Overall Evaluation Methodology in interactIVe

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Content

• “Evaluation and legal aspects” – Overview and Methodology

• Technical Assessment

• User-related Assessment

• Safety Impact Assessment
“Evaluation and legal aspects” - Overview

Role in interactIVe:

- Definition of a test and evaluation framework
- Development of test scenarios, procedures and evaluation methods
- Provision of tools (e.g. equipment, test catalogues, questionnaires or software) and test support
- Definition of test and evaluation criteria
- Analysis of legal aspects

Evaluation divided into:

- Technical assessment (on function level)
- User-related assessment
- Impact assessment
- Legal aspects
“Evaluation and legal aspects” - Methodology

Methodology for the evaluation bases mainly on the PReVAL methodology:

- Step 0: System and function description
- Step 1: Expected impact and hypotheses
- Step 2: Test scenario definition
- Step 3: Evaluation method selection
- Step 4: Measurement plan
- Step 5: Test execution and analysis

Adaptation and application of methodology in interactIVE

- Definition of Research questions (D7.1)
- Definition of Hypotheses (D7.2)
- Definition of Indicators (D7.2)
- Test and Evaluation Plan (D7.4)
- Evaluation of Function (D7.5)
- Verification of Hypotheses
- Calculation of Indicators
- Measurement Data
- Test of Function
Facts

- 11 different functions in 7 demonstrator vehicles
- Tested conflict types:
  - Rear-end, Head-on, Blind spot, Road Departure, Crossing Traffic, VRU, Excessive Speed, Traffic Rule Violation
- In total over 900 test runs
- 30 general hypotheses (for all functions)
- 63 specific hypotheses
**Technical Assessment – Example Results**

- **Example:**
  Hyp_T_gen_TecU_01: The driver has enough time to react and avoid the accident, when the warning is issued.

  ![Box plot diagram showing remaining reaction time in seconds]

  - The remaining reaction time is \((TTC @ \text{warning} - t_{\text{Manoeuvre}})\) compared to the presumed reaction time.
  - Hypothesis is confirmed at significance level of 5% at a reaction time of \(t_{\text{Reaction}} = 1.2\) s in the example.

- In general the interactIVe functions behave in the intended way.
- Considering the activation behaviour at least some function are still in the research phase.
User-related Assessment – Evaluation and Test Design

- 9 studies with 263 test persons have been conducted
- Method chosen depending on the criticality of the system under investigation
  - Small field test
  - Focus group studies
  - Test on a test track
  - Driving simulator studies
Safety Impact Assessment – Methodology

• Literature review on impact assessment methodologies:
  • Safety Mechanisms
  • Accident Reconstruction
  • Neural Network
  • FOT – Approach

• Selection of appropriate methodology by considering available data as well as advantage and disadvantages of the methodologies:
  • Nine Safety Mechanisms

• Direct effects
  1. Direct in-car modification of the driving task,
  2. Direct influence by roadside applications,
  3. Indirect effects on user
  4. Indirect modification of non-user behaviour,
  5. Modification of interaction between users and non-users,

• Exposure effects
  6. Modification of road user exposure,
  7. Modification of modal choice,
  8. Modification of route choice,

• Effects on post-accident consequence modification
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• Direct effects
  1. Direct in-car modification of the driving task,
  2. Indirect effects on user
     • Direct influence by roadside applications,
  3. Indirect modification of user behaviour,
  4. Indirect modification of non-user behaviour,
  5. Modification of interaction between users and non-users,
  6. Exposure effects
     • Nine Safety Mechanisms

• Exposure effects, typically small
  7. Modification of modal choice,
  8. Modification of route choice,
  9. Effects on post-accident consequence modification
     • Nine Safety Mechanisms
Conclusion

• Evaluation Methodology in interactIVe base on PReVAL

• 11 different functions integrated in 7 demonstrator vehicles were successfully tested in interactIVe

• interactIVe functions were tested with respect to their technical and user-related performance

• Afterwards based on the results a safety impact assessment of interactIVe functions were conducted

• Acknowledgement
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Thank you

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