



Code of Practice for development, validation and market introduction of ADAS

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DAIMLERCHRYSLER



BOSCH



RESPONSE 3
a PReVENT Project

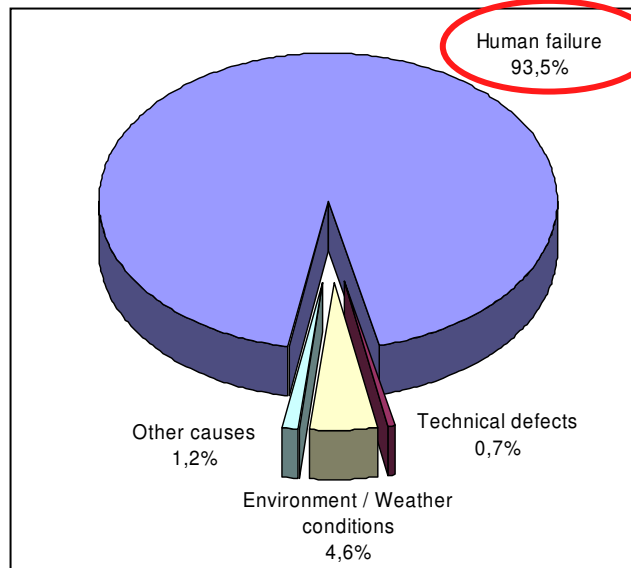
PSA PEUGEOT CITROËN

VOLKSWAGEN AG

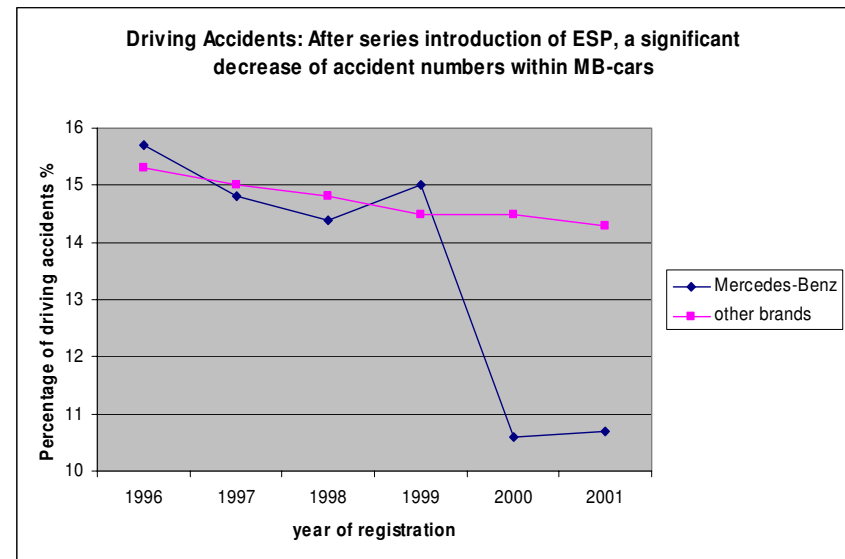


- Safety Benefit and Product Safety of Driver Assistance Systems
- Challenges and Consequences for OEM and suppliers developing ADAS
- Rationale of the Project RESPONSE 3
- Legal aspects of a Code of Practice (CoP)
- Scope and content of the CoP
- Timeline RESPONSE 3, what's your job

Safety Benefit of Driver Assistance Systems



AARU / VW / Gidas data base



Safety Benefit of
Driver Assistance Systems

- Vehicle Safety in good shape
- Driver's Performance can and should be assisted

Product Safety of Driver Assistance Systems

Main focus
of IVIS



Task1: Navigation
*Determination of
Destination and
Travel Time*

Main focus
of ADAS

Environment



Task 2: Manoeuvring
*Mental determination
of a collision-free
Corridor*

ABS,
ESP/DSC,...

Vehicle



Task3: Stabilisation
*Operation of throttle,
brakes, steering wheel,
gear change,...*

**Distraction
ESoP**

???

???

Risk Issues?

**Safety
approved**

Safety Topics of Driver Assistance Systems

Main focus
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Task1: Navigation
*Determination of
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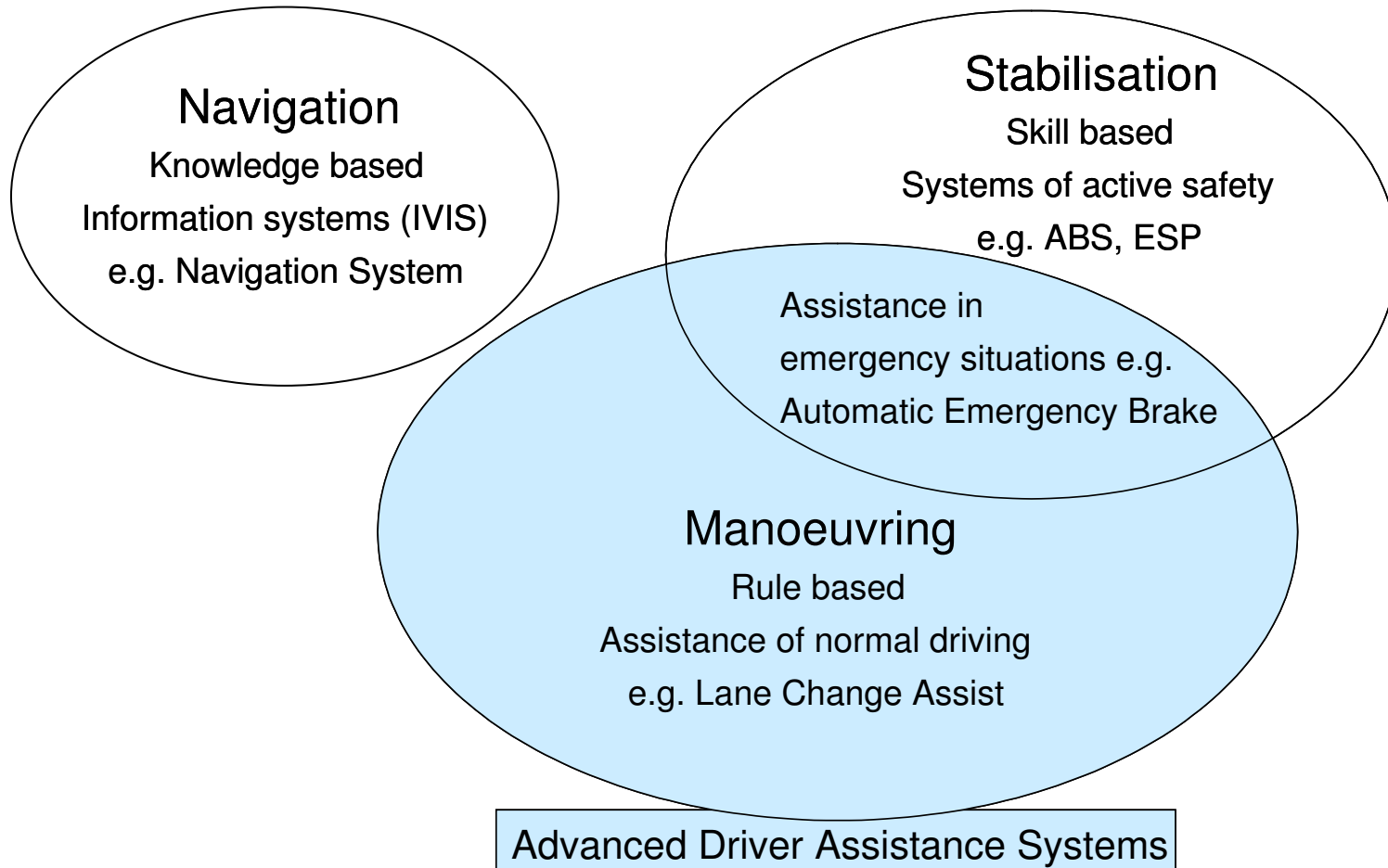
Task3: Stabilisation
*Operation of throttle,
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**Human Machine
Interface,
Nomadic Device**

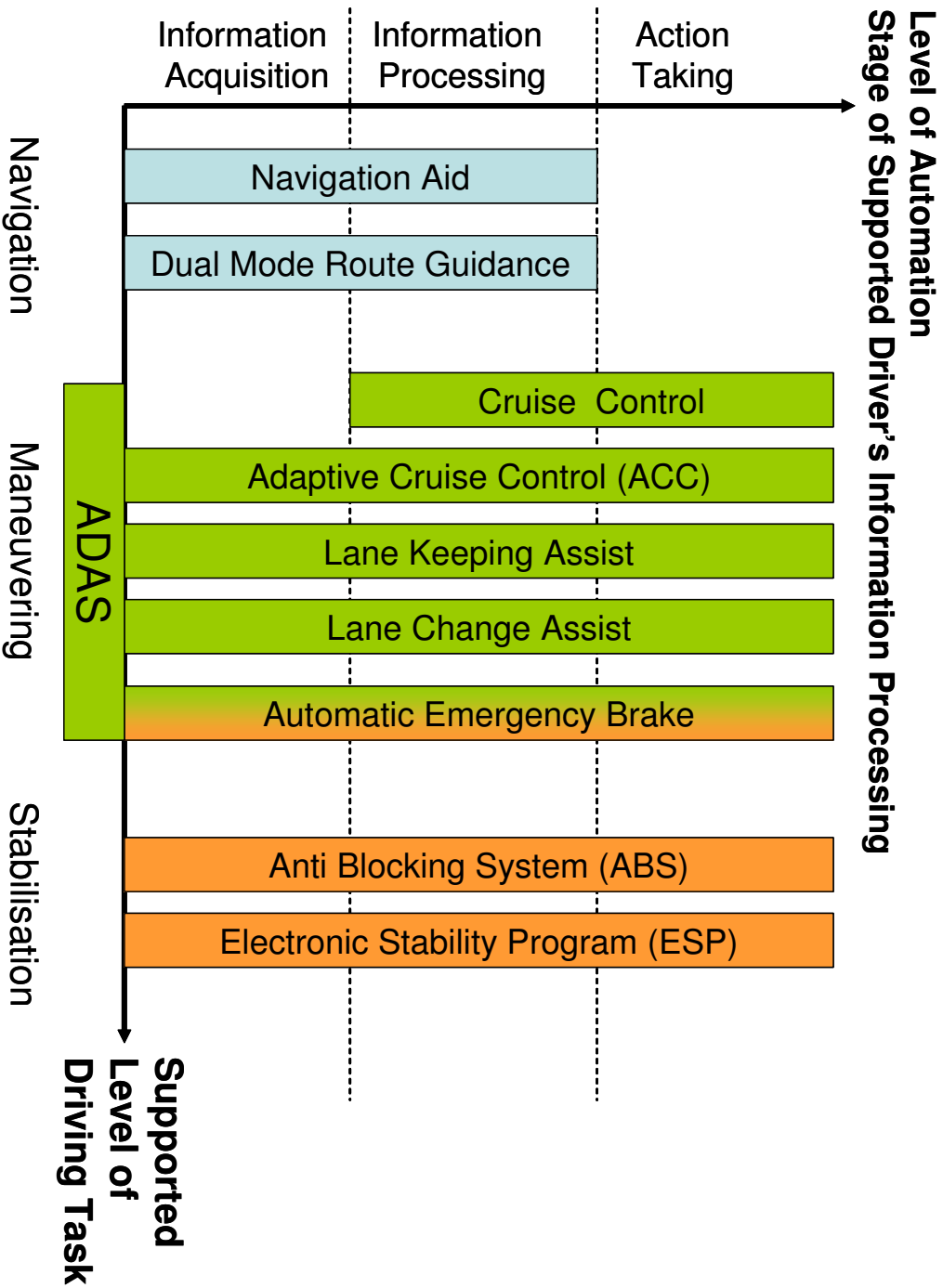
**Human Machine
Interaction**

**Technical
Safety Concept**

Driver Assistance Systems



ADAS Definition (2)



Development and introduction of Advanced Driver Assistance Systems means:

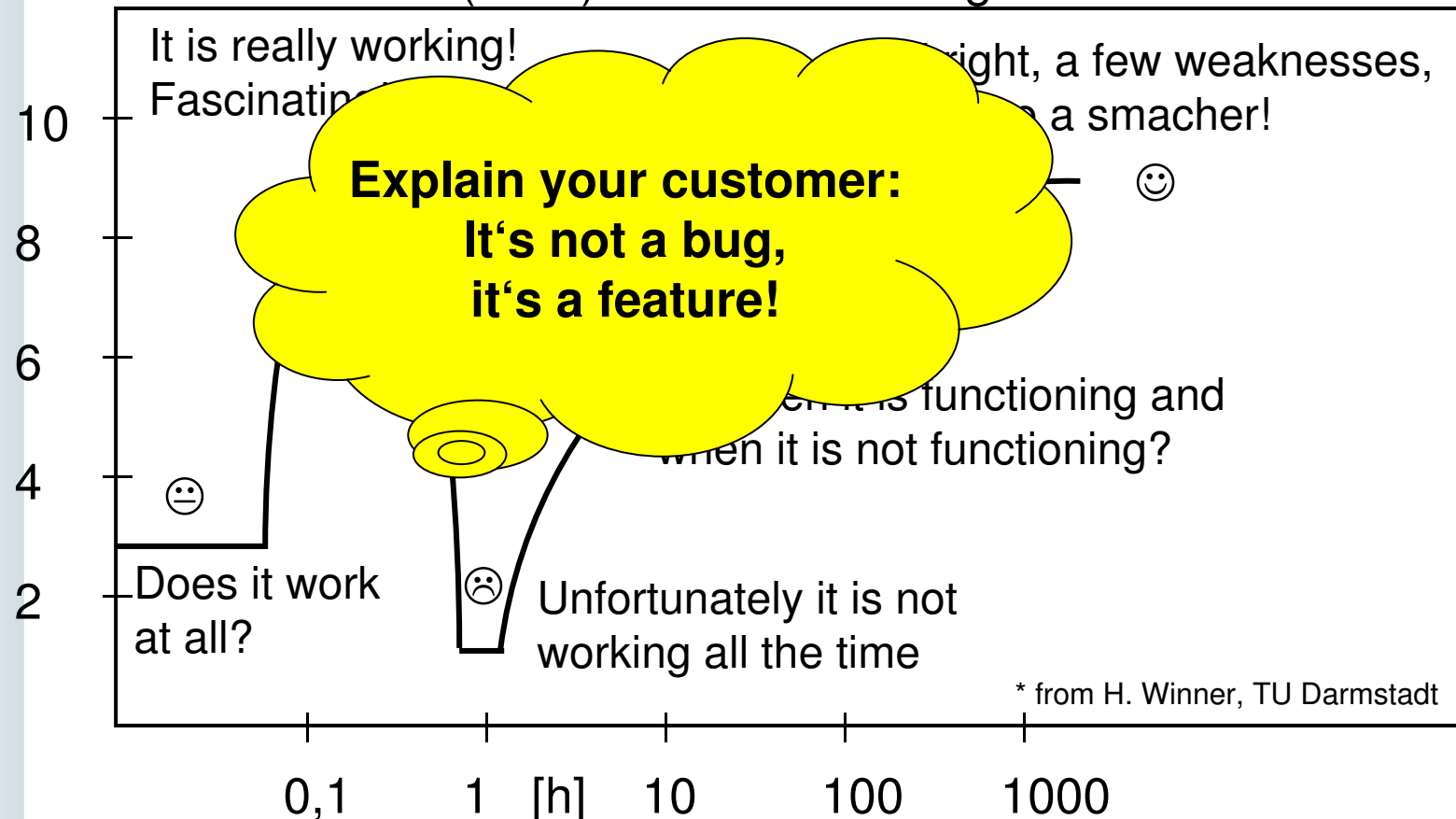
- Supporting and/or substituting the driver in his driving task
- Therefore: complex interaction of system and driver in multiple traffic situations
- Therefore new challenges for system safety due to
 - functional complexity (software; human errors in development)
 - more complex driver system interaction,
 - lack of experience and unknown user reactions (human errors in usage)

- possible business case but there are also financial risks based on:
 - possible damage of brand image, if ADAS doesn't meet consumer expectations
 - possible recall campaigns, if ADAS doesn't meet consumer expectations or shows malfunctions
 - product liability, if ADAS doesn't meet requirements of a safe product

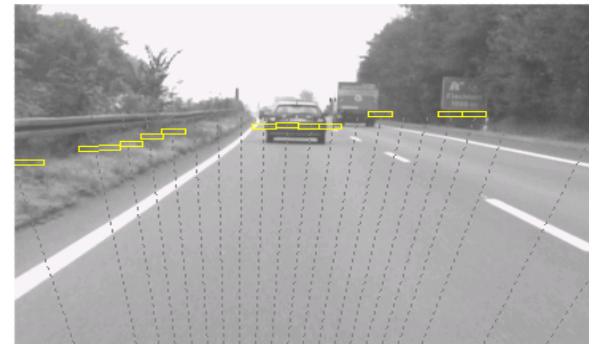
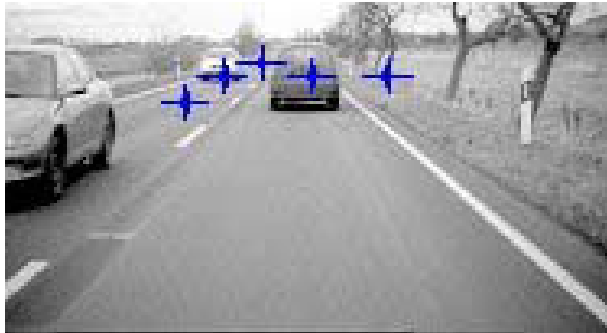
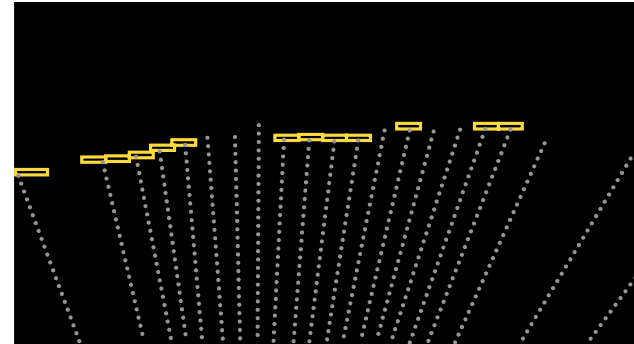
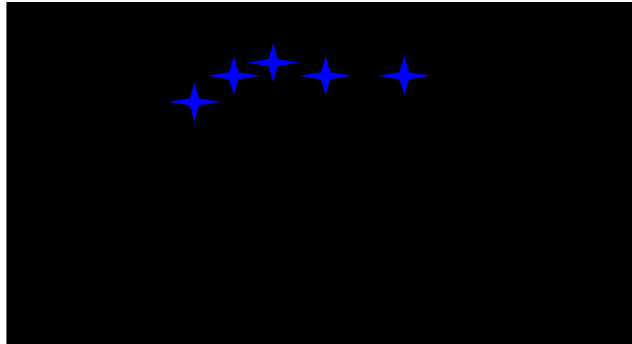
ADAS risks - Driver Acceptance

ACC: Developed as comfort - functions: focus on high availability

Satisfaction index (ACC) over time of usage



ADAS Risks - Sensor Limits

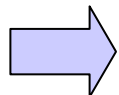


Radar

Lidar

**How to explain these limits to a customer?
How will the customer create a mental model?**

- What can be done about legal risks linked to ADAS?
 - How to prove, that the product is reasonably safe?
 - How to prove, that the manufacturer has fulfilled his duty of care?
 - What is the state of the art for development and validation of ADAS?



Code of Practice as a solution?

- **A product is defective, if**
 - it does not provide the **safety that can reasonably be expected** taking into account all circumstances,
 - in particular the presentation of the product,
 - the use of the product that can be expected in faith
- Codes of practice already play a role on a European level in product safety law.
- Can therefore contribute to the assessment of “safe product”/“non-defective product“ on the same level as other voluntary rules/ guidelines / recommendations.
- Code of Practice should integrate existing elements of state of art/state of science and art such as standards, recommendations etc, and fill the gaps not yet covered.

Importance of Validation Effort Legal Consideration of a CoP

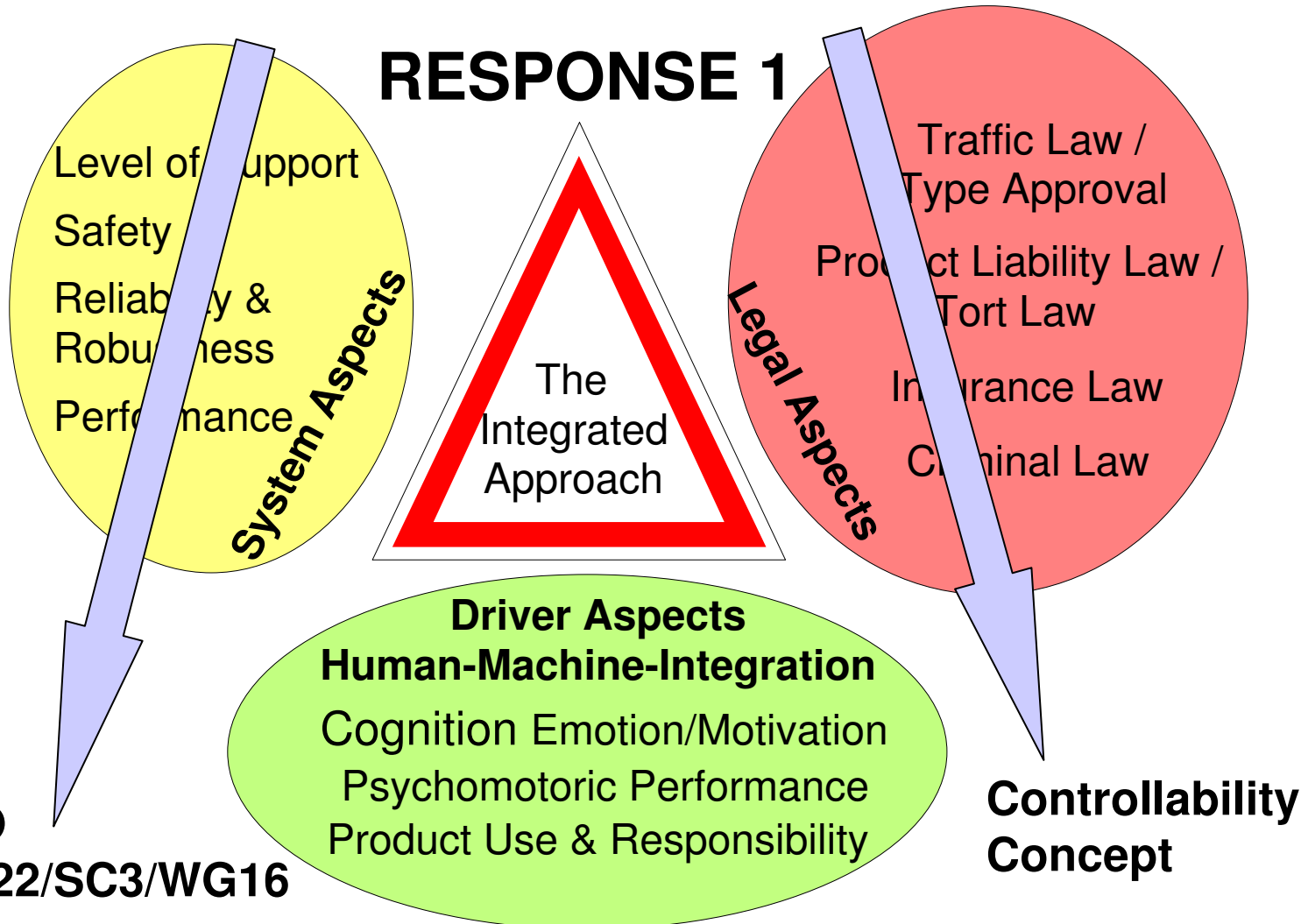
- Safety Levels:
- Product Liability Law: State of science and art
- Product Safety Law: State of art and technology
 - (1) Community provisions (European legislation)
 - (2) Rules of national law
 - (3) National standards giving effect to a European standard
 - (4) Community technical specifications
 - (5) National standards
 - (6) ***Code of good practice*** 
 - (7) State of art and technology
 - (8) Safety which consumers reasonably expect

 **A Code of Practice will be legally relevant**

- This COP specifies a procedure for assisting the assessment of safety issues of ADAS, focussing Human-Machine-Interaction. It addresses
 - Risk identification within specification work of ADAS
 - Performing hazard and risk analyses
 - Assessment methodology for ADAS

Scope of the Draft CoP (2)

RESPONSE 1



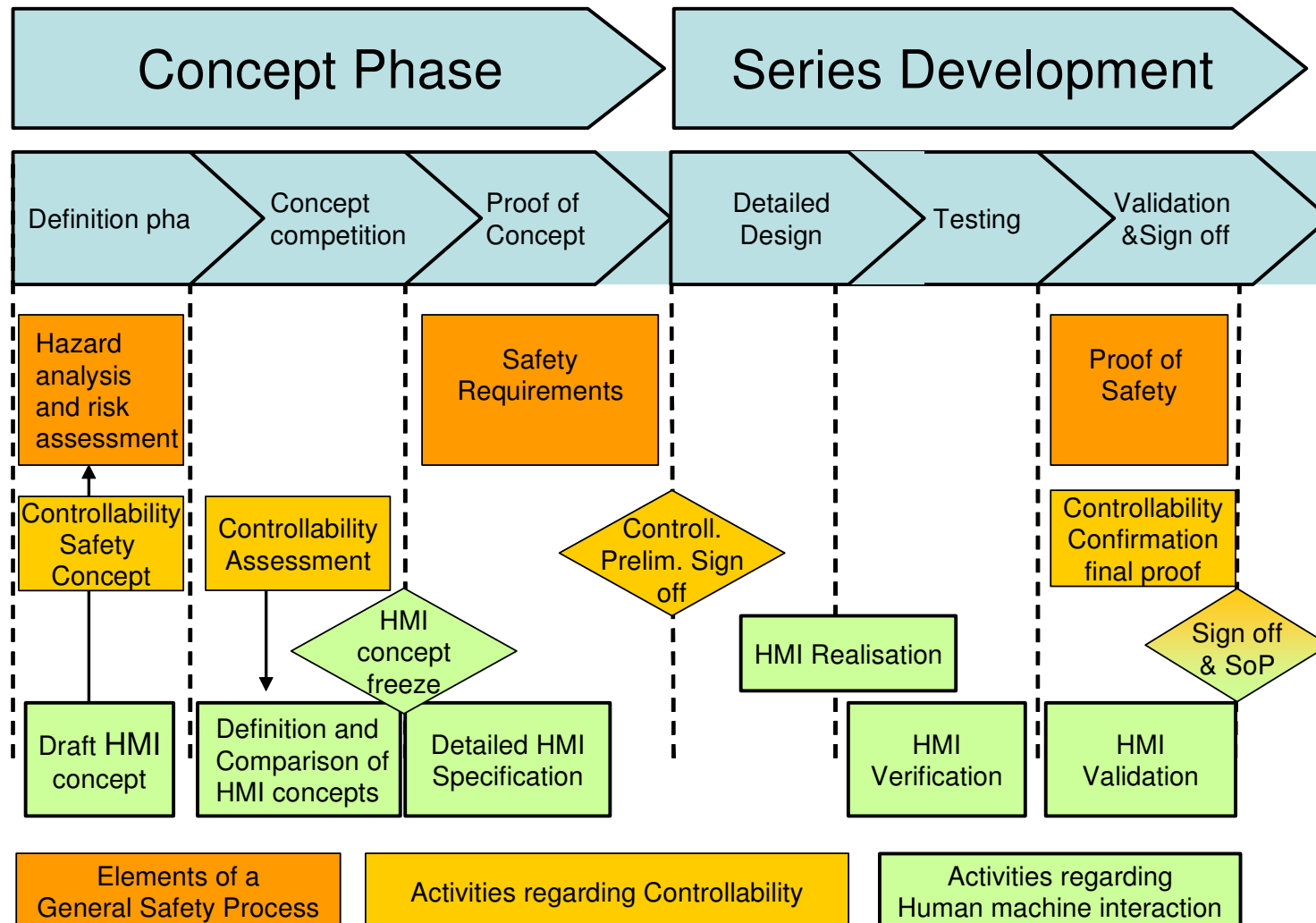
Controllability:

Likelihood that the driver can cope with driving situations including ADAS assisted driving, system limits and system failures.

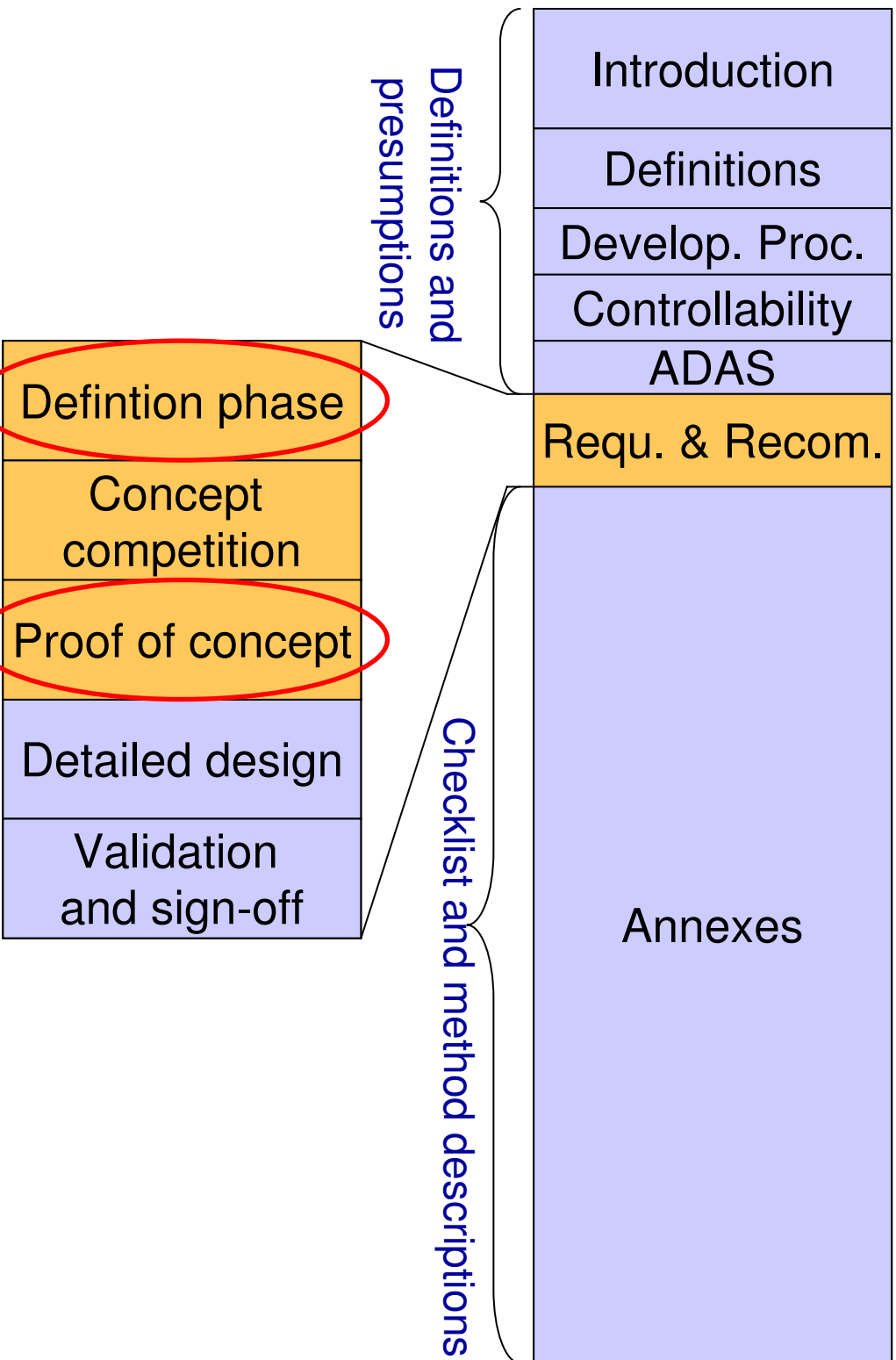
Controllability is related to

- ...the possibility and capability to **perceive** the **criticality** of the situation
- ...the capability to **decide** on an **appropriate countermeasure** (e.g. override capabilities, complexity of the system switch-off procedure)
- ...the driver's ability to **perform** the **chosen countermeasure** (e.g. reaction time, sensory-motor speed, accuracy)

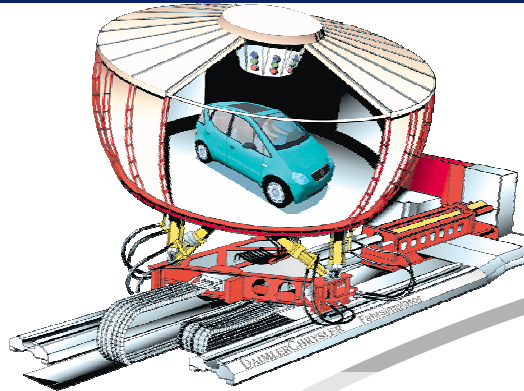
Elements of a safety process and controllability aspects



Structure of requirements



Content - Overview



Evaluation of controllability

Controllability
final proof



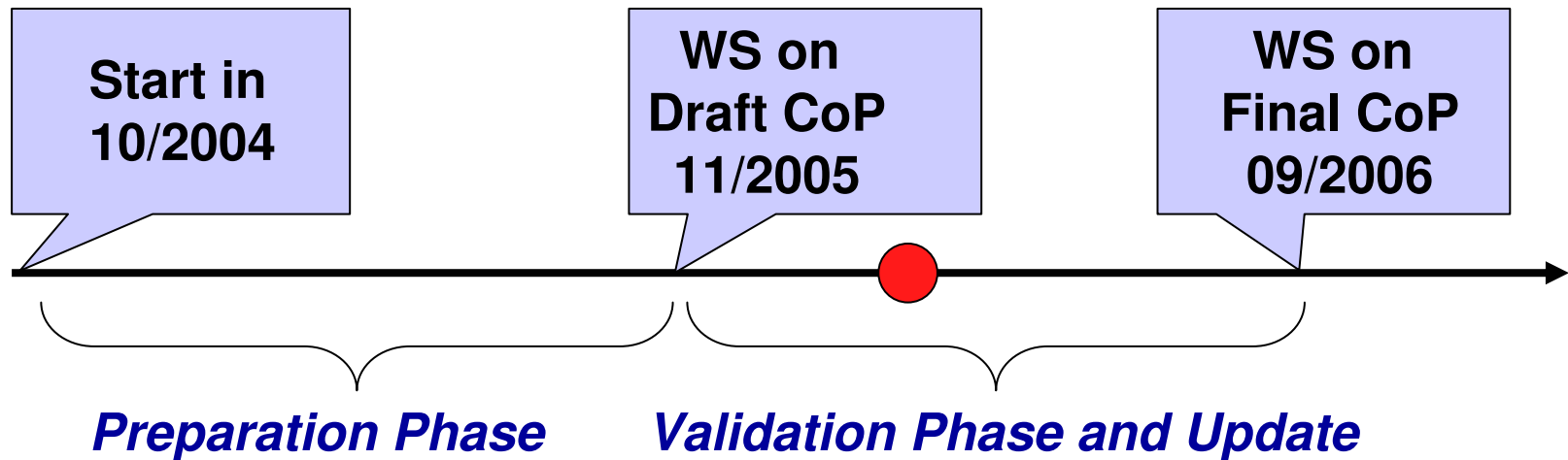
Estimation of controllability problems

Identification of possible risky situations

Specification Framework

Perceptibility (message transfer to driver)	Yes	No	Not suitable	Comments
1. Is it possible that the driver may fail to perceive a system message ?	☹	☺		
2. Is it necessary to support system feedback using additional information channels ? (e. g. acoustic in addition to optical display)	☹	☺		
3. Does the system provide timely feedback about system reaction in a given traffic situation? (e. g. take over request from adaptive cruise control)	☺	☹		
4. Can system output and information be perceived by the driver quickly enough to enable him to react appropriately? (e. g. take over request from adaptive cruise control)	☺	☹		
5. Is a misinterpretation of a system message possible ?	☹	☺		

Timeline of RESPONSE 3 – What's your job?



- Preparation of Draft CoP by RESPONSE 3 partners

- Wider Application of Draft CoP by partners and also members of Consensus team
- Collecting feedback about use of the Draft CoP
 - Useability
 - Missing content
 - Objections to the content



Summary of RESPONSE 3: Code of Practice for ADAS



- **Translating the key issues of “reasonable safety” and “duty of care” into engineering practice**
- **Basis for a definition of "safe" ADAS development and testing also from a legal point of view**
- **Agreement on these development guidelines between all stakeholders as basis for company internal translation and/or optimisation of system design specifications and complementary verification methods.**

