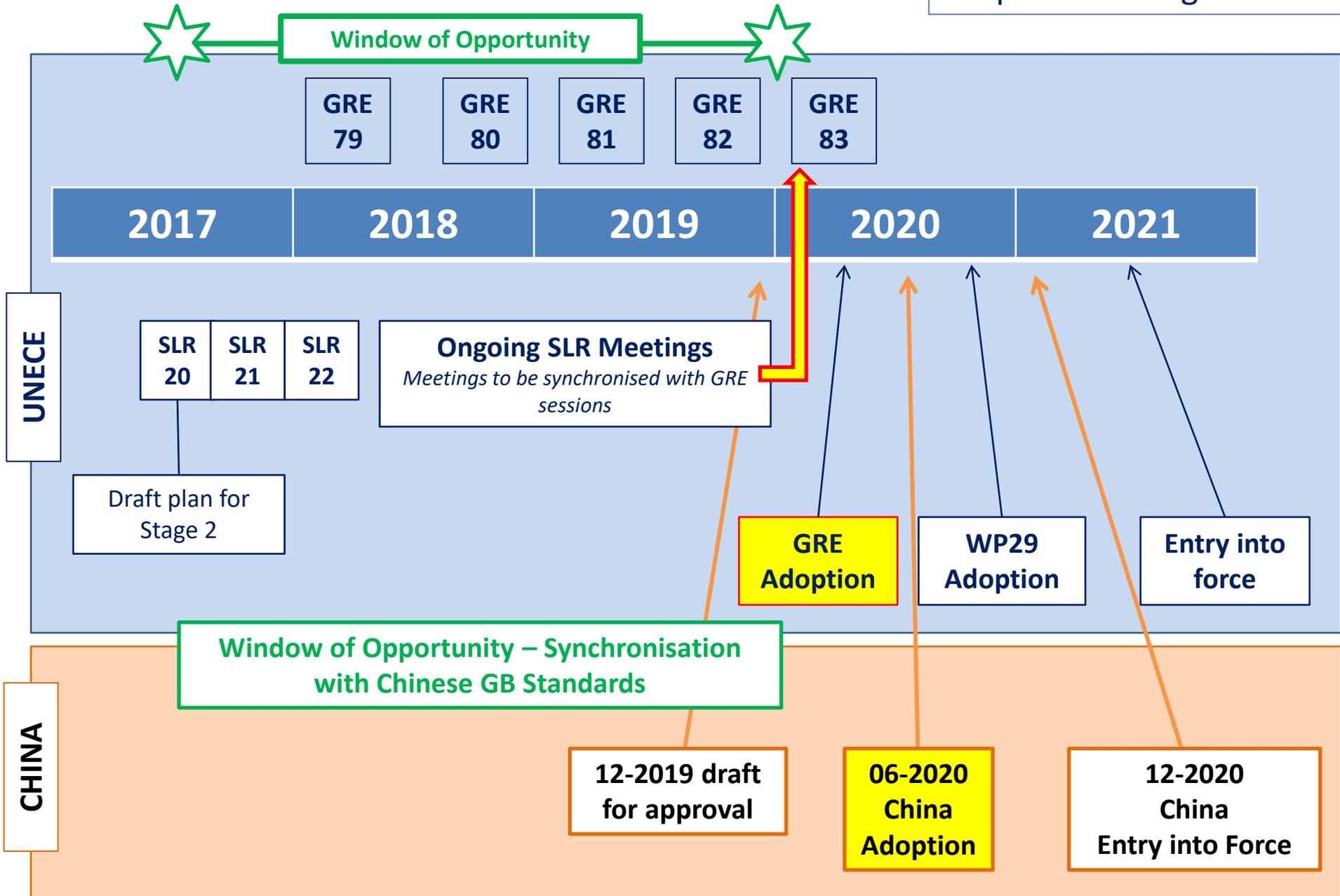
SLR Group

Focus Groups

SLR Group

➔ GRE

Note: This is similar to the approach adopted for the Stage 1 simplification



Definitions of “Performance Based” and “Technology Neutral”, specifically drafted to be **suitable for Lighting & Light Signalling**, are required

Installation of Functions

1. Allowed functions – generally fall into two categories
 - Mandatory (*because they are considered to be fundamental for safety*)
 - Optional

2. Permitted or not permitted?
 - *Whatever is not explicitly forbidden is allowed (USA self-certification system)*
 - *Whatever is not explicitly allowed is forbidden (UN type approval system)*

Note: There is no statement in the UN Regulations that something is explicitly forbidden. However, it is not expected that these two opposing approaches will change , so for Stage 2 we are obliged to follow the UNECE approach and define new functionalities that can be allowed with suitable objective requirements. However this could be debated in IWG-SLR.

Installation of Functions

2. Is there some possibility to introduce general provisions into the Regulations to allow functions, that provide assistance to the driver or other road users, to be optionally installed provided they comply with well defined performance criteria based upon objective tests?
 - The basis of this approach would be a requirement that these optional functions do not reduce/ impair/ degrade/ lessen the performance (photometry, colour) of the required functions, i.e. taking account of current general limits.
 - Such optional functions could , for example, include “decorative lighting” and information projected onto the road surface (e.g. signals connected with parking manoeuvres / entry to and exit from vehicles, etc.)

The objective of this approach is to avoid the need to constantly update the technical provisions in the Regulations in the interest of maintaining global harmonisation and synchronisation.

Installation of Functions

1. Introduce **functions**, not devices (system approach).
 - Need to define the purpose of a function (see SLR-20-14).
 - Consider Fail safe provisions / redundancy, symmetry, etc.
 - In some cases the optical performances are not enough and the perception of the function by the other road users is fundamental.

For example, in case of tail lamp function we need a signal for each side of the vehicle to make sure that the vehicle is clearly visible and its width is well perceived by other road users (must perception be symmetrical?).

“Single Lamp” and “Apparent Surface”

1. Is a definition of “Single lamp” still appropriate? The current definition is not performance oriented.
2. Consider redefining “Single Lamp”, e.g. as “Single function” / “single system” / “single function lamp”, ...
3. The function may be produced by a single “device” or a cluster of “devices”. The maximum and minimum photometric requirements should apply to the function, however it is produced
4. The important requirement is to provide an acceptable visual appearance that is not confusing to other road users. This shall include the topic of symmetry of functions and not devices.

The term “device” is not a performance concept for lighting and light signalling application. “Function” is a more appropriate and performance-based concept, especially in the context of innovations associated with the installation of increasingly intelligent functions. This performance based approach is compatible with the objective of long term stability of regulations and standards.

Objective Photometric Requirements in the context of “Performance Based”

1. In the context of the work of GRE, the use of the term “Performance based” does NOT imply that photometric and other test requirements shall be validated at the installation level. In particular, assessment of photometric performance of the complete vehicle is not economically viable. It is more logical to make references to the photometric and other test requirements of the devices (functions).
2. Develop objective requirements to determine and verify the maximum permitted intensities of red light to the front and white light to the rear; research is required.
 - Need to avoid the obligation of unnecessary systematic verifications on vehicles, difficult to achieve at vehicle approval (big additional burden).
 - IR LED produces some red light to the front: does it create confusion or not?
 - Objective requirements are required to replace current subjective requirements in the Regulations. The human eye can see light beyond 780 nm wavelength.

Revision of the Definition of “Apparent Surface”

Objective requirements based upon a new definition of a new term to replace “apparent surface” that can be applied to all measurements.

- “Apparent surface” today can be the “light emitting surface” or the “illuminating surface” and the results can be completely different. Need to improve clarity.
- These objective requirements must be capable of being validated at the design stage.
- Requirements concerning the separation of distinct visible light emitting surfaces and geometrical installation requirements should be reviewed with regard to experience of type approved configurations that are currently in use.

1. Review of Sections 5 and 6 of the Installation Regulations to identify opportunities to amend requirements to become performance based/technology neutral
2. Reconsider positioning rules and geometric visibility in the context of the function and a new approach to the definition of “single lamp”
3. Vertical inclination of the passing beam cut-off
 - Incorporate the outcome of the work of IWG-VGL
 - GB 7258 has different requirements than GB 4785

4. What constitutes a “standard vehicle” condition that has to be taken into account according to the specific technical requirements,
 - e.g. normal use of the vehicle
 - e.g. treatment of obstructions to the correct performance of the devices
 - e.g. treatment of special lamps on trucks and other vehicles that are not regulated but allowed by national laws.

5. Adaption of the installation provisions to facilitate the introduction of:
 - o new “digital technologies” (e.g. projection features)
 - o road scene illumination and light signalling for autonomous vehicles

1. The current RID photometric requirements are performance based but are not technology neutral.
2. There are concerns about the adequacy of the photometric requirements in the context of modern traffic conditions. It may be necessary to define performance criteria based upon the maximum speed of certain vehicle categories.
3. How to specify improved objective performance requirements for road scene illumination
 - convergence with the approach proposed by Dr. Targosinski at GRE?
 - Is there a need to reconsider requirements relating to glare from RID?
(Are the current requirements still relevant?)

Is it necessary to specify the detailed requirements for all classes and modes of AFS? Should AFS be treated as a cluster?

- The current AFS and ADB requirements are over prescribed and are not technology neutral.
- To avoid unnecessary barriers to innovation it is necessary to **re-classify AFS and ADB as adaptive versions of RID** with performance requirements and objective tests regarding minimum visibility and maximum glare under all conditions of adaptation.
- This will require a major study supported by a literature review of existing research.

1. Detailed analysis of the LSD and RRD Regulations is required to identify areas where simplification can be achieved
2. Are the current photometric requirements still adequate?
3. Are requirements for the “apparent surface” of the DRL necessary?
4. Requirements for category 5 and 6 Direction Indicators: should these requirements be reviewed in the context of recent research?