SG3
In Service Monitoring and Reporting

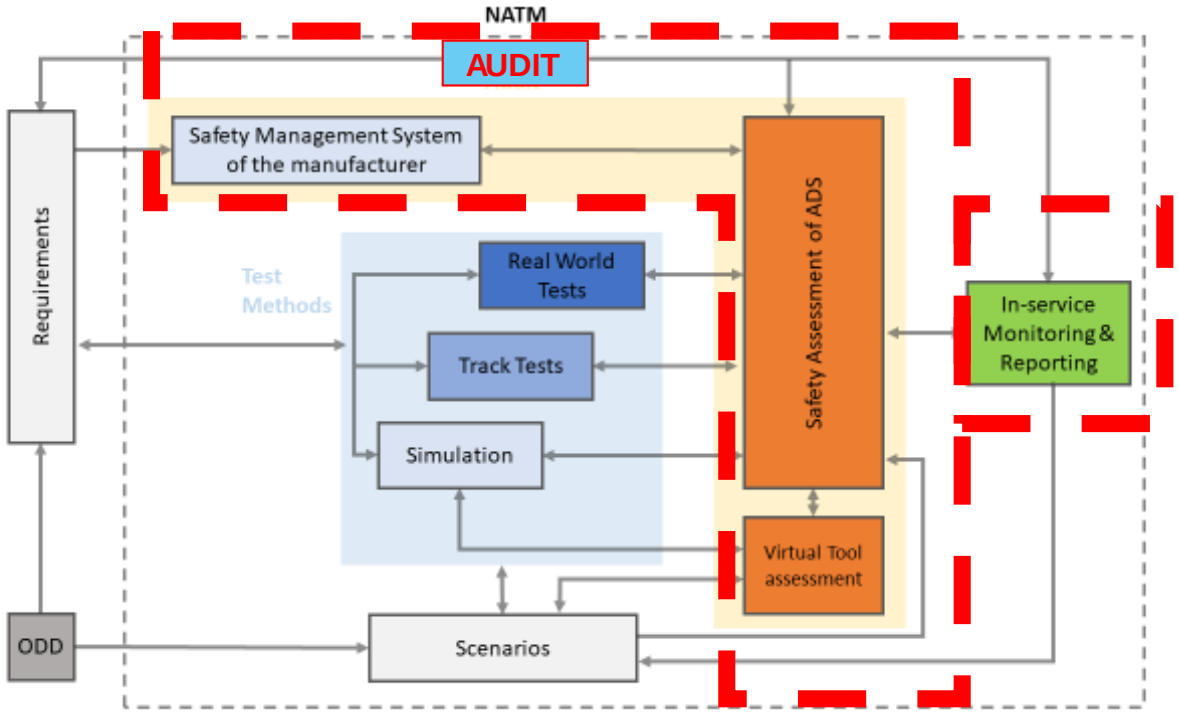
VMAD Technical Workshop on In-Service Safety Performance of Automated Vehicles

- 17 & 24 March

SG3

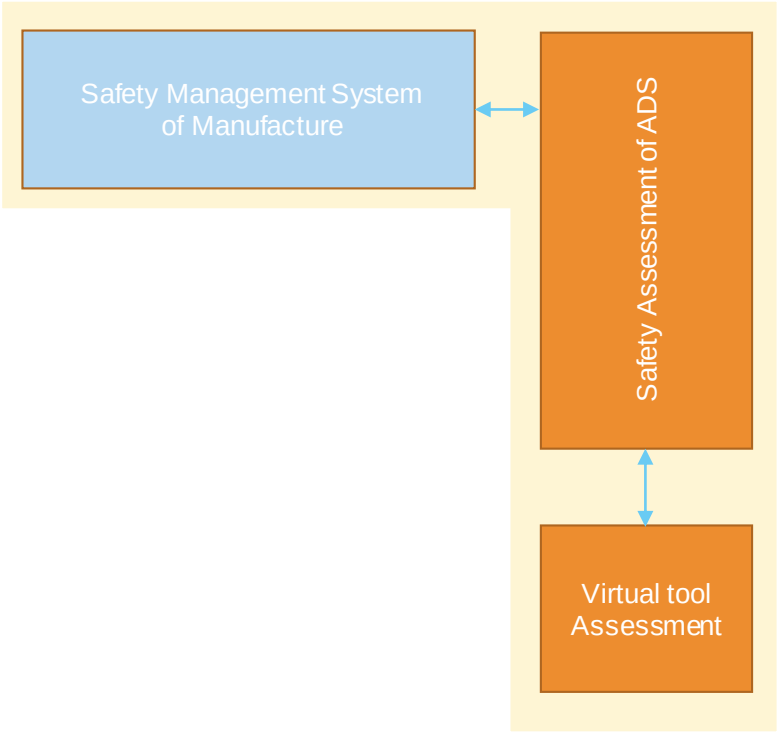
- SG3 is a subgroup of VMAD IWG that provides a contribution for the development of the New Assessment/Test Method for automated driving (NATM)

- SG3 activities are focused on two areas: **Audit** and **In-Service Monitoring and Reporting.**



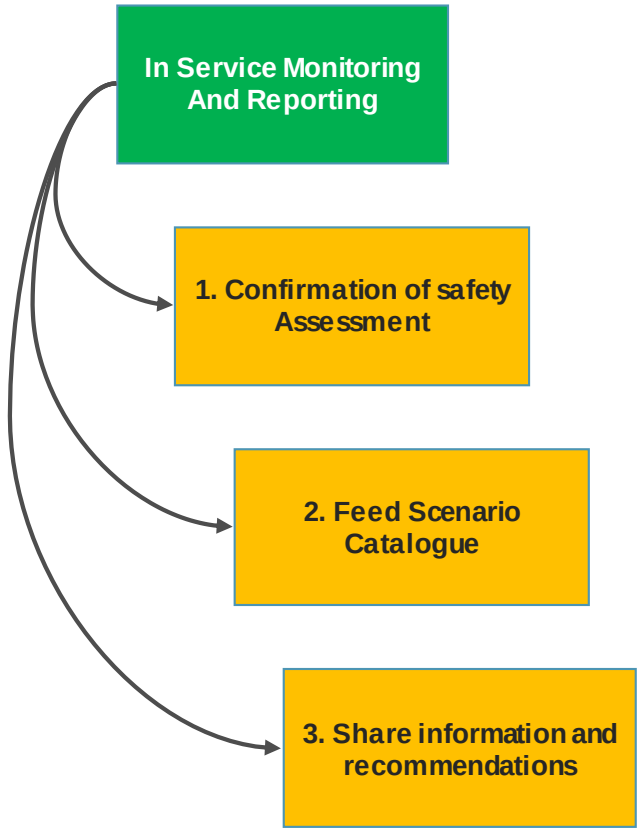
SG3-Audit, Objectives and Deliverables

- To develop ***Audit procedures*** to verify that ADS manufactures have robust processes/mechanisms/strategies (i.e., ***safety management system***) that are in place to ensure the ADS meets the relevant functional requirements throughout the vehicle lifecycle.
- To develop ***Audit/Assessment procedures*** to validate that ADS's hazards and risks have been identified and that a consistent ***safety-by-design concept*** has been put in place
- To develop ***Audit/Assessment procedures*** which establish how manufacturers will be required **to demonstrate** to safety authorities using documentation, their simulation, test-track, and/or real-world testing of **the capabilities of an ADS**.
- To Assure the **complementarity between the different pillars** of the assessment and the overall scenario coverage.



SG3-In Service Monitoring and Reporting, Objectives and Deliverables

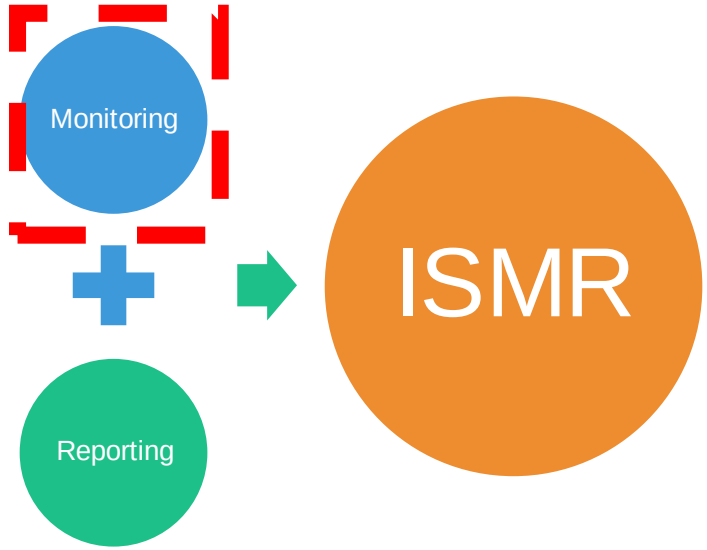
- In-Service Monitoring and Reporting (ISMR) addresses the in-service safety of the ADS after its placing on the market (operational experience feedback loop)
- It relies on the collection of in-service data(fleet monitoring) to assess whether the ADS continues to be safe when operated on the road and to identify safety risks
- This data collection can also be used for the identification of new scenarios to support the development of the Scenario Catalogue.
- ISMR allows the whole ADS community to learn from major ADS accidents/incidents through information sharing
- SG3 is developing procedures to confirm the in-service ADS safety and to improve the level of safety of ADS based on the evidence collected from the field operation

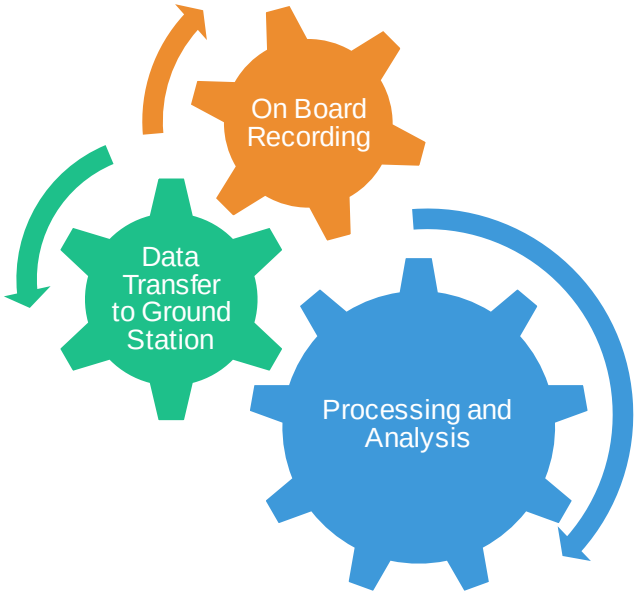


In Service Monitoring

Monitoring (*Link with the AUDIT Pillar):*

- Manufacturers should set up a monitoring program according to the SMS Requirements
- Vehicle data collection and analysis by the manufactures for reporting under ISMR, besides EDR/DSSAD
- Manufacturers are expected to collect data also from **other accessible sources** of data (e.g., customer reports)



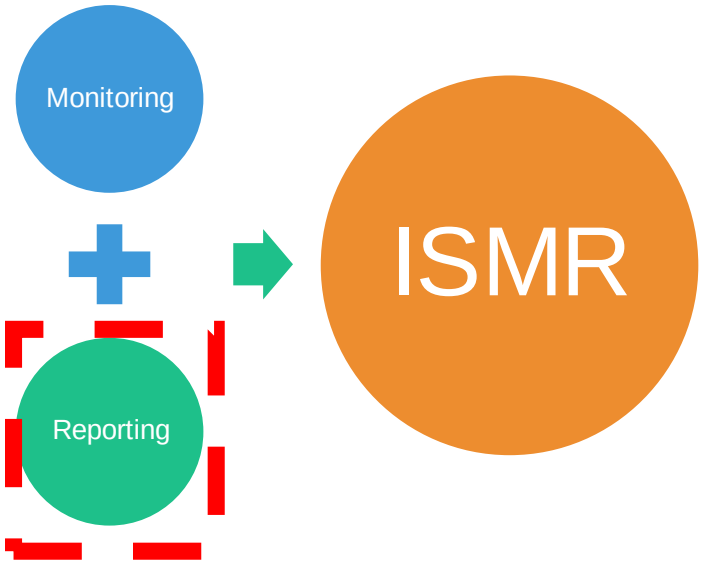


- Proactive approach for Safety which shall be integrated in the Safety Management System
- Beyond the scope of the occurrences reporting
- Increase safety and operational efficiency by identifying trends and unusual or unsafe circumstances

In Service Reporting

Occurrence Reporting*:*

- Occurrence refers to any safety-related event involving a vehicle equipped with an ADS.
- For reporting, two different categories of occurrences are defined: critical and not critical occurrences.
- The manufacturer should report, as required by the Authority, on both critical and non-critical occurrences



The main purpose of in-service reporting is the prevention of accidents and incidents and not to attribute blame or liability. (Just culture)

Types of Reporting

- **Short-term reporting** – occurrences that require the manufacturer to take remedial action when data provides evidence of the ADS posing an unacceptable in-service risk. (within 1 month)
  a) indications of failure to meet safety requirements
  b) critical occurrence where the ADS was at fault
  c) other safety-relevant performance issues

- **Periodic reporting** - reporting in the form of aggregated data (per hour of operation or driven km) for ADS-vehicle type and related to ADS operation (at least every year)
  a) no inconsistencies have been detected compared to the ADS safety performance assessed prior to market introduction;
  b) the ADS respects the performance requirements set by FRAV and as evaluated in the test methods developed by VMAD;
  c) any newly discovered significant ADS safety performance issues have been adequately addressed and how this was achieved.

Occurrences list

OCCURRENCE	SHORT-TERM REPORTING [1 Month]	PERIODIC REPORTING [6 Month/1 Year]
1.a. Safety critical occurrences known to the ADS manufacturer or OEM	X	X
1.b. Occurrences related to ADS operation outside its ODD	X	X
1.c. ADS failure to achieve a minimal risk condition when necessary	X	X
1.d. Communication-related occurrences		X
1.e. Cybersecurity-related occurrences		X
1.f. Interaction with remote operator if applicable		X
2.a. Driver unavailability (where applicable) and other user-related occurrences		X
2.b. Occurrences related to Transfer of Control failure		X
2.c. Prevention of takeover under unsafe conditions		X
3.a. Occurrences related ADS failure		X
3.b. Maintenance and repair problems		X
3.c. Occurrences related to unauthorized modifications		X
3.d. Modifications made by the ADS manufacturer or OEM to address an identified and significant ADS safety issue		X
4. Occurrences related to the identification of new safety-relevant scenarios	X	X

Outstanding Issues

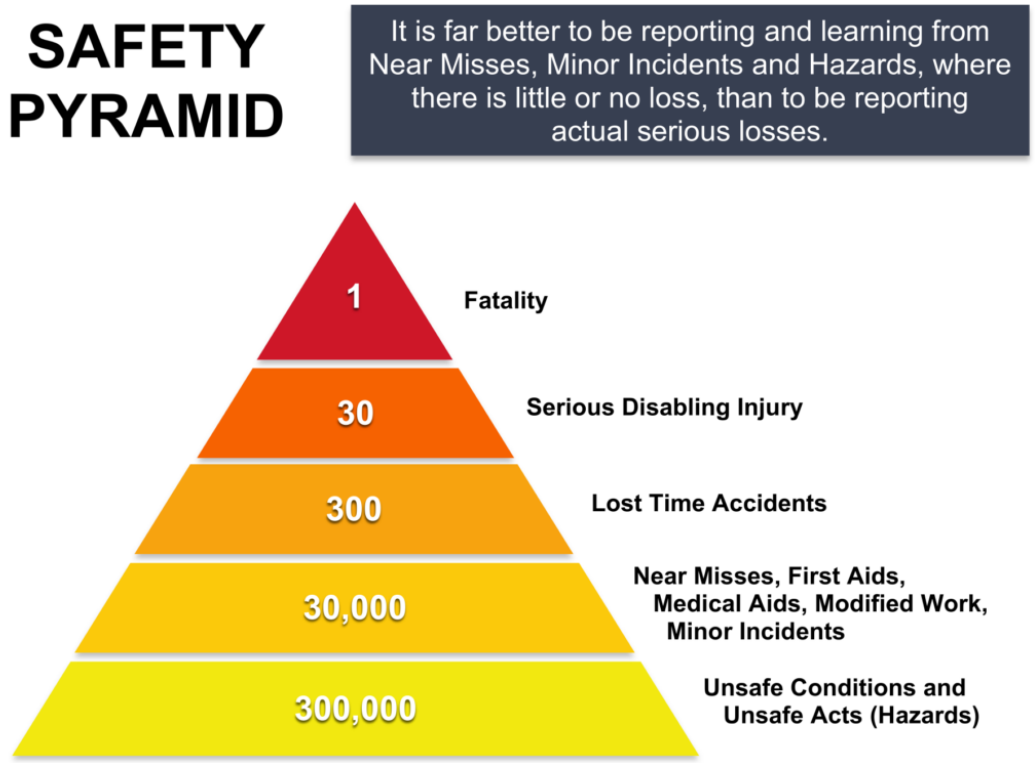
1. Data elements vs occurrences:
    I. Need to identify specific data elements to be monitored (and reported) besides the high-level occurrences listed by SG3;
    II. Non-critical occurrences reporting (e.g., near misses);
2. ISMR roles and responsibilities:
    I. Identify roles of national/international authorities, including
        I. data accessibility/protection and
        II. development and sharing of safety recommendations
3. Pending exchange with GRVA/WP29
    I. Information sharing among safety authorities & Contracting Parties
    II. Reporting from other sources than the ADS manufacturers;

Near misses

"An unplanned event that did not result in injury, illness or damage –

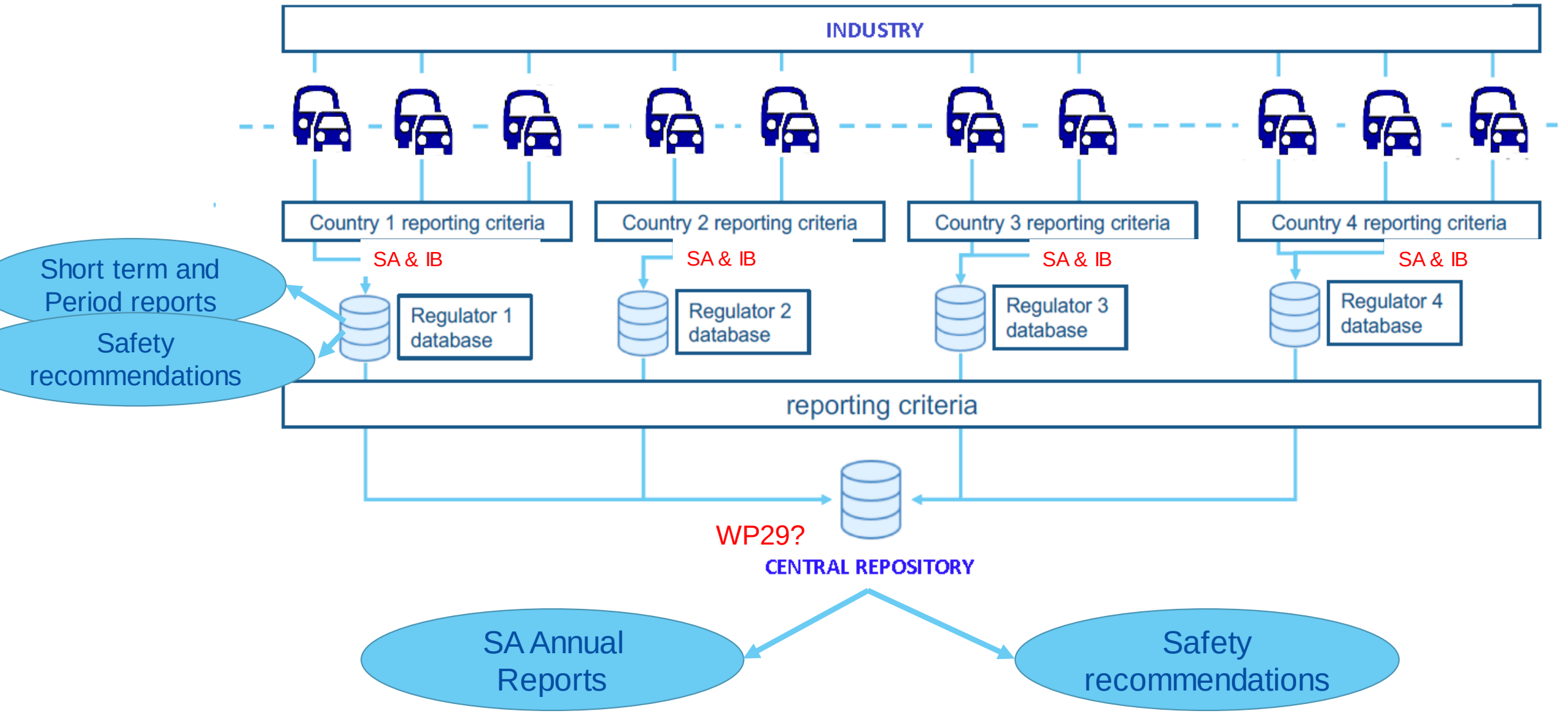
but had the potential to do so"

- Near misses are precursors for crashes to come, their analysis is of vital importance to prevent incidents
- Near Misses could be included in the monitoring task to fully exploit the possibility to find potentially harmful behaviors in ADS before a collision occurs
- Frequency of near miss is highly spread depending on the field and on the way near misses are detected/counted, nonetheless it is typically order of magnitude higher than incident/accident

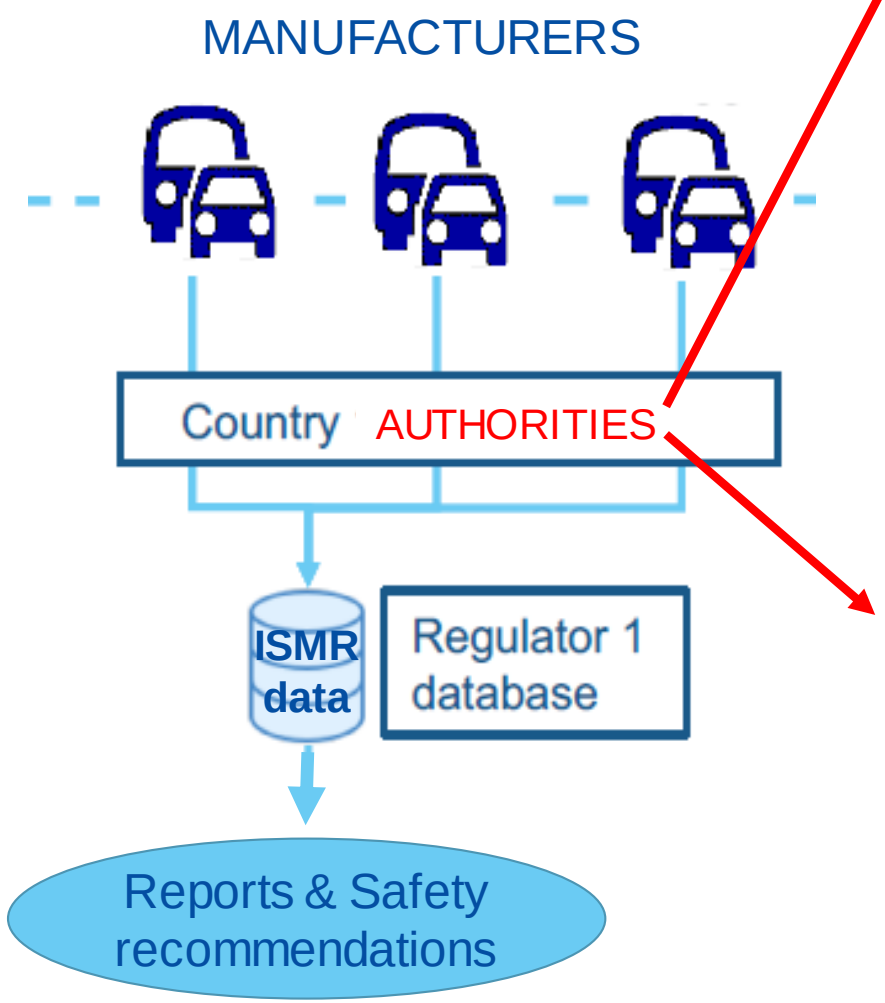


[1]*Industrial Accident Prevention, A Scientific Approach, Herbert W. Heinrich 1931.*

ISMR Roles and responsibilities



ISMR Roles and responsibilities



Safety Authority (SA)

- Can be the enforcement Authority or not; if not, it gives recommendations to the enforcement Authority
- Responsible for ISMR data management at national level
- Derives safety recommendations and shares them at higher level
- Publish annual report summarizing the level of ADS safety.

Investigation Body (IB)

- Independent/impartial body, investigates accidents
- Issue safety recommendations for Competent Authorities
- Provides an Annual report with evidence of investigations

Protection of Information

- Data collection should ensure its confidentiality, the protection of its source and the confidence of the reporters
- Sensitive safety information should be protected by preventing its use for purposes other than safety.
- Safety Authorities have to set up a confidential reporting scheme and to ensure that no personal details are ever recorded in the databases both at national/international level.

Information sharing among safety authorities & Contracting Parties

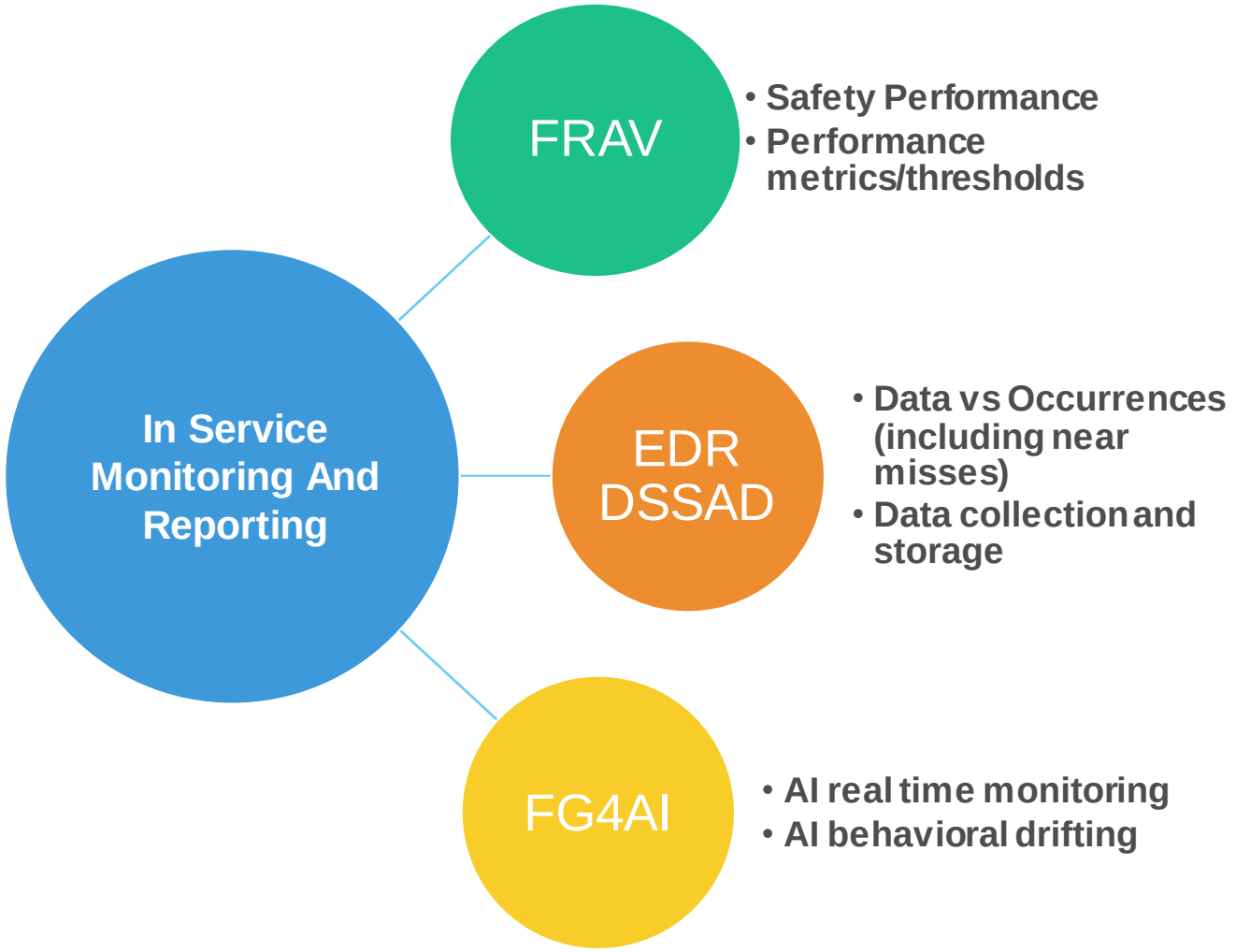
- The final aim of ISM is to improve ADS safety through dissemination of lessons learned
- A broader exchange of information and the dissemination of safety recommendations should be ensured among the Contracting Parties, at international level

- **Guiding principles**
  - Access to the database for the authorities
  - Safety Recommendations publicly accessible
  - Promote cooperation Contracting parties/among authorities with regular exchange of information

Reporting from other sources

- Limiting the reporting requirements to manufacturers will also limit the amount and type of information covered by ISM, with a strong impact on the achievable safety improvement.
- E.g. identification of traffic rules infringement is not possible through data collected on-board the vehicle, and reporting by local authorities and ADS vehicle users is needed.
- Other transport sectors extend the operational reporting mechanism also to drivers, operators, users, traffic managers, and any other person connected to the vehicle operation.

Interaction with other groups



FRAV-ISMR could interact for the identification of the performance to be monitored and relevant metrics/thresholds

EDR/DSSAD-ISMR could interact to identify the data to be collected for the characterization of the occurrences

FG4AI-ISMR could interact to identify the AI performance and behaviors that can be potentially monitored during the operations

Next Steps

- Next SG3 Meeting on March 28th and April 11th
  1. To Discuss:
     1. Data elements vs occurrences: further discuss non-critical occurrences reporting; discuss the need to identify specific data elements to be monitored (and reported) besides the high-level occurrences listed by SG3;
     2. Monitoring vs Reporting vs Investigation
  2. To finalize:
     1. Roles and responsibilities for authorities
     2. Reporting from other sources and information sharing among authorities
  3. NATM guidelines on ISMR by May 2022

Thank you !

Interaction with other groups (Example)