Overview

- Project Objectives & Focus
- WorkPlan & Status
- Planned Results:
  - Assessment of future technologies
  - Generic Specifications
Project Objectives

Improve quality of incident detection
  • Functionality & performance
    • improve detection accuracy, reliability
    • reduce false alarm rate, detection delay

System concepts for new technologies
  • Generic specifications
    • Cost estimates, benefits and feasibility
    • Quality requirements on main components:
      sensors, data fusion & detection algorithms
Project Focus


- Road side systems (video, radar, laser, BT, ...)
- In-vehicle systems (G5, 3G)
- Nomadic devices (3G)

From 1st Stakeholder consultations and WS:

1. Focus on (3) types of incidents
   Accidents, Broken down vehicles, Extraordinary congestion

2. Typical Use Cases of NRAs
   Road type, Traffic volume / state, Existing detection systems

3. NRAs Decision process
   as a basis for developing generic specifications
## Workplan & Status

<table>
<thead>
<tr>
<th>Milestones, Deliverable &amp; Work Packages</th>
<th>Project Month</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16</td>
</tr>
<tr>
<td>MS1 Consolidated Requirements</td>
<td></td>
</tr>
<tr>
<td>MS2 Specifications</td>
<td></td>
</tr>
<tr>
<td>WS1 Stakeholder Workshop 1 on Requirements</td>
<td></td>
</tr>
<tr>
<td>WS2 Stakeholder workshop 2 on Specifications</td>
<td></td>
</tr>
<tr>
<td>D2.1 User Needs &amp; Reqs</td>
<td></td>
</tr>
<tr>
<td>D4.1 Specifications</td>
<td></td>
</tr>
<tr>
<td>D5.1 Final summary</td>
<td></td>
</tr>
<tr>
<td>WP1 Project management</td>
<td></td>
</tr>
<tr>
<td>WP2 Stakeholder consultations</td>
<td></td>
</tr>
<tr>
<td>WP3 Requirements analysis</td>
<td></td>
</tr>
<tr>
<td>WP4 Specification of innovative technologies</td>
<td></td>
</tr>
<tr>
<td>WP5 Final results and recommendations</td>
<td></td>
</tr>
</tbody>
</table>

![Gantt chart with milestone and work package information](chart.png)
Planned Results

Generic Specifications support the decision process of a NRA

1. Typical Use Cases of NRA
   Existing system -> Desired situation (what needs to be improved)
   Selection of 3 typical Use Cases

2. Analyse Innovative Technologies
   Library of Technology Sheets

3. Selection of technologies for Use Cases and Incident Types
   How to integrate innovative technology into existing systems

4. Benefits in performance & costs
Use Cases: Existing Situation

**Network type:**
- a. Motorway
- b. Trunk road
- c. Secondary road

**Traffic volume:**
- a. High
- b. Low

**Existing incident detection:**
- a. VBRS
- b. Radar
- c. Loops
- d. None
Future technologies

Assessment of future technologies for the user needs and requirements

Nomadic & In-Vehicle Systems
- eCall
- Nomadic devices (3G)
- Cooperative Systems (3G)
- Cooperative Systems (G5)

Road Side Systems
- Tracking Video
- Scanning Radar
- Tolling Systems
- Bluetooth scanner
- Advanced Inductive Loops
- ANPR
- Magnetometers
- Acoustics
- Fibre optics
- Thermography
- WIM
- ...
Technology Library

• Fact sheet per technology
  • Detailed descriptions of
    – Performance considerations
    – Cost considerations

• Technology sheet with overview table
  example for Cooperative Systems (G5)
  on next 2 slides
### Performance Considerations

<table>
<thead>
<tr>
<th>Incident Type</th>
<th>Accidents</th>
<th>Breakdowns</th>
<th>Congestion</th>
</tr>
</thead>
<tbody>
<tr>
<td>Detector Accuracy</td>
<td>Very High (accel., ABS, ESP,..)</td>
<td>Very high (CAN)</td>
<td>Very high (Speed, accelerations, CAN)</td>
</tr>
<tr>
<td>Detection Delay</td>
<td>Seconds Equipped vehicle is in direct communication contact with road side units, connecting to the infrastructure of the road operator</td>
<td>Securities Equipped vehicle is in direct communication contact with road side units, connecting to the infrastructure of the road operator</td>
<td></td>
</tr>
<tr>
<td>Detection Rate</td>
<td>Low depending on penetration rate</td>
<td></td>
<td>Very high for speed based congestion detection. With lower penetration rates not applicable for flow and density detection</td>
</tr>
<tr>
<td>False Alarm Rate</td>
<td>low</td>
<td>low</td>
<td>low</td>
</tr>
<tr>
<td>Suitability</td>
<td>Good (with low penetration rate, detection rate similar to loops?)</td>
<td></td>
<td>Excelent</td>
</tr>
</tbody>
</table>
## Cost Considerations

<table>
<thead>
<tr>
<th>Set Up Costs</th>
<th>New System</th>
<th>Retrofit</th>
<th>Upgrade</th>
</tr>
</thead>
<tbody>
<tr>
<td>High</td>
<td>requires road side units with G5 communication units every 500-1000m</td>
<td>Low</td>
<td>add G5 communication units to existing road side units and reuse network</td>
</tr>
<tr>
<td>Maint.</td>
<td>Medium communication units will require updates and have a limited life time</td>
<td>Medium communication units will require updates and have a limited life time</td>
<td>NA</td>
</tr>
<tr>
<td>Operation</td>
<td>Additional equipment may be required to verify incidents</td>
<td>Low</td>
<td>if existing infrastructure already provides systems for incident verification</td>
</tr>
</tbody>
</table>
3. Selection of Technologies

Selection of technologies for (Use Cases * Incident Types)

1. Existing situation
   - Motorway with / without hard shoulder / Arterial
   - High / Low traffic volume
   - No incident detection system / loops / radar / video / tolling

2. Desired situation
   - Improve performance for incident type
   - Reduce costs for setup, maintenance, or operation

3. Options
   - Propose most effective / efficient technologies
<table>
<thead>
<tr>
<th>Option</th>
<th>System 2020</th>
<th>Detector Accuracy</th>
<th>Detection Delay</th>
<th>Detection Rate</th>
<th>False Alarm Rate</th>
<th>Set up</th>
<th>Cost Maint.</th>
<th>Cost Oper.</th>
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</thead>
<tbody>
<tr>
<td>Ref.</td>
<td><em>No detection</em></td>
<td>N.A.</td>
<td>N.A.</td>
<td>N.A.</td>
<td>N.A.</td>
<td>0</td>
<td>0</td>
<td>+++</td>
</tr>
<tr>
<td>1</td>
<td>V2I - G5</td>
<td>Excellent</td>
<td>Excellent (1 sec)</td>
<td>Excellent * 20%</td>
<td>Excellent</td>
<td>++</td>
<td>++</td>
<td>/+++</td>
</tr>
<tr>
<td></td>
<td>20% penetration</td>
<td>* 20%</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>V2I - 3G</td>
<td>Excellent</td>
<td>Excellent (10 sec)</td>
<td>Excellent * 30%</td>
<td>Excellent</td>
<td>+</td>
<td>+</td>
<td>/+++</td>
</tr>
<tr>
<td></td>
<td>30% penetration</td>
<td>* 30%</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Tracking Video</td>
<td>Good</td>
<td>Excellent</td>
<td>Excellent</td>
<td>Good</td>
<td>+++</td>
<td>++</td>
<td>--</td>
</tr>
<tr>
<td></td>
<td>@ 500m up &amp; downstream</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Scanning Radar</td>
<td>Good</td>
<td>Excellent</td>
<td>Good</td>
<td>Good</td>
<td>++</td>
<td>++</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>@ 1km</td>
<td></td>
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<td></td>
<td></td>
<td></td>
<td></td>
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</tr>
<tr>
<td>5</td>
<td>Nomadic Devices</td>
<td>Manual</td>
<td>&gt;1 min</td>
<td>manual</td>
<td>Average</td>
<td>+</td>
<td>+</td>
<td>--</td>
</tr>
<tr>
<td></td>
<td>70% active, 30% has App</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>6</td>
<td>V2I eCall</td>
<td>N.A.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>40% penetration</td>
<td></td>
<td></td>
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</tbody>
</table>
Questions to the PEB

• Extend project end to from 01 March to 31 July 2013
  – D4.1 in April 2013 – Specifications
  – D5.1 in June 2013 – Final Summary report (20 p)
  – extra Progress report in April 2013

• Selection of (3) typical Use Cases
  – Feedback on our proposal in December 2012

• 2nd Stakeholder WS
  – Objective:
    • Dissemination of final results
    • Discussion with experts from PEB / NRAs
  – Form of WS
    • Individual consultation of experts
    • WS during an event
    • Separate RAIDER WS (Brussels)
Thank you for your attention

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