Reasoning and suggested approach for EDR Step 2 topics proposed by European Commission

10/04/2024

Overview of proposed topics

1. Triggering for vehicle-to-vulnerable road user collisions (light duty vehicles)
2. Improved triggering for vehicle-to-vehicle collisions (light duty vehicles)
3. Additional data elements and changes to existing data elements (light duty vehicles)
4. Increased recording frequency of pre-crash data on driving dynamics and the effects of the vehicle safety systems (light duty vehicles)

1. Triggering for vehicle-to-vulnerable road user collisions

- Reason to propose topic:
  - VRU collisions are highly relevant in European accidentology: Collisions with pedestrians and cyclists cause 30% of EU road fatalities; collisions with motorcyclists another 19%[1]
  - Current UN R160 only contains one trigger suitable to capture vehicle-to-VRU collisions: 5.3.1.4. Activation of VRU secondary safety system
  - VRU secondary safety systems only fitted to a small number of cars: None of the 10 top-selling models in Europe in 2023 were equipped[2]
  - Without additional trigger, VRU collisions will mostly not be captured by EDR
- Suggestion how to approach in IWG:
  - Collate potential trigger options in IWG
  - Agree on timeframe available for Step 2
  - Based on timeframe available and technical feasibility of trigger options, IWG to decide which options to pursue further
  - IWG to discuss what evidence and studies are needed to define regulatory text
- Potential trigger options to consider:
  - Jerk threshold defined in regulation
  - Deceleration threshold defined in regulation (e.g. 0.8 km/h within 20 ms)
  - VRU impact test procedure (mechanism to achieve trigger left to manufacturer)
  - Safety system intervention (e.g. braking intervention of pedestrian/cyclist/motorcyclist AEB)

1) Source: European Road Safety Observatory, Facts and Figures – Pedestrians - 2023, https://road-safety.transport.ec.europa.eu/document/download/58883bdc-4312-4665-a424-d5796658e14f_en?filename=ff_pedestrians_20230213.pdf

2) Source: Euro NCAP safety equipment reports and manufacturer information for: Tesla Model Y, Dacia Sandero, VW T-Roc, Renault Clio, Peugeot 208, Opel Corsa, VW Golf, Toyota Yaris Cross, Fiat 500 and Skoda Octavia

2. Improved triggering for vehicle-to-vehicle collisions

- Reason to propose topic:
  - Active safety systems such as AEB are estimated to be up to 50% effective at preventing front-to-rear collisions[1]; it is also known that some collisions are only mitigated but this rate is not well known and the characteristics of these collisions not documented.
  - High severity vehicle-to-vehicle impacts captured well by existing triggers, but ADAS-mitigated impacts might fall short of deceleration threshold and therefore not be recorded.
  - EDR records on these mitigated collisions are important for effectiveness studies of ADAS (to fully understand the benefit of equipped vs non-equipped vehicles) and to identify collision characteristics that are mitigated but not avoided in order to improve system performance
- Suggestion how to approach in IWG:
  - Same as topic 1 (trigger for VRU)
- Potential trigger options to consider:
  - Safety system intervention (e.g. braking intervention of vehicle-to-vehicle AEB)
  - Other collision detection (e.g. compiled information from multiple sensors)

1) Source: Cicchino (2017) Effectiveness of forward collision warning and autonomous emergency braking systems in reducing front-to-rear crash rates, https://doi.org/10.1016/j.aap.2016.11.009

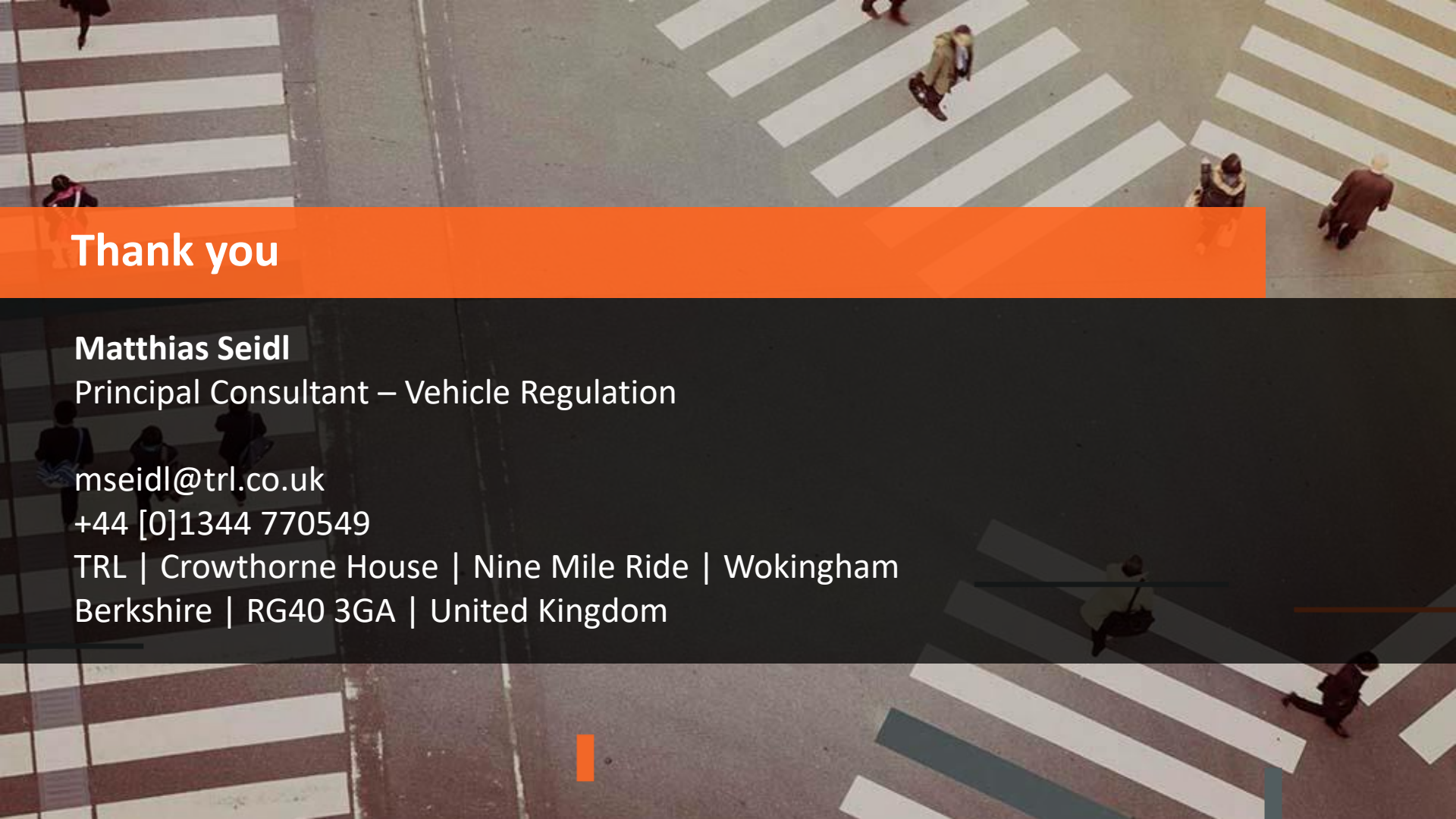
3. Additional data elements and changes to existing data elements

- Reason to propose topic:
  - Enable effectiveness research of active safety systems (more detail below)
- Suggestion how to approach in IWG:
  - EDR-DSSAD-12-02 lists data elements that were considered in Step 1 but moved for consideration to Step 2 due to time constraints
  - List contains 96 data elements. To ensure effective discussion suggest that IWG members declare which elements are still of interest and only these are discussed.
  - European Commission has interest in 8 data elements (see below)
- Data elements with EC interest to consider:
  - Trigger type: If additional triggers are defined (e.g. safety systems, VRU deceleration) information will be relevant for analysis of records; included in HV-EDR regulation
  - Blind spot monitoring status: Analyse prevalence of warnings in lane change collisions to quantify benefit compared to non-equipped vehicles and understand more/less effective warning strategies
  - Emergency stop signal status: Identify most effective activation threshold
  - Reversing detection system status: Analyse timing of warnings and driver reaction to understand benefit and improve effectiveness; included in HV-EDR regulation
  - Advanced driver distraction warning status: as above
  - Driver drowsiness and attention warning status: as above
  - Rear AEBS status: Analyse interventions and driver reactions to understand system benefit
  - Turn indicator [switch] status: Driver setting turn indicator can override lane departure warning system; in relevant collisions important to record as a potential reason why no lane departure warning was issued

4. Increased recording frequency of pre-crash data

- Reason to propose topic:
  - Currently, pre-crash data elements recorded at 2 Hz. 500 ms between data points has been shown to be too long to reliably record all actions (some actions might be missed) and to understand the sequence of interactions between driver and vehicle systems[1].
  - To research, based on EDR data, active safety system interventions, interactions with the driver and suitable activation thresholds, more data points are required.
- Suggestion how to approach in IWG:
  - Discuss this topic in conjunction with recording interval and additional data elements
  - Consider ways to achieve intended aim (to have a detailed record of immediate pre-crash/pre-trigger phase) while limiting additional memory requirements, e.g.
    - Increased frequency recording only for selected data elements
    - Time-variable recording frequency with increased frequency only in immediate pre-crash phase

1) DOT, NHTSA, 49 CFR Part 563, [Docket No. NHTSA–2022–0021], RIN 2127–AM12, Event Data Recorders, NPRM



Thank you

Matthias Seidl
Principal Consultant – Vehicle Regulation

mseidl@trl.co.uk
+44 [0]1344 770549
TRL | Crowthorne House | Nine Mile Ride | Wokingham
Berkshire | RG40 3GA | United Kingdom