



**AI for Autonomous  
and Assisted Driving**  
AN ITU FOCUS GROUP

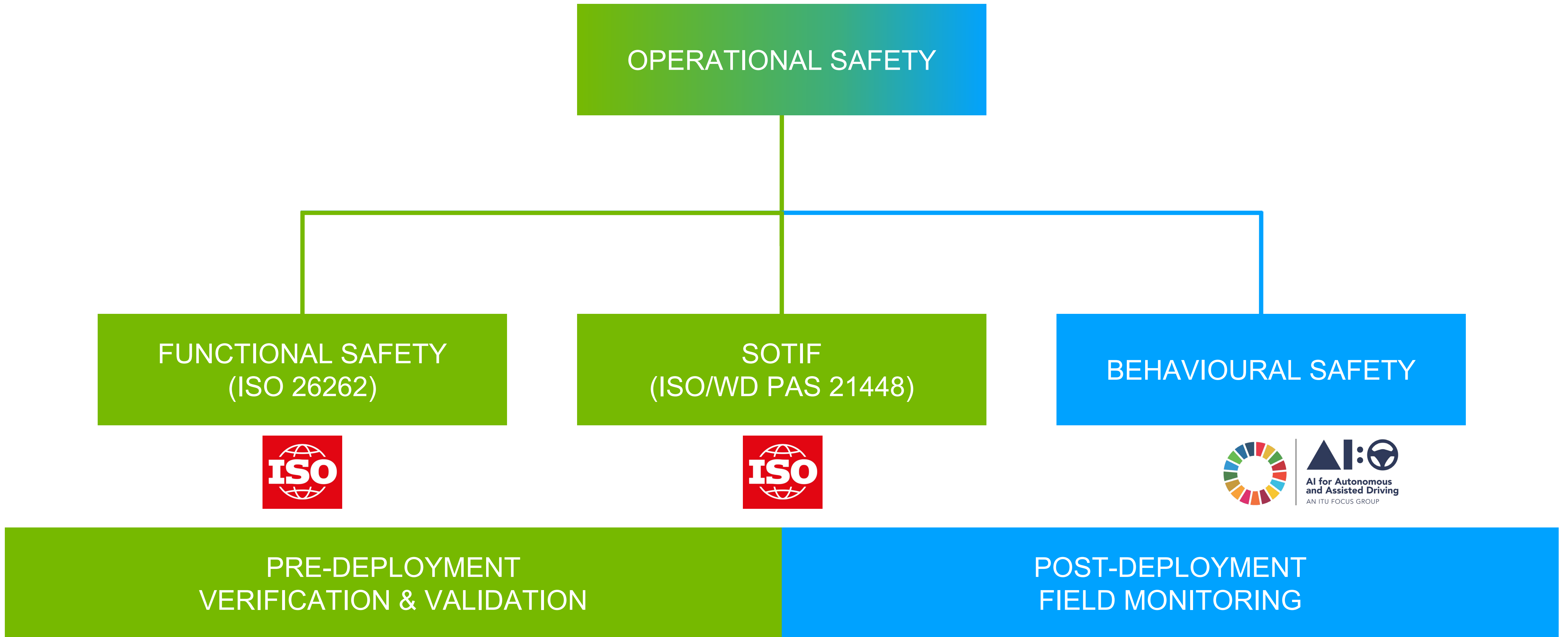
Informal document **GRVA-07-33**  
7th GRVA, 21-25 September 2020  
Agenda item 12(b)

## **Update on FG-AI4AD related activities**

WP.1 & WP.29/GRVA  
21-25<sup>th</sup> September 2020  
Geneva, Switzerland



# Operational Safety





# Global Regulatory Landscape



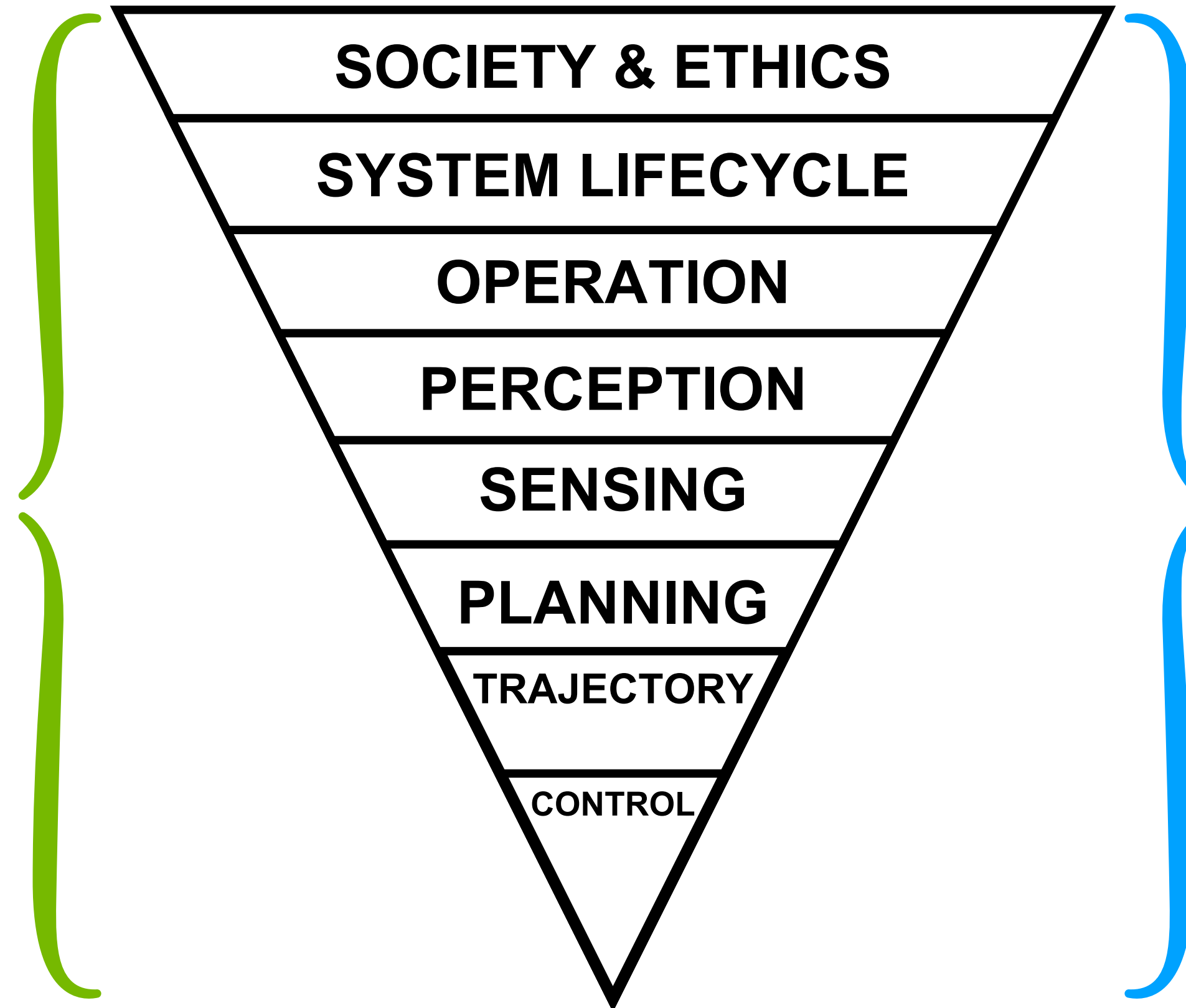
## UNECE WP29

Agreement concerning the Establishing of Global Technical Regulations for Wheeled Vehicles...



## UNECE WP1

Convention on Road Traffic  
Road User & Driver Behaviour



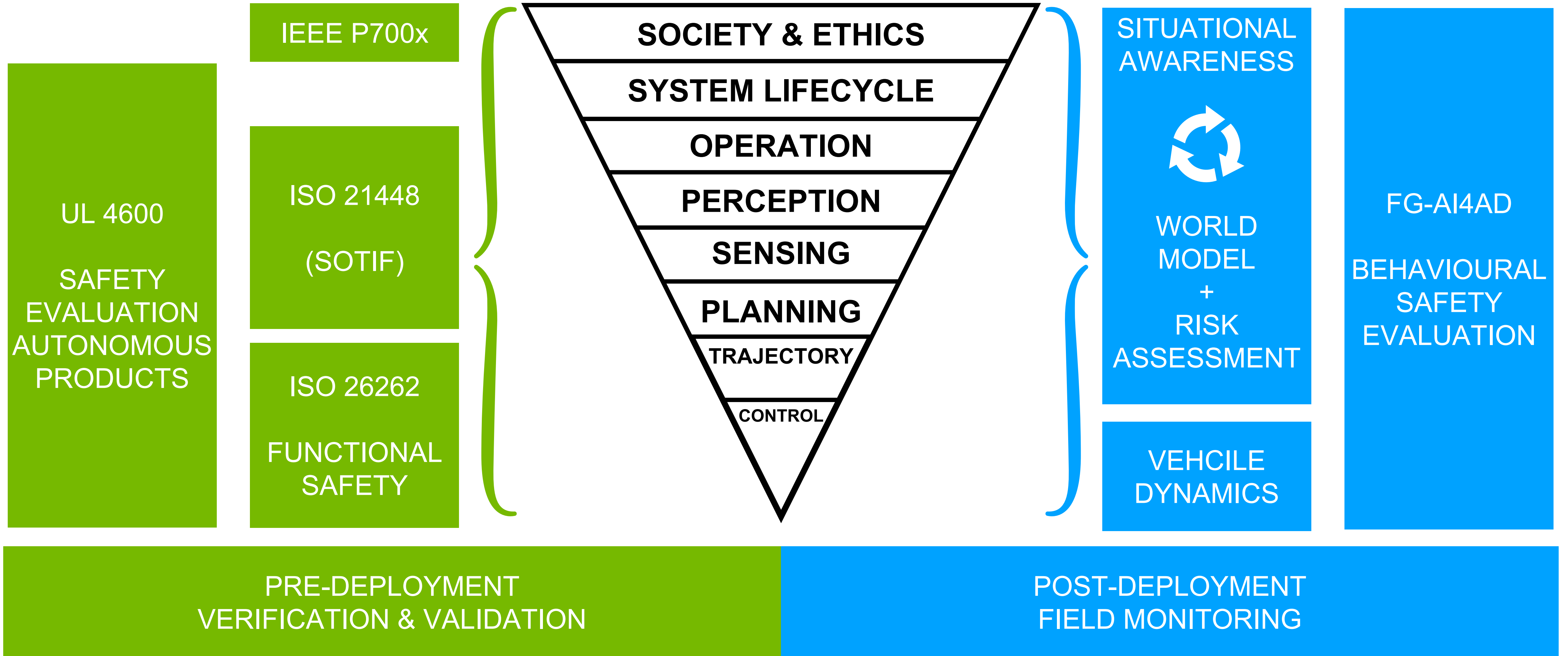
PRE-DEPLOYMENT  
VERIFICATION & VALIDATION

POST-DEPLOYMENT  
FIELD MONITORING





# Safety Standard Landscape





# Field Monitoring - Leading Measures & Metrics

## POST-DEPLOYMENT FIELD MONITORING

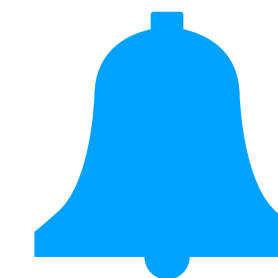
### LAGGING MEASURES

Observations of safety  
outcomes or harm



### LEADING MEASURES

Reflect performance,  
activity, and prevention





# The Molly Problem

*Self-Driving Ethics Revisited*

A young girl called Molly is crossing the road alone and is hit by unoccupied self-driving vehicle. There are no eye-witnesses.

– *The Molly Problem*

What are the reasonable expectations for what happens next?

- *The Molly Problem: A young girl called Molly is crossing the road alone and is hit by unoccupied self-driving vehicle. There are no eye-witnesses.*



Would you expect the self-driving software;

a) to be aware of the collision?

YES/NO

- *The Molly Problem: A young girl called Molly is crossing the road alone and is hit by unoccupied self-driving vehicle. There are no eye-witnesses.*

Would you expect the self-driving software;  
b) to bring the vehicle to a safe stop at the collision site?

YES/NO

- *The Molly Problem: A young girl called Molly is crossing the road alone and is hit by unoccupied self-driving vehicle. There are no eye-witnesses.*

Would you expect the self-driving software;  
c) to indicate a hazard to other drivers?

YES/NO

- *The Molly Problem: A young girl called Molly is crossing the road alone and is hit by unoccupied self-driving vehicle. There are no eye-witnesses.*

Would you expect the self-driving software;  
d) to alert the emergency services?

YES/NO

- *The Molly Problem: A young girl called Molly is crossing the road alone and is hit by unoccupied self-driving vehicle. There are no eye-witnesses.*

Would you expect the self-driving software;

e) to be able to recall information about the collision required to explain what happened?

YES/NO

- *The Molly Problem: A young girl called Molly is crossing the road alone and is hit by unoccupied self-driving vehicle. There are no eye-witnesses.*

Would you expect this recalled information to confirm;

a: the time of the collision?

YES/NO

- *The Molly Problem: A young girl called Molly is crossing the road alone and is hit by unoccupied self-driving vehicle. There are no eye-witnesses.*

Would you expect this recalled information to confirm;  
b: the location of the collision?

YES/NO

- *The Molly Problem: A young girl called Molly is crossing the road alone and is hit by unoccupied self-driving vehicle. There are no eye-witnesses.*

Would you expect this recalled information to confirm;

c: the speed of the vehicle at the point of collision?

YES/NO

- *The Molly Problem: A young girl called Molly is crossing the road alone and is hit by unoccupied self-driving vehicle. There are no eye-witnesses.*



Would you expect this recalled information to confirm;

d: if Molly was detected by the software?

YES/NO

- *The Molly Problem: A young girl called Molly is crossing the road alone and is hit by unoccupied self-driving vehicle. There are no eye-witnesses.*

Would you expect this recalled information to confirm;  
e: when Molly was detected by the software?

YES/NO

- *The Molly Problem: A young girl called Molly is crossing the road alone and is hit by unoccupied self-driving vehicle. There are no eye-witnesses.*

Would you expect this recalled information to confirm;  
f: when the risk of collision was identified?

YES/NO

- *The Molly Problem: A young girl called Molly is crossing the road alone and is hit by unoccupied self-driving vehicle. There are no eye-witnesses.*

Would you expect this recalled information to confirm;  
g: when mitigating action was taken to avoid the collision?

YES/NO

- *The Molly Problem: A young girl called Molly is crossing the road alone and is hit by unoccupied self-driving vehicle. There are no eye-witnesses.*

Would you expect this recalled information to confirm;  
h: what mitigating action was taken to avoid the collision?

YES/NO

- *The Molly Problem: A young girl called Molly is crossing the road alone and is hit by unoccupied self-driving vehicle. There are no eye-witnesses.*

Would you expect this recalled information to confirm;  
i: whether the mitigating action was executed successfully?

YES/NO

- *The Molly Problem: A young girl called Molly is crossing the road alone and is hit by unoccupied self-driving vehicle. There are no eye-witnesses.*

## Question #1

Is the data recorded by the EDR and DSSAD sufficient answer the questions posed by The Molly Problem?

- *The Molly Problem: A young girl called Molly is crossing the road alone and is hit by unoccupied self-driving vehicle. There are no eye-witnesses.*

No.

EDR will not trigger on pedestrian impact  
DSSAD records only the entity responsible for the DDT

Continual monitoring of perception, risk, action and outcome is required to identify and store both collision and near-miss events.

- *The Molly Problem: A young girl called Molly is crossing the road alone and is hit by unoccupied self-driving vehicle. There are no eye-witnesses.*



## Question #2

Is The Molly Problem relevant to the expectations that automated vehicles “*shall not cause any traffic accidents resulting in injury or death that are reasonably foreseeable and preventable*”?

- *The Molly Problem: A young girl called Molly is crossing the road alone and is hit by unoccupied self-driving vehicle. There are no eye-witnesses.*

Yes.

“Reasonable foreseeable” requires a record of the road traffic situation (scenario) encountered. Preventable requires the timing of decisions and the mitigating actions executed to be recorded.

Collision specific evidence is required for both the initial investigation and to provide new input into scenario databases to enhance training and testing. Scenario-based testing alone is not sufficient.

- *The Molly Problem: A young girl called Molly is crossing the road alone and is hit by unoccupied self-driving vehicle. There are no eye-witnesses.*

## Question #3

Are the behavioral expectations of The Molly Problem covered by the 1968 Convention on Road Traffic Article 31 behaviour in case of accident?

- *The Molly Problem: A young girl called Molly is crossing the road alone and is hit by unoccupied self-driving vehicle. There are no eye-witnesses.*

Yes.

Article 31 covers the requirement to (a) Stop, (b) Endeavour to ensure traffic safety at the site, (c) Notify the police if a person is injured or killed.

The identification of the collision, it's severity and execution of the appropriate action are covered by the expected 'mental ability' of a driver specified in Article 8.3.

- *The Molly Problem: A young girl called Molly is crossing the road alone and is hit by unoccupied self-driving vehicle. There are no eye-witnesses.*

## Question #4

Is the ability to store and recall information described by The Molly Problem covered by the 1968 Convention on Road Traffic?

- *The Molly Problem: A young girl called Molly is crossing the road alone and is hit by unoccupied self-driving vehicle. There are no eye-witnesses.*

Implicitly, yes.

Article 8.3 specifies that every driver shall possess the necessary mental ability and be in a mental condition required to drive.

The mental ability to store and recall information is essential as evidence for collision investigation and as a foundation for continual learning. The mental condition to store and recall information is a key capability for a driver, without which a license may be revoked.

- *The Molly Problem: A young girl called Molly is crossing the road alone and is hit by unoccupied self-driving vehicle. There are no eye-witnesses.*

## Question #3

Does the proposed Article 34 bis amendment to the 1968 Convention on Road Traffic harmonise behavioral expectations for human and non-human drivers?

- *The Molly Problem: A young girl called Molly is crossing the road alone and is hit by unoccupied self-driving vehicle. There are no eye-witnesses.*

No.

The proposed Article 34 bis deems an ADS to satisfy Article 8.1 but **only** by exempting the ADS from the 32 Articles and 132 Clauses that specify the behaviour of drivers and road users specified.

e.g. an ADS would become exempt from Article 31 behavior in case of accident as well as Article 8.3 driver mental ability and condition.

- *The Molly Problem: A young girl called Molly is crossing the road alone and is hit by unoccupied self-driving vehicle. There are no eye-witnesses.*





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THANK YOU. STAY SAFE. STAY HEALTHY.

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