Enviromental Sensing
- Level of dangerousness of environment
- Level of attention required

WP3

WP4
- Drowsiness/Sleepiness
- Emotions
- Inattention
- Stress

Driver Monitoring

Personalization Module

Decision System
- Availability of automated functions
- Timeframe for activation
- Vehicle & Environment state

WP5

DLR Framework
- Enum interaction strategy
- Driving Style

Interaction Controller
(Strategies store in XML format)

HMI-Elements
- Profile information
- E.g. vehicle speed, lean angle

Vehicle Automation
Parameter Sets

Automated Functions

Interaction Controller
- Enum interaction strategy

Interaction Controller
- Enum interaction strategy

Interaction Controller
- Enum interaction strategy

Interaction Controller
- Enum interaction strategy

Interaction Controller
- Enum interaction strategy
Sketch

[Handwritten diagram with annotations and flowchart]

1. WHAT IF TWO STATES ARE DETECTED AT THE SAME TIME?
2. USE WIP OR WIP?
3. USE WIP OR WIP?
4. USE WIP OR WIP?
5. USE WIP OR WIP?

FROM DLR FRAMEWORK:
- VeloCity
- Steering Wheel Angle
- Current Actuator Level
- Available Actuator Level
- Acceleration/Deceleration

DO WE NEED DOMINO TO MEET?

CRITICALITY LEVEL
- Prioritized Profiles
- HMI Profiles
- Timing
- Driver Warning
- HMI Message

WEATHER PROFILES:
- Customizable Profiles
- Density Profiles
- State Profiles

OR IS WEATHER ONLY A CONFIGURATION VARIABLE?
- NO SPECIAL HMI-BUSINESS CASE
Sensors

- Eye tracker
  - Smart Eye
- Localisation
  - NAVENTIK
- cECG Seat
  - FORD/RWTH Aachen
- Environmental Situation awareness
  - DENSO
- Speech analyser
  - OVGU
Autonomous functions and HMI

Steering wheel
Autoliv

Cluster Display
DLR

Ambient Light Display
DLR

Speaker

Mobile Device
Takeover info

Level 3 Automation

Driver state change

Takeover request

Takeover warning
UC C – Evaluation plan (WP7)

**Driver states**
Fatigue, stress, emotion, distraction

**Sample**
12 drivers | 25-40 years-old | >5 years driving experience

**Design**

<table>
<thead>
<tr>
<th>Session A</th>
<th>Fatigue (sleep deprivation night before)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Session B</td>
<td>UCD evaluation Emotions (interact with badly working speech system)</td>
</tr>
<tr>
<td>Session C</td>
<td>Distraction (visual-manual secondary task) Stress (n-back task)</td>
</tr>
</tbody>
</table>

**Procedure**

- **Briefing**
- **Familiarization**
- **Test trial(s)**
- **Debriefing**

Within-subjects design: all subjects perform all sessions

**Curved section:**
- Driving manually
- Driver under influence of state
- System recognizes state
- Transition (manual-automated)

**Straight section:**
- Automated driving
- Driver under influence of state
- System recognizes state
- Transition (automated – manual)
UC D – Evaluation plan (WP7)

**Driver states**
No state will be induced

**Sample**
12 drivers | 25-40 years-old | >5 years driving experience

**Design**

- **Session A**
  - Fatigue (sleep deprivation night before)

- **Session B**
  - UCD evaluation
    - Emotions (interact with badly working speech system)

- **Session C**
  - Distraction (visual-manual secondary task)
  - Stress (n-back task)

**Procedure**

- **Briefing**
- **Familiarization**
- **Test trial(s)**
- **Debriefing**

**Curved section:**
- Driving manually
- Notification to handover control
- Transition (manual-automated)

**Straight section:**
- Automated driving
- Notification to regain control
- Driver ignores notification
- Safe stop

Within-subjects design: all subjects perform all sessions
Priority Scenario UC C

Driver state-based smooth & safe automation transitions
Priority Scenario UC D

Non-Reacting Driver Emergency Manoeuvre

Scene 1

Handover request
System limit
Transition Phase with driver state based HMI
SAE 3
SAE 0
Driver state monitoring

Scene 2

Takeover by automation
Transition Phase with driver state based HMI
SAE 3
Advanced comp. Safe Stop
SAE 0
Driver state monitoring
Non-Reaction Driver

Scene 3

Takeover by automation
Transition Phase with driver state based HMI
SAE 3
Advanced comp. Safe Stop
SAE 0
Driver state monitoring
Non-Reaction Driver

Scene 1

Start
Induction of driver state
SAE 0
Driver state monitoring

Scene 2

Takeover request by automation
Transition Phase with driver state based HMI
SAE 0
SAE3 available
Driver does not react so automation kicks in

Scene 3

Driver does not react so automation kicks in
SAE 0
SAE3
Inadequate driver state
Thank you!

ADAS&ME