Presentation 1
4th GoE on LIAV, 1-2 September 2022
Provisional agenda item 2

Picture the future automated safe system as a compass for GE.3/LIAV when drafting a new convention

Recycling old news

Hans Berg

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Seeing safe automated vehicles as a multivariate equation……!

From: $Y_{\text{Safe drivers}} = X_1 + X_2 + X_3 + X_4 + X_5 + X_n$

To: $Y_{\text{Safer automated driving}} = X_1 + X_2 + X_3 + X_4 + X_5 + X_n$

Y= The needed qualification/competence to ensure a safe trip and (the goal),

X= the needed parts of a new convention (the mean(s))

A lot of knowledge……

An enormous amount of research has been devoted on the topic of driver behavior and relation to accidents/injuries, and a substantial number of research papers and reports can be found on the topic of driver education and other measures to lower these risks

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Global Forum for Road Traffic Safety (WP.1)
Resolution on the Deployment of Highly and Fully Automated Vehicles in Road Traffic

Informal document WP.1

United Nations ECE/TRANS/WP.1/2021/2

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What are the additional road safety risks posed by automated vehicles in comparison to traditional ones that you believe require intervention by road safety authorities?

COMMISSION IMPLEMENTING REGULATION (EU) 2022/1426
of 5 August 2022
laying down rules for the application of Regulation (EU) 2019/2144 of the European Parliament and of the Council as regards uniform procedures and technical specifications for the type-approval of the automated driving system (ADS) of fully automated vehicles

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New EU Regulations on the Type Approval of Fully Automated Vehicles

- The European Commission have recently published one EU Regulations which pave the way for the more widespread deployment of fully automated vehicles and revising 2018/858.
- The first of these Regulations specifies proposed amendments to (EU) 2018/858 on the approval and market surveillance of motor vehicles and their trailers which would permit the European Small Series Type Approval of fully automated vehicles.
- The second Regulation is a new Implementing Regulation (2022/1426) proposing uniform procedures and technical specifications for the type approval of the automated driving systems of fully automated motor vehicles.

https://eur-lex.europa.eu/search.html?scope=EURLEX&text=%28EU%29+2022%2F1426&lang=en&type=quick&qid=1661841316689

New EU Regulations on the Type Approval of Fully Automated Vehicles cont.

Fully automated vehicles of category:

1. N (only goods vehicles)
2. M and N (passenger vehicles and goods vehicles, that are designed to accommodate occupants)
3. Dual mode vehicles (equipped with both a fully automated driving mode and a manual driving mode)

Three use cases:

1. Fully automated vehicles operating in a predefined area in an urban or suburban environment
2. Fully automated vehicles or dual mode vehicles operating on a predefined route, with fixed start and end points, which may include urban, suburban or motorway environments
3. Dual mode vehicles with a fully automated driving mode for parking applications within predefined parking facilities

New EU Regulations on the Type Approval of Fully Automated Vehicles cont.

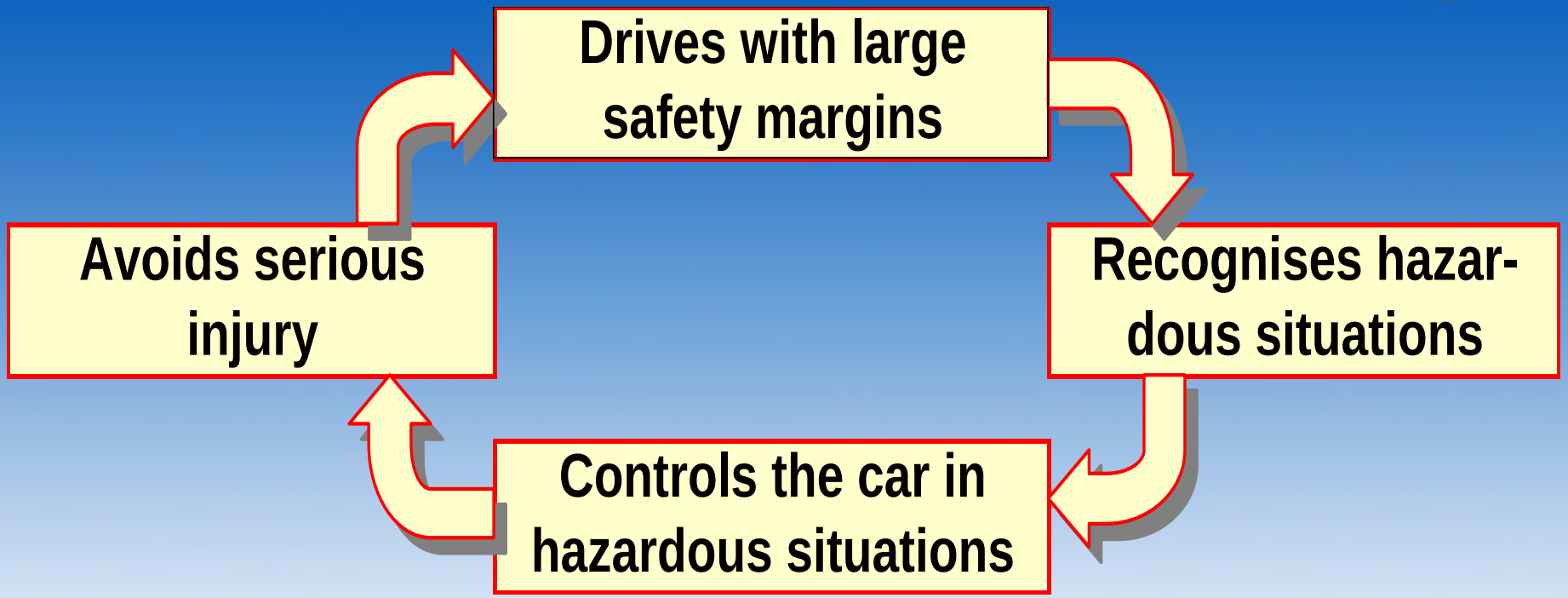
Annex 2 of the draft Regulation specifies the performance requirements that an automated driving system must comply with, including requirements on the following:

1. Dynamic driving task in nominal conditions
2. Dynamic driving task in emergency conditions
3. How the automated driving system must react and perform if the vehicle goes outside its Operational Design Domain (ODD)
4. Failure conditions
5. Minimum risk manoeuvre
6. Cybersecurity
7. Software updates
8. Data Recording

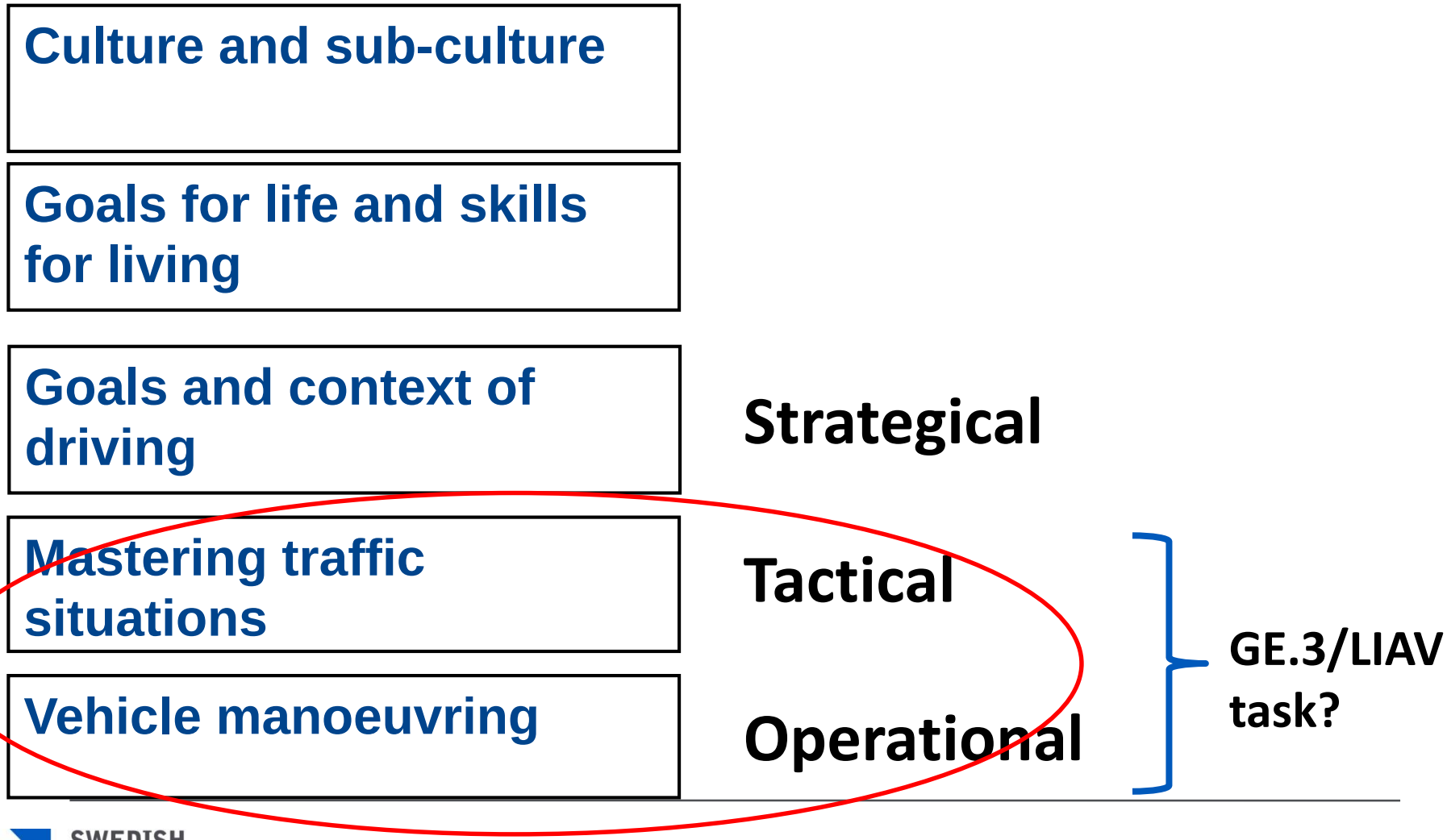
New EU Regulations on the Type Approval of Fully Automated Vehicles cont.

- As part of the type approval application, the manufacturer must compile documentation detailing the design and operation of the automated driving system, its “safety concept” and the safety management system operated by the manufacturer to demonstrate that thorough consideration of functional and operational safety has been applied throughout the design and development of the system.

A safe driver is planning the trip well and ……



Hierarchical competence approach to the task of driving (cont.)



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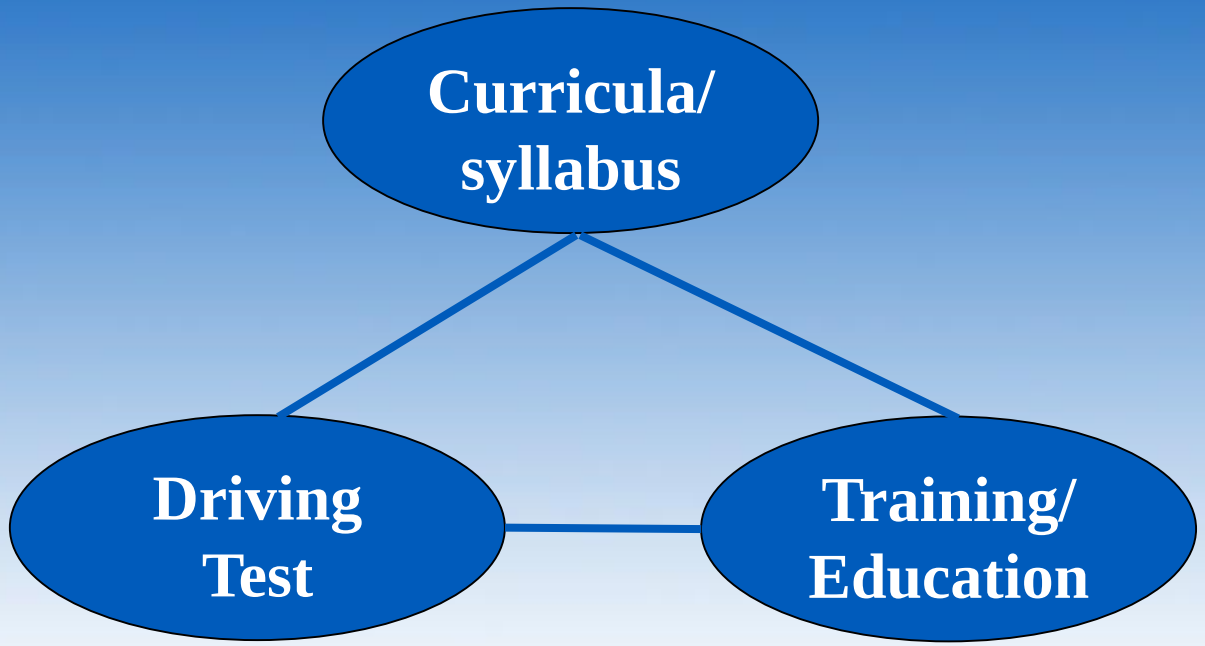
Hierarchical levels of driver behaviour (adapted from Keskinen, 1996 and Partly based on original ideas of Mikkonen and Keskinen, 1980).

The important triad to produce safe drivers by education



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Recycling?

Using research results, curriculas, syllabuses, new EU regulations etc. and changing ”Driver” to ”Automated Vehicle” and combine this with the WP.1 two resolutions?

Text in the Swedish Curricula for Category B

Swedish Road Administration
Code of Statutes

VVFS 2004:110

Published on
7 September 2004

SRA regulations concerning curriculums for category B courses;
decided on 30 August 2004.

Compliant with Clauses 7 and 12 of the Ordinance (1998:978) on Driving Schools, the SRA specifies [1] the following.

Chapter 1 Make-up and structure of the course curriculum

Clause 1 Driving licence training shall comprise the following parts.

1. Manoeuvring, vehicle and the environment,
2. driving in different traffic environments,
3. travelling by car in special circumstances and,
4. personal circumstances and objectives.

The four parts shall be divided into the following two knowledge areas.

1. Theory and skill, and
2. self-appraisal.

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The output – a safe driver
Changing the word ”Driver” to ”Automated Vehicle”

Example of an Y:

An automated vehicle (AV) must have the capacity to safely interact with other road users in different traffic situations and under different driving conditions. The AV should also have the ability to foresight, detect risks and drive with such safety margins that it will not become involved in critical situations or accidents and injuries. A safe interaction between the AV and vulnerable road users are especially important.

An AV should also have a the ability to follow traffic rules.

Mastering traffic situations

Recycling - changing the word ”Driver” to ”Automated vehicle” cont.

The “X’s” to reach the goal “Y”

The automated vehicle should:

- *use* traffic rules that are applicable,
- *demonstrate* good detection routines in various traffic environments,
- *safely interact* with other road users, especially vulnerable
- *drive* with adequate margins of safety,
- *use* a driving technique that leads to low energy consumption,
- *adjust* driving to suit the prevailing conditions,
- *identify* the risks in various traffic situations and traffic environments,
- *foresee* different turns of events in traffic,
- *assess* the consequences of various sequences of events.
- Etc……

Mastering traffic situations

Recycling – already X's (and some Y's) from WP.1 and EU

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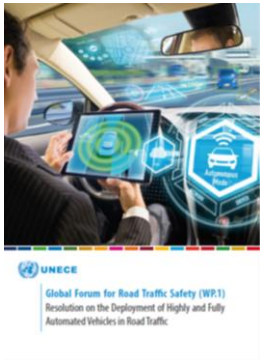
Terms of reference of the Group of Experts on drafting a new legal instrument on the use of automated vehicles in traffic

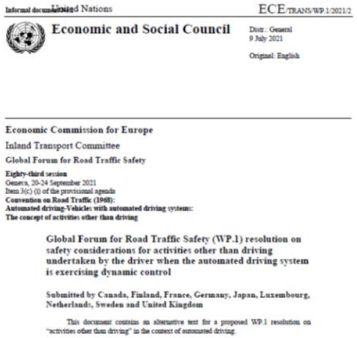
IV. Recommendations for automated driving systems in highly and fully automated vehicles



4. Automated driving systems in highly and fully automated vehicles should:

- (a) Make road safety a priority;
- (b) Monitor and safely interact with the surrounding traffic environment;
- (c) Endeavour to safely tolerate errors of the vehicles' users, inside and outside of the vehicle, and of other road users in order to minimize potential effects of such errors;
- (d) Comply with traffic rules, including those referring to:
  - (i) Interacting safely with other road users;
  - (ii) Following instructions from law enforcement authorities, and those authorized to direct traffic;
  - (iii) Maintaining smooth and safe flow of traffic.
- (e) Only operate within their ODD;
- (f) Be capable of achieving a state that maximizes road safety when a given trip cannot or should not be completed for example in case of a failure in the automated driving system or other vehicle system;
- (g) React to unforeseen situations in a way that minimizes danger to the vehicle's users and other road users;
- (h) Communicate with their users and other road users, in a clear, effective and consistent way, by providing sufficient information about their status and intention, and enabling an appropriate interaction;
- (i) Clearly and effectively provide appropriate notice, if the vehicle leaves its ODD;
- (j) Operate in a way that enables verification as to whether or not they are or were performing dynamic control; and
- (k) Enable their deactivation in a safe manner.

Other activities….
Four recommendations with X's…..



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- III. Recommendations regarding automated driving systems issuing transition demands
- IV. Recommendations for drivers
- V. Recommendations for manufacturers of automated driving systems issuing transition demands
- VI. Recommendations for Contracting Parties

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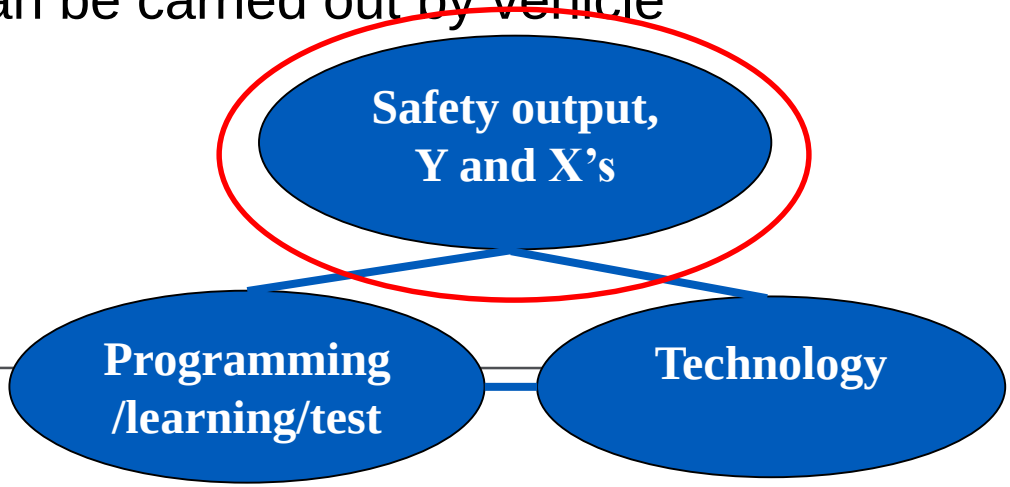
Terms of reference of the Group of Experts on drafting a new legal instrument on the use of automated vehicles in traffic

- 4. The main output of the Group of Experts is to draft a new legal instrument which is expected to complement the 1949 and 1968 Conventions on Road Traffic. It will include, in addition to the typical sections on definitions and final clauses, a set of legal provisions for the safe deployment of automated vehicles in international traffic. *These provisions will specifically aim to ensure road safety, in particular the safety of vulnerable road users. ("Y")*

Separate roles and responsibilities. To be efficient!

- Recycle ”old news” and use the new EU Regulation, with a focus to ”proclaim” the needed safety output from a WP.1-perspective, aiming to agree upon a minumum level of competence of automated vehicles to be allowed to cross borders (WP.1/GE.3/LIAV)
- WP.29 to ensure the minimum level of safety output and competence by regulations, GTRs and other rules
- The ”training” of the automated vehicles to reach minimum level of safety and competence can be carried out by vehicle manufacturers



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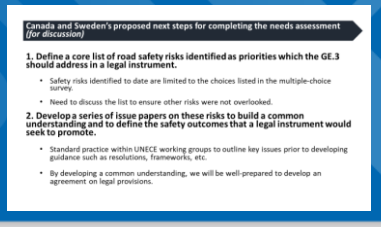
Conclusion


Canada and Sweden's proposed next steps for completing the needs assessment (for discussion)

1. Define a core list of road safety risks identified as priorities which the GE.3 should address in a legal instrument.
   - Safety risks identified to date are limited to the choices listed in the multiple-choice survey.
   - Need to discuss the list to ensure other risks were not overlooked.
2. Develop a series of issue papers on these risks to build a common understanding and to define the safety outcomes that a legal instrument would seek to promote.
   - Standard practice within UNECE working groups to outline key issues prior to developing guidance such as resolutions, frameworks, etc.
   - By developing a common understanding, we will be well-prepared to develop an agreement on legal provisions.

- We need to state and agree upon Y in our equation, it will be our ”compass” and by this help us to know the needed content (the X’s) in a new convention
- To put GE.3/LIAV discussions in to a goal (Y) and mean(s) (X´s) hiearchy
- Efficiency
- Guide GE.3/LIAV and other WP´s, CP´s and industry
- We already have many (but not all?) X’s
- Use of the new EU Regulations on the Type Approval of Fully Automated Vehicles

Do any CP:s already have a the Y (and maybe corresponding X´s) which can be used as our GE.3/LIAV ”compass” and drafting model?

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Thank you!
Merci!
Danke!

どうも有り難うございます！

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