Why Use Cases?

• **Definition:** A use case is the description of a specific sequence of interaction between the user(s) and a technical system to achieve a specific goal
Introduction

- Workshop at DLR in Braunschweig
- Meeting of all stakeholders to discuss and derive Use Cases
- DLR IDeELab Theatre System was used to aid development process
Use Case Design Process

Function descriptions

Sequence diagrams

Main flow

Alternative flow

Traffic scenario sketches

Narratives
Sequence Diagrams

Demonstrator: BMW, CONTI, VTEC, VW
Use-Case 6.3: System initiated lane change

Main Flow A: System initiated lane change

- lane change possible
- lane change conducts
- lane change done
- lane change necessary
- actuator shall change lane
- feedback in display
- feedback visible for driver
- time

States and transitions:
- Unintended / unexpected
  - Changed / unchanged
  - Limits failure
- Intended / expected
  - Environmental change / unchanged
  - Normal
  - Normal driver only assisted
  - Partial automatic
  - Cond. automatic
  - High automatic
  - Full automatic
- Failure
  - Abuse/misuse
    - Unresponsive
    - Distracted
    - Sec. task
    - Drowsy

AdaptIVe Final Event, Aachen
Sequence Diagrams

Demonstrator: BMW, CONTI, VTEC, VW
Use-Case 6.3: System initiated lane change

Alternative Flow 1: System initiated lane change not possible due to lane obstruction

- lane obstruction detected
- actuator shall change lane
- steer back into lane
- feedback in display
- feedback visible for driver

states transitions

unintended / unexpected
- changed
- unchanged
- limits
- failure
- limits
- failure
- abuse/misuse
- unresponsive
- distracted
- sec. task
- drowsy

intended / expected
- environment
- vehicle
- automation
- steering wheel
- gas pedal
- brake pedal
- display
- lever/button
- driver

feedback visible for driver
Sequence Diagrams

Demonstrator: DAI, Ford, IKA
Use-Case 4.2: Parking In

States:
- Unintended/unexpected
  - Changed
  - Unchanged
- Intended/expected
  - Normal
  - Driver only assisted
  - Partial automation
  - Conditional automation
  - High automation
  - Full automation

Transitions:
- Limits failure
- Failure
- Abuse/misuse
  - Unresponsive
  - Distracted
  - Sec. task
  - Drowsy

Main Flow: Parking in

1. Position reached
2. System starts parking
3. Driver interacts with system

Time:

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// Sequence Diagrams

**Demonstrator: DAI, Ford, IKA**

**Use-Case 4.2: Parking in**

### States
- Intended / Expected
  - Normal
  - Partial automated
  - Conditional automated
  - High automated
  - Full automated

- Unintended / Unexpected
  - Changed
  - Unchanged
  - Limits
  - Failure
  - Abuse / Misuse
  - Unresponsive
  - Distracted
  - Sec. Task
  - Drowsy

### Transitions
- Changed
- Unchanged

### Alternate Flow: Parkslot blocked
- System starts parking
- System stops vehicle
- System informs the driver
- Information to the driver

**AdaptIVe Final Event, Aachen**

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// Number of Use Cases

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Conclusions

• The outcome of this design process are use case scenarios for automated driving in low, medium and high speed environments
• They serve as a baseline for functional requirements, research questions and human factors recommendations
• What is to be developed, what is out of scope
• Input to AdaptIVe deliverables on Use Cases and Requirements as well as Use Case Catalogue
Thank you.

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