Towards a Scenario-Based Approach for an Electronic Driving Management System Architecture: A Case Study

Martin Gottlieb-Schaflechner\textsuperscript{1}, Matthias Gottlieb\textsuperscript{2}, Harald Hagel\textsuperscript{1}

\textsuperscript{1}Bundeswehr University Munich, Chair for Software Tools and Methods for Integrated Applications (iA) {martin.schaflechner|harald.hagel}@unibw.de

\textsuperscript{2}Technical University of Munich, Chair for Information Systems (i17) matthias.gottlieb@tum.de
Agenda

- Motivation
- Research Focus
- Method
- Dimensions of Driving Situation
- Scenarios of an Electronic Driving Management System
- Conclusion
- Future Work
Model- and Architecture-based Design of the Digital Transformation

Martin Gottlieb-Schaflechner\textsuperscript{1}, Matthias Gottlieb\textsuperscript{2}, Harald Hagel\textsuperscript{1}

1. Chair for Software Tools and Methods for Integrated Tools (iA)
   Univ.-Prof. Dr. Andreas Karcher

2. Chair for Information System (i17)
   Univ.-Prof. Dr. Helmut Krcmar

Martin Gottlieb-Schaflechner, Matthias Gottlieb, Harald Hagel - ForenSecure 12th of April 2019
Motivation

Electric vehicles (e-vehicles):
- Proportional lower ranges
- More frequent recharging

Prior vehicle fleets are combustion engines
- Loading infrastructure for e-vehicles is rare
- New requirements needed

Electromobile Driving Fleet Management System

- What are applicable scenarios for electronic driving management?
Method

1. Literature Review
   Keywords: e-mobility, fleet management, driving logbook, electrified mobility, electrified fleet management
   Databases: Google Scholar, Microsoft Academic, WebOfScience

2. Dimensions of Applicable Driving Scenarios
   Coding
   - Organization
   - Usage
   - Trip

3. Mobility Concept

Keywords: e-mobility, fleet management, driving logbook, electrified mobility, electrified fleet management
Databases: Google Scholar, Microsoft Academic, WebOfScience
Dimensions of a Driving Scenario

Plan
Act
Change
Documentation
Analysis

Single Track vs. Tour

Trip

Private vs. Business Usage

Organization

Usage

Martin Gottlieb-Schaflechner, Matthias Gottlieb, Harald Hagel - ForenSecure 12th of April 2019
Scenarios of the Mobility Concept

Plan
- Private
- Service
- Carsharing

Act
- Private
- Service
- Carsharing

Change
- Private
- Service
- Carsharing

Documentation
- Private
- Service
- Carsharing

Analysis
- Private
- Service
- Carsharing

Private
- Service
- Carsharing

Business
- Service
- Carsharing

Single Track

Tour

Martin Gottlieb-Schaflechner, Matthias Gottlieb, Harald Hagel - ForenSecure 12th of April 2019
### Scenarios of the Mobility Concept (2)

<table>
<thead>
<tr>
<th>No.</th>
<th>Organization</th>
<th>Usage</th>
<th>Trip</th>
<th>Mobility Concept</th>
</tr>
</thead>
<tbody>
<tr>
<td>S01</td>
<td>Plan</td>
<td>Private</td>
<td>Single</td>
<td>3 options: (1) private vehicle usage (2) service vehicle usage (3) car sharing vehicle usage</td>
</tr>
<tr>
<td>S04</td>
<td>Plan</td>
<td>Private</td>
<td>Tour</td>
<td>3 options: (1) private vehicle usage (2) service vehicle usage (3) car sharing vehicle usage</td>
</tr>
<tr>
<td>S07</td>
<td>Plan</td>
<td>Business</td>
<td>Single</td>
<td>2 options: (1) service vehicle usage (2) car sharing vehicle usage</td>
</tr>
<tr>
<td>S09</td>
<td>Plan</td>
<td>Business</td>
<td>Tour</td>
<td>2 options: (1) service vehicle usage (2) car sharing vehicle usage</td>
</tr>
<tr>
<td>...</td>
<td>...</td>
<td>...</td>
<td>...</td>
<td>...</td>
</tr>
<tr>
<td>S11</td>
<td>Act</td>
<td>Private</td>
<td>Single</td>
<td>3 options: (1) private vehicle usage (2) service vehicle usage (3) car sharing vehicle usage</td>
</tr>
<tr>
<td>...</td>
<td>...</td>
<td>...</td>
<td>...</td>
<td>...</td>
</tr>
<tr>
<td>S21</td>
<td>Change</td>
<td>Private</td>
<td>Tour</td>
<td>3 options: (1) private vehicle usage (2) service vehicle usage (3) car sharing vehicle usage</td>
</tr>
<tr>
<td>...</td>
<td>...</td>
<td>...</td>
<td>...</td>
<td>...</td>
</tr>
<tr>
<td>S31</td>
<td>Documentation</td>
<td>Business</td>
<td>Single</td>
<td>2 options: (1) service vehicle usage (2) car sharing vehicle usage</td>
</tr>
<tr>
<td>...</td>
<td>...</td>
<td>...</td>
<td>...</td>
<td>...</td>
</tr>
<tr>
<td>S50</td>
<td>Analysis</td>
<td>Business</td>
<td>Tour</td>
<td>2 options: (1) service vehicle usage (2) car sharing vehicle usage</td>
</tr>
</tbody>
</table>
Conclusion

- Providing a **first step of a Mobility Concept for an EDMS** in order to operate inhomogeneous fleets comprehensively

- Driving person is embedded into the respective trip situation, characterized by its’ environment
  - Driving management (**internal perspective**) and Trip management (**external perspective**) have to be merged into an integrated EDMS

- Future solutions tailored to the business needs of fleet operators will include:
  - smart action planning,
  - operational control,
  - analysis and evaluation.
Future Work

- Exploratory research is in a limited market → need of additional validation for general knowledge

- Integrating the validation of our approach and the conceptualization of solution patterns architecturally.

- Including safety- and security-driven aspects for the implementation of an EDMS
Thank you!

there are some questions that cannot be answered by Google.
Towards a Scenario-Based Approach for an Electronic Driving Management System Architecture: A Case Study

Martin Gottlieb-Schaflechner\textsuperscript{1}, Matthias Gottlieb\textsuperscript{2}, Harald Hagel\textsuperscript{1}

\textsuperscript{1}Bundeswehr University Munich, Chair for Software Tools and Methods for Integrated Applications (iA)\
{martin.schaflechner|harald.hagel}@unibw.de

\textsuperscript{2}Technical University of Munich, Chair for Information Systems (i17)\
mattias.gottlieb@tum.de
References