

Report on Seminar 1: Starting a Field Operational Test

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Group work

The participants of the seminar worked on hypotheses in three groups, concerned with one of three “imaginary” systems.

Group 1: Nomadic device: find and book parking places for disabled drivers

Group 2: ADAS: Lane departure warning that works in the snow

Group 3: Cooperative system: Shock wave warning

Group 1: Parking places for disabled drivers

Function description

System:

- ID -> person + vehicle
- Parking places (free) for disabled
- Pricing/availability
- Closest to destination
- Duration of parking
- Estimated Time of Arrival & Departure
- Navigation
- 2 way communication
- HMI

Centre:

- Booking sign.
- Vehicle ID
- Parking management

Top – down: the six areas

1. Direct effects of a system on the user and driving
 - Searching for space: less time
 - Comfort goes up
 - Fuel consumption less
2. Indirect effects (behavior adaptation) effects of the system on the user
 - More trips, because of confidence in navigation system
 - Sales of navigation system
 - More business & tasks for parking services
 - Integration of disabled in society
 - Increased demand of non-disabled
 - More demand for follow-up services
 - Voice/hearing facility, distraction from driving task, could lead to more accidents
4. Modification of interaction between users and non users (including vulnerable road users)
 - Mixture of different types of vehicle for disabled on the road-> slow/fast traffic

- Special entrance facilities
5. Modifying accident consequences
- Negative effect on safety, less concentration on driving task, when used while driving
 - Benefits of navigation
6. Effects of combination with other systems
- Combination with e-call -> specific help
 - Combination with navigation system -> more mobility, less depression, more integration

Use cases

Use case A: Booking while driving

Situation: traffic conditions:

- Pedestrians
- Other traffic (high density)

Scenario:

- Start trigger: start booking
- End trigger: finish booking

Use case B: parking at booked space

Situation: street parking:

- space reserved
- space not reserved

empty space reserved
queue before the garage/separate entry
non-booked car in your space

Scenario:

- Start trigger: arrive at queue, at garage, at destination
- End trigger: engine off

Use case C: Booking at home

Use case D: now to parking

Impacts and indicators

1. Comfort:

- time to park
- standard deviation of lateral position
- steering jerk
- eye movements
- video of exterior

2. Safety: speed in garage, video of exterior:

- longitudinal control
- time to contact
- speed variation
- eye movements
- video of exterior for pedestrians and cyclists
- indication of user/operator, driver or passenger

Group 2: Lane departure warning that works in the snow

Function description:

- In case of an unintentional lane departure the system provides the driver with a warning (1 level, audio)
- High precision GPS and enhanced map attributes (like number of lanes; updates on road works) should be available
- The function will be activated only above a speed threshold (which should be adjustable)
- The system should work regardless the lanes are visible or not

Top – down: the six areas

1. Direct effects of a system on the user and driving
 - The system helps the driver to keep the lane
2. Indirect effects (behavior adaptation) effects of the system on the user
 - Over trust over rely on the system
 - Driving when snowing
 - Risky behavior (e.g. speeding behavior)
 - Less attention to the road
3. Indirect effects (behavior adaptation) effects of the system on the non user
 - Easier overtaking
4. Modification of interaction between users and non users (including vulnerable road users)
 - none
5. Modifying accident consequences
 - none
6. Effects of combination with other systems
 - Increase safety if combined with speed related systems (like ISA), ACC, BSW and so on
 - The combination might impose driver workload

Impacts

- Safety: Positive effect
- Efficiency: Positive effect especially for professional drivers
- Environment: Negative effect (more miles driven)
- Mobility: Positive effect (you can drive in difficult conditions)
- Acceptance and trust: Investigate the number of false alarms; aggressive drivers might be irritated; user centered approach
- Usage: professional drivers
- Adoption: depending on location; adoption to professional use
- System Penetration: professional market
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Bottom–up: the use case approach

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|-----------|---|
| Use case | Leaving a lane |
| Situation | Lane marking not visible |
| Scenario | Leaving a lane when the lane marking is not visible |
| Event | Leaving the lane |

Hypotheses prioritization

1. Less lane departures; accidents and/or incidents will decrease
2. Level of acceptance will be higher for non-professional drivers (short term effects)
3. The professional drivers will set a higher speed threshold
4. Number of journeys and kilometers driven when snowing will increase
5. Visual attention to the road will decrease

6. The workload will be higher without LDW system when snowing

Group 3: Cooperative system warning for shockwaves on the motorway up to 4 km ahead

Functions

Detection: strong braking, drop speed
Warning shockwave 4 km ahead (beep)

Top – down: the six areas

1. Direct effects of a system on the user and driving
 - Higher level of attention
 - Reduced speed when warning
2. Indirect effects (behavior adaptation) effects of the system on the user
 - Reduced attention when no warning, especially in dense traffic
 - Over-reaction when receiving warning
3. Indirect effects (behavior adaptation) effects of the system on the non user
 - Non-users reduce speed
4. Modification of interaction between users and non users (including vulnerable road users)
5. Modifying accident consequences
 - Reduced accidents (rate and severity)
 - Reduced secondary accidents
6. Effects of combination with other systems

Non-classified hypotheses:

- False alarms reduce acceptance
- Missed alarms will increase (dangerous situation plus accident) incidents
- Combination with longitudinal control will improve comfort and safety
- Combination with navigation system will improve efficiency
- Improve traffic flow (speed ...)
- Reduce GHG emissions
- Increase mobility
- Acceptance decreases with increasing warning
- With/without distance use of navigation systems
- Combination with navigation systems will create other congestions
- Can create legal and ethical issue (information system)
- Performance increased by penetration

Use cases

Use case:

- Traffic jam ahead (standing still)
- (No traffic jam ->non-use case)
- Shockwave
- Stop & go

Situations:

- speed before warning
- dry/wet
- dense/clear
- ACC
- navigation system
- penetration

Scenarios:

- traffic jam + warning + ...
+ no warning + ...
- no Traffic jam + warning

Events:

- Accidents
- Braking under threshold

Performance indicators:

- speed
- acceleration
- emission
- delay
- rerouting
- toll income
- hours traffic jam
- number of accidents
- events
- throughput
- low speed