Deployment status and users’ willingness to pay – results on selected in-vehicle ITS systems
Background

- Expectations towards traffic:
  - Reduced burden on environment – less CO2 emissions
  - Vision zero of traffic safety
  - More efficient mobility of people and goods
  (European white paper on transport, 2011)

- Expectations towards ITS (Objectives of European iMobility Forum in time period 2011-2020):
  - 30% reduction in the number of fatalities across Europe
  - 30% reduction in the number of seriously injured persons across Europe
  - 15% reduction of road traffic related congestion
  - 20% improvements in energy-efficiency
  - 50% increase in availability of real time traffic and travel information
  (http://www.imobilitysupport.eu)
Priority iMobility Systems

**Infrastructure based priority systems**
- Dynamic traffic management
- eCall
- Eco-driving assistance
- Eco-driving coaching
- Extended environmental information (extended FCD)
- Local danger warning
- Real-time traffic and travel information
- Speed alert

**Vehicle based priority systems**
- Adaptive headlights
- Blind spot monitoring
- Emergency braking
- Obstacle and collision warning (including adaptive cruise control)
- Lane keeping support

http://www.imobilitysupport.org
http://www.imobility-effects-database.org
Expected impacts for priority iMobility systems

- Expected impacts of priority iMobility systems are presented in the iMobility Implementation Road Map

- The estimates are based on a literature study and expert assessment

<table>
<thead>
<tr>
<th>Priority systems</th>
<th>Accident type especially affected</th>
<th>Local results in specific conditions for effects on all accidents for vehicles or roads equipped based on research incorporating accident analysis</th>
</tr>
</thead>
<tbody>
<tr>
<td>Obstacle &amp; collision warning</td>
<td>rear-end crashes</td>
<td>-</td>
</tr>
<tr>
<td>Emergency braking</td>
<td>rear-end crashes</td>
<td>all fatalities EU -7%</td>
</tr>
<tr>
<td>Blind spot monitoring</td>
<td>side collisions</td>
<td>all injuries EU -7%</td>
</tr>
<tr>
<td>Adaptive headlights</td>
<td>accidents with pedestrians and cyclists on unlit roads</td>
<td>-</td>
</tr>
<tr>
<td>Lane keeping support</td>
<td>head-on or run-off-road, side collisions</td>
<td>injuries EU -2 to -6%</td>
</tr>
<tr>
<td>RTTI</td>
<td>accidents in adverse conditions, pile-ups</td>
<td>all fatalities EU -5 to -10%</td>
</tr>
<tr>
<td>Dynamic traffic management (VMS)</td>
<td>accidents in adverse conditions, pile-ups</td>
<td>all injury crashes -5 to -20%</td>
</tr>
<tr>
<td>Local danger warning</td>
<td>accidents in adverse conditions, pile-ups</td>
<td>all fatal crashes -10 to -25%</td>
</tr>
<tr>
<td>Extended environmental information</td>
<td>accidents in adverse environmental conditions</td>
<td>all injury crashes -1 to -15%</td>
</tr>
<tr>
<td>eCall</td>
<td></td>
<td>all fatalities -2 to -15%; EU -6%; severe injuries -3 to -15%;</td>
</tr>
<tr>
<td>Speed Alert</td>
<td>accidents caused by exceeding speed limits</td>
<td>all injuries EU -6%</td>
</tr>
<tr>
<td>Dynamic navigation</td>
<td>all accidents</td>
<td>all fatalities EU -9%</td>
</tr>
<tr>
<td>Eco-driving</td>
<td>accidents caused by exceeding speed limits</td>
<td>reduced exposure but increased accident rate due to driving on lower category roads</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Similar effects as speed alert if the functionality includes that part</td>
</tr>
</tbody>
</table>
# Deployment status of priority iMobility systems

<table>
<thead>
<tr>
<th>Priority system</th>
<th>Trans-European road network coverage in EU28</th>
<th>Fleet penetration in EU28</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Vehicle based systems</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Obstacle and collision warning (incl. ACC)</td>
<td>-</td>
<td>&lt;1%</td>
</tr>
<tr>
<td>Emergency braking</td>
<td>-</td>
<td>&lt;1%</td>
</tr>
<tr>
<td>Blind spot monitoring</td>
<td>-</td>
<td>&lt;1%</td>
</tr>
<tr>
<td>Adaptive headlights</td>
<td>-</td>
<td>1–5%</td>
</tr>
<tr>
<td><strong>Infrastructure based systems</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>RTTI</td>
<td>RDS-TMC: 20–40%</td>
<td>RDS-TMC: 20–40%</td>
</tr>
<tr>
<td>DAB</td>
<td>&lt;10%</td>
<td>&lt;1%</td>
</tr>
<tr>
<td>Dynamic traffic management</td>
<td>Variable speed limits: 5–10%</td>
<td>-</td>
</tr>
<tr>
<td>Local danger warning</td>
<td>10–30 % (of critical spots requiring local danger warnings)</td>
<td>-</td>
</tr>
<tr>
<td>Extended environmental information (extended FCD)</td>
<td>&lt;5%</td>
<td>&lt;1%</td>
</tr>
<tr>
<td>eCall</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Speed alert</td>
<td>5–20%</td>
<td>Built-in: 1–10 %</td>
</tr>
<tr>
<td>Dynamic navigation</td>
<td>See RTTI</td>
<td>Built-in: 5–10 %</td>
</tr>
<tr>
<td>Nomadic and aftermarket: 10–40 %</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Eco-driving</td>
<td>5–10 %</td>
<td>Eco-driving assistance: 5–10 % (built-in)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>&lt;1% nomadic and aftermarket</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Eco-driving coaching: &lt;1% (all)</td>
</tr>
</tbody>
</table>
Deployment rates of vehicle based priority systems – increasing but from a low base

<table>
<thead>
<tr>
<th>Priority system</th>
<th>2010</th>
<th>2011</th>
<th>2012</th>
</tr>
</thead>
<tbody>
<tr>
<td>Adaptive headlights</td>
<td>9.7%</td>
<td>11.9%</td>
<td>12.6%</td>
</tr>
<tr>
<td>Blind spot monitoring</td>
<td>0.57%</td>
<td>0.97%</td>
<td>3.0%</td>
</tr>
<tr>
<td>Eco-driving support</td>
<td>4.5%</td>
<td>16.2%</td>
<td>23.7%</td>
</tr>
<tr>
<td>Emergency braking</td>
<td>0.34%</td>
<td>1.1%</td>
<td>2.7%</td>
</tr>
<tr>
<td>Lane keeping support</td>
<td>0.55%</td>
<td>0.90%</td>
<td>4.2%</td>
</tr>
<tr>
<td>Obstacle and collision warning (including ACC)</td>
<td>1.8%</td>
<td>2.8%</td>
<td>4.4%</td>
</tr>
</tbody>
</table>

Öörni, R. 2013. iMobility priority systems monitoring report, Deliverable D3.2 of iMobility Support. and study reports by FSD GmbH
ITS systems promoted in iMobility Challenge

Systems promoted to consumers
- Eco-driving assistance
- Real-time traffic and travel information
- Start-stop assistant
- Tyre pressure monitoring

Systems promoted to decision-makers
- Eco-driving coaching
- eCall
- Dynamic traffic light optimisation
- Cooperative adaptive cruise control
- Fuel efficient route choice
- Speed alert

Descriptions of the systems are available in iMobility Challenge D2.1, http://www.imobilitychallenge.eu
<table>
<thead>
<tr>
<th>Impacts on environment, safety and mobility</th>
<th>Background</th>
<th>Criteria</th>
<th>Results</th>
</tr>
</thead>
<tbody>
<tr>
<td>+</td>
<td>-</td>
<td>+++</td>
<td>X</td>
</tr>
<tr>
<td>++</td>
<td>-</td>
<td>-</td>
<td>X</td>
</tr>
<tr>
<td>+++</td>
<td>-</td>
<td>-</td>
<td>X</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Technological maturity</th>
<th>Background</th>
<th>Criteria</th>
<th>Results</th>
</tr>
</thead>
<tbody>
<tr>
<td>+</td>
<td>-</td>
<td>+</td>
<td>X</td>
</tr>
<tr>
<td>++</td>
<td>-</td>
<td>+</td>
<td>X</td>
</tr>
<tr>
<td>+++</td>
<td>-</td>
<td>+</td>
<td>X</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Time horizon for deployment</th>
<th>Background</th>
<th>Criteria</th>
<th>Results</th>
</tr>
</thead>
<tbody>
<tr>
<td>+</td>
<td>-</td>
<td>+</td>
<td>X</td>
</tr>
<tr>
<td>++</td>
<td>-</td>
<td>+</td>
<td>X</td>
</tr>
<tr>
<td>+++</td>
<td>-</td>
<td>+</td>
<td>X</td>
</tr>
</tbody>
</table>

| Eco-driving assistance      | X          | -        | +++     | X       |
| Eco-driving coaching        | X          | -        | -       | ++      | -       | X       |
| eCall                       | X          | X        | -       | +++     | +       | ++      |
| Fuel-efficient route choice | -          | (X)      | ++      | +       | +       | -       | X       |
| Dynamic traffic light       | -          | (X)      | +       | -       | -       | -       | X       |
| optimisation and optimum    | -          | (X)      | +       | -       | -       | -       | X       |
| speed advisory              | -          | (X)      | +       | -       | -       | -       | X       |
| Cooperative adaptive cruise control | -          | X        | +       | -       | +       | +       | -       | X       |
| Intersection safety assistant | -         | X        | -       | ++      | -       | +       | -       | -       | X       |
| Start-stop assistant        | (X)        | -        | ++      | -       | -       | +++     | X       |
| Tyre pressure monitoring    | -          | (X)      | +       | -       | +       | -       | X       |
| system                     | -          | (X)      | +       | -       | +       | -       | X       |
| Cooperative local danger warning | -         | X        | -       | +       | -       | +       | +       | -       | X       |
| Wrong way driving warning   | -          | X        | -       | +       | -       | +       | +       | -       | -       | X       |
| Traffic signal violation warning | -         | X        | -       | +       | -       | +       | +       | -       | -       | X       |
| Speed alert                 | X          | (X)      | +       | +++     | -       | +       | ++      | -       | X       |
| Real-time traffic information | X          | X        | +       | +++     | -       | +++     | X       |
| Post crash warning          | X          | -        | +       | -       | +       | -       | X       |
| Adaptive headlights         | X          | -        | +       | -       | +       | -       | X       |
| Emergency braking           | X          | -        | +       | -       | +       | -       | X       |
| Lane keeping support        | X          | -        | +       | -       | +       | -       | X       |
| Blind spot monitoring       | X          | -        | +       | -       | +       | -       | X       |

Users’ awareness and demand for iMobility Challenge systems were studied with a questionnaire. n > 5000, data collection in FI, NL, ES, NL and CZ. The study results indicate moderate levels of user awareness of the systems. Most car users have still not experienced the systems themselves.
Car users’ willingness to pay for iMobility Challenge systems

- A significant share is car users is willing to pay for the systems analysed in the study
- Most respondents indicated that are not willing to pay more than €300
- The results suggest that car users are sensitive to price
- The results are based on a questionnaire, not data on observed purchasing behaviour
Discussion and conclusions

- Market penetration of intelligent vehicle safety systems in new vehicles is increasing but from a low base (except ESC which is now mandatory in new vehicles in EU)
- European car users have moderate levels of awareness of the existing in-vehicle ITS systems
- Willingness to pay was studied with a questionnaire, collecting the same data with other means would be difficult
- Large share of users are willing to pay for the systems. However, most users were not willing to pay more than €300 for the systems.
- Information available on the impacts of systems is still limited, this applies especially to novel systems. For some novel systems, available estimates on impacts are based on simulation or expert opinion
- Applications intervening in driving task are already on the market!
More information

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http://www.imobilitysupport.eu
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