UNECE IWG EqOP
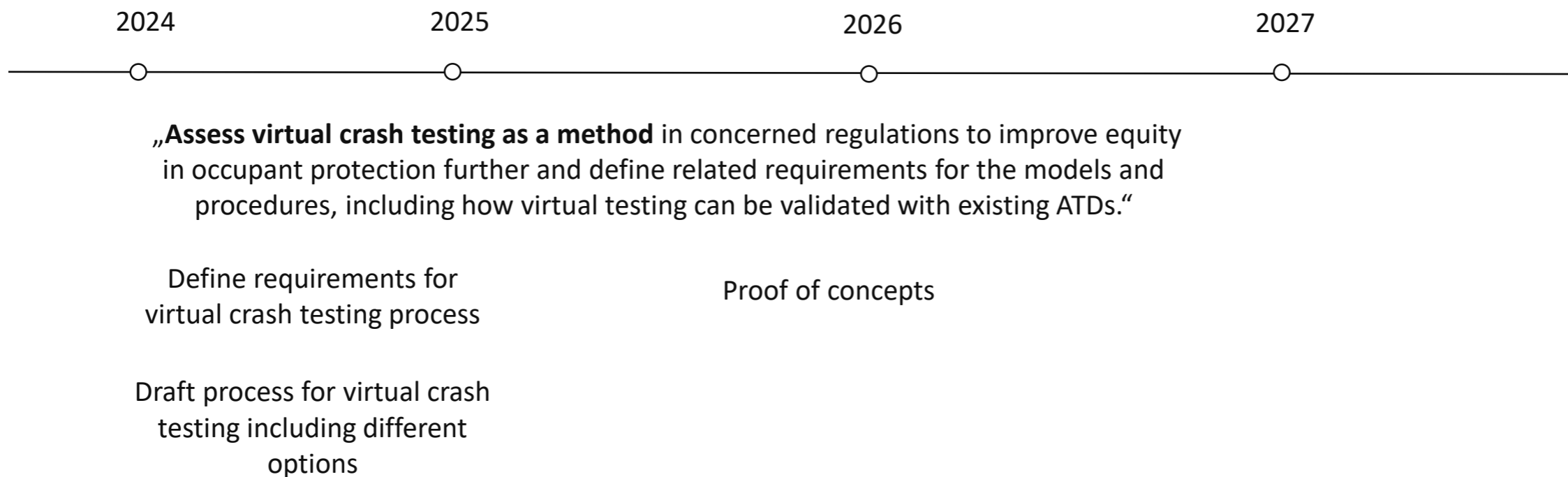# Task Force Virtual Crash-Testing

IWG EqOP - TF VCT; 3rd Meeting

EqOP Task Force on Virtual Testing

2024   2025   2026   2027

„**Assess virtual crash testing as a method** in concerned regulations to improve equity in occupant protection further and define related requirements for the models and procedures, including how virtual testing can be validated with existing ATDs."

Define requirements for virtual crash testing process

Proof of concepts

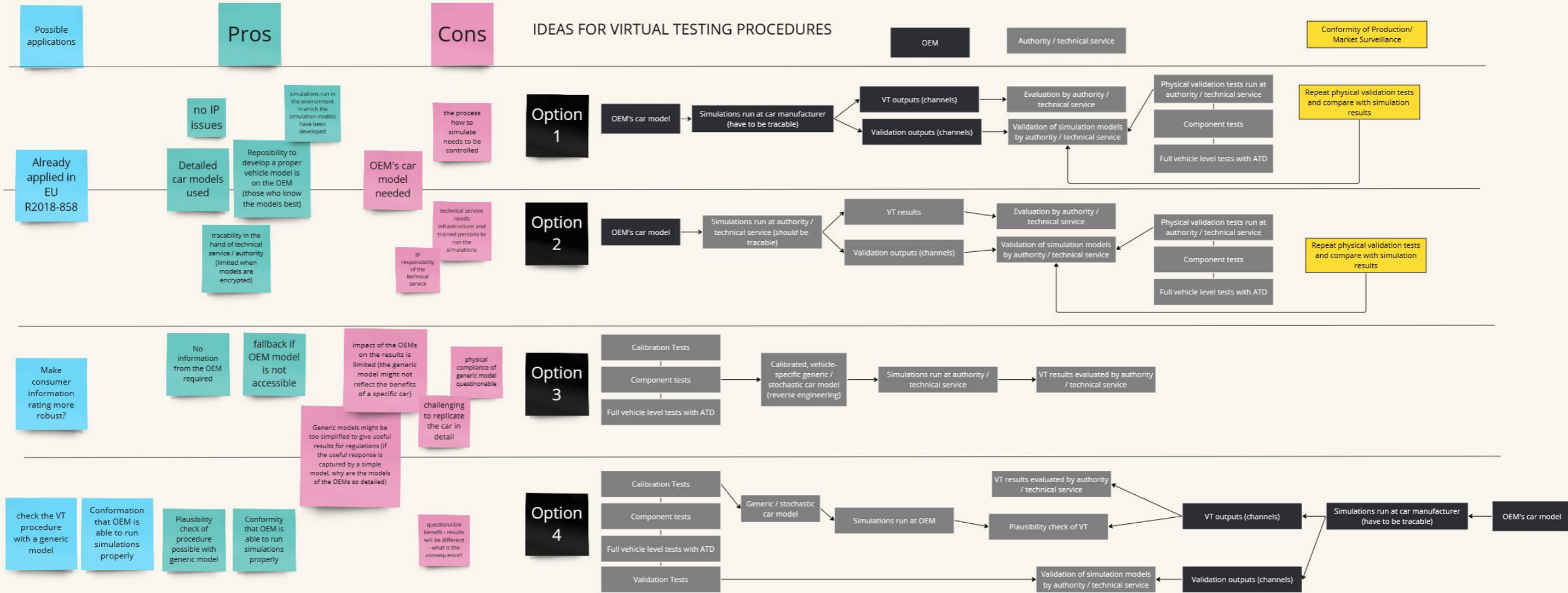Draft process for virtual crash testing including different options

Building blocks under discussion

https://miro.com/app/board/uXjVNzajwm8=/?share_link_id=474359906003

IDEAS FOR VIRTUAL TESTING PROCEDURES

Possible applications

Pros

Cons

| OEM | Authority / technical service | | Conformity of Production/ Market Surveillance |

Option 1

- Already applied in EU R2018-858

Pros: no IP issues; Detailed car models used; simulations run in the environment in which the simulation models have been developed; Reposibility to develop a proper vehicle model is on the OEM (those who know the models best); tracability in the hand of technical service / authority (limited when models are encrypted)

Cons: the process how to simulate needs to be controlled; OEM's car model needed

Flow: OEM's car model → Simulations run at car manufacturer (have to be tracable) → VT outputs (channels) → Evaluation by authority / technical service; Validation outputs (channels) → Validation of simulation models by authority / technical service → Physical validation tests run at authority / technical service / Component tests / Full vehicle level tests with ATD → Repeat physical validation tests and compare with simulation results

Option 2

Cons: technical service needs infrastructure and trained persons to run the simulations; IP responsibility of the technical service

Flow: OEM's car model → Simulations run at authority / technical service (*should* be tracable) → VT results → Evaluation by authority / technical service; Validation outputs (channels) → Validation of simulation models by authority / technical service → Physical validation tests run at authority / technical service / Component tests / Full vehicle level tests with ATD → Repeat physical validation tests and compare with simulation results

Option 3

- Make consumer information rating more robust?

Pros: No information from the OEM required; fallback if OEM model is not accessible

Cons: impact of the OEMs on the results is limited (the generic model might not reflect the benefits of a specific car); physical compliance of generic model questionable; challenging to replicate the car in detail; Generic models might be too simplified to give useful results for regulations (if the useful response is captured by a simple model, why are the models of the OEMs so detailed)

Flow: Calibration Tests / Component tests / Full vehicle level tests with ATD → Calibrated, vehicle-specific generic / stochastic car model (reverse engineering) → Simulations run at authority / technical service → VT results evaluated by authority / technical service

Option 4

Pros: check the VT procedure with a generic model; Conformation that OEM is able to run simulations properly; Plausibility check of procedure possible with generic model; Conformity that OEM is able to run simulations properly

Cons: questionable benefit - results will be different - what is the consequence?

Flow: Calibration Tests / Component tests / Full vehicle level tests with ATD / Validation Tests → Generic / stochastic car model → Simulations run at OEM → Plausibility check of VT → VT results evaluated by authority / technical service; VT outputs (channels) ← Simulations run at car manufacturer (have to be tracable) ← OEM's car model; Validation outputs (channels) → Validation of simulation models by authority / technical service

Next steps

1. *Define wording / glossary (starting point presented in the second workshop; to be refined during the work if needed)*
2. **Sketch General Process**
3. Definition of loadcases
4. Requirements for occupant simulation models (ATDs & HBM)
5. Requirements for vehicle model validation (Standards)
6. Processes to combine occupant and vehicle model to a simulation loadcase/scenario
7. Requirements for FE Software
   a. Process for traceability of model changes and linked results
   b. Process for running models at technical service
8. Requirements for outputs / documentation
9. Collaborations with other groups / experts?
   - Forum i.e. as policy lab
   - Cyber security
   - GRVA (e.g. R157)
   - SAR (specific absorption rate)
   - WP6 (Standardisation…)
   - Ask SAE to organise a workshop to better link with other disciplines?

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