



Wrap-up Workshop on edge cases

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Conclusions Break-out 1

DRAWING CONCLUSIONS



- Definition: unusual, extreme, etc. etc., definitions are important systematic investigations
- Problem for AV: interpretation/understanding complex situations
- ODD definition needs more detail to get to edge cases
- You need to know the systems' limits in detail, transparency readiness
- Legal human limit edge cases: acceptance by users and courts/experts
- Multi-dimensional parameter space, testing meaningful cases
- Human caused edge cases: anticipate worst cases and avoid them, analyse liability?
- Relate to the competency of system and user, relate to ODD
- Not all edge cases are related to safety, AV stops fulfilling is driving mission
- Relation with tele-operation; Cyberattacks/hacking
- Interaction internal and external parameters
- ODD must be monitored, and edge cases must inform ODD, vehicle specific edge cases
- Human reference in scenarios, global risk balance between human and AV

Conclusions Break-out 2

- **Methods:** statistical (black box) on occurrence, technology independent, qualitative (instead of quantitative), simulations
- **Sources:** accident data, simulations, infrastructure (e.g. intersection but also random spots)
- **Missing sources:** AV vehicles accidents or near-crashes
- **Sharing edge cases:** Yes! Technology independent. Need for standardization on formats.
- **Bottlenecks:** if we detect new edge cases (e.g. from simulations) we also need new principles for updating software (or even hardware), edge cases might be location specific (environment)

Conclusions Break-out 3

- Systems Theoretic Process Analysis (STPA) was found to provide the most exhaustive list of hazards capturing system interactions.
- Key aspects for an edge case: delimitation of defect, severity and exposure
- Edge case is a function of the system design (sensor configuration, etc.). An edge case for one may not be an edge case for another system. Therefore, a hybrid method is required for their creation.
- “Safe enough” cannot be defined only from technical viewpoint, also e.g. society and legal viewpoint need to be considered.
- Edge cases should challenge the developers and help them to discover unknown situations (learning loop) and show robust “safety culture” of manufacturers. Ongoing data collection for public use is needed.
- In edge case testing it is good to focus on subsystems: Component level should first show not to have problems with edge cases, then proceed to test higher system level
- Edge case definition is necessary, but also system behaviour / pass criteria!
- Different testing tools valid for testing against edge cases. Simulation very useful to allow testing against not safe situations, but there must be some testing at vehicle level, too.



Thank you joining!

- Coming up 16 June 2021: International workshop on [Vehicle Technologies for CCAM](#)
- partnership@connectedautomateddriving.eu

The ARCADE team

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