Decision-support for investing in cooperative systems

Results of the project COBRA
(Cooperative Benefits for Road Authorities)

27 September 2013
Intro COBRA project

• COoperative Benefits for Road Authorities
• ERA-NET road programme
• Sept 2011 – April 2013
• € 415K
• Partners:
  - Project coordinator
  - Project partner
  - Subcontractor
Deliverables of COBRA

• D1: State of the Art
• D2: Methodology framework
• D3: Results of the Impact Assessment
• D4: Cost-Benefit Analysis, COBRA Tool
• D5: Conclusions and Recommendations for Deployment of Cooperative Systems by Road Authorities
Aim of COBRA tool

• compare cooperative platforms
• societal cost and benefits, and costs (savings) for NRAs
• decision to be taken in next 5-10 years
• usable and extendable by NRA’s
Methodology

• Impact Assessment
  – Safety, traffic efficiency, environment
  – At Bundle level (3 in total)

• CBA: Depends on
  – Deployment level
  – Existing Roadside Infrastructure
  – Reference scenario
  – Platform Choice

• BM
  – Several choices
Bundles

• Bundle 1: Local dynamic event warnings
  – Hazardous location notification
  – Road works warning
  – Traffic jam ahead warning
  – eCall

• Bundle 2: In-vehicle speed and signage
  – In-vehicle signage
  – Intelligent speed adaptation
  – Dynamic speed limits

• Bundle 3: Travel Information and Dynamic Route Guidance
  – Traffic info and recommended itinerary
  – Multimodal traffic information
  – Truck parking information and guidance
# Combinations Bundles and Platforms

<table>
<thead>
<tr>
<th>Bundle</th>
<th>Cellular</th>
<th>Wireless Beacons</th>
</tr>
</thead>
<tbody>
<tr>
<td>Local Dynamic Event Warnings</td>
<td></td>
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<td>In-vehicle speed and signage</td>
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</tr>
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<td>Travel Information and Dynamic Route Guidance</td>
<td></td>
<td>N/A</td>
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</table>
COBRA tool

• Aims to support investment decision by NRA to deploy CS
• Flexible, can be expanded in the future
• Countries for which data expected in 1st version:
  – Netherlands
  – United Kingdom
Business Models for NRA

- BM1 - Free RA app (Cellular)
- BM2a - commercial app (Cellular)
- BM2b - Navigation extended (Cellular)
- BM3 - Public travel time information (Cellular)
- BM4 - Private dynamic navigation (Cellular)
- BM5 - Public road-side (Wireless beacons)
- BM6a - PPS (road-side private; app by NRA) (Wireless beacons)
- BM6b - PPS (road-side by NRA; app private) (Wireless beacons)
- BM7 - Private road-side (Wireless beacons)
BM6b - PPS (road-side by NRA; app private) (Wireless beacons) Value web 6b: PPS public roadside WLAN

Society

Behavioural change / societal benefits (virtual €)

Savings current infrastructure

Road authority

App provider

FCD (0 €)

App

Driver

Warning (0 €)

Investment in road side infra

Road side infra provider

Invest in service & helpdesk

Traffic control centre

FCD

€

€

€

€

€

Data comm.

Flow | Mandatory | Optional
---|---|---
Money | → | ---
Services and goods | → | ---
Societal benefits | → | ---

27 September 2013
BM2a - commercial app (Cellular)

Value web 2a: 1€ commercial app

- Road authority
  - Invest in service and helpdesk
- Traffic control centre
  - Traffic info
- App provider
  - FCD (0 €)
  - App
  - Behavioural change / societal benefits (virtual €)
- Driver
  - Data comm. bundle
  - Information (0 €)
  - Warning (0 €)
- Communication provider

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<tr>
<td>Country</td>
<td>Scenario 1</td>
<td>Scenario 2</td>
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<td>Bundles</td>
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<td>Aftermarket/Smartphone vehicle penetration curve</td>
<td>BM2a - 1$ commercial app (Cellular)</td>
<td>BM6b - PPS (road-side by NRA; app private) (Wireless beacons)</td>
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<td>OEM vehicle penetration curve</td>
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<td>Start year for deployment of wireless beacons roadside units</td>
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<tr>
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<td>2030</td>
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<td>Include infrastructure cost savings?</td>
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Societal Costs and Benefits
Cumulative Benefit-Cost Ratio
Business Case for the Road Authority
Business Case for the Road Authority
Business Case for the Road Authority
### Scenario 1

- **Country:** Netherlands
- **Bundles:** Local dynamic event warnings
- **Platforms:** Cellular
- **Role/business model:** BM² - 1$ commercial app (Cellular)
- **Aftermarket/Smartphone vehicle penetration curve:** Medium
- **OEM vehicle penetration curve:** Medium
- **Start year for deployment of wireless beacons roadside units:** 2012
- **End year for deployment of wireless beacons roadside units:** 2030
- **% of infrastructure equipped with wireless beacons roadside units in end year:** 2.5%
- **Wireless beacons roadside units investment scheme:** Linear
- **Include in-vehicle CAPEX costs?:** Yes, but 1/3 of price to buyer
- **Include in-vehicle OPEX costs?:** No
- **Include infrastructure cost savings?:** Yes

### Scenario 2

- **Country:** Netherlands
- **Bundles:** Local dynamic event warnings
- **Platforms:** Wireless beacons
- **Role/business model:** BM² - PPS (road-side by NRA; app private) (Wireless beacons)
- **Aftermarket/Smartphone vehicle penetration curve:** Medium
- **OEM vehicle penetration curve:** Medium
- **Start year for deployment of wireless beacons roadside units:** 2012
- **End year for deployment of wireless beacons roadside units:** 2030
- **% of infrastructure equipped with wireless beacons roadside units in end year:** 2.5%
- **Wireless beacons roadside units investment scheme:** Linear
- **Include in-vehicle CAPEX costs?:** Yes, but 1/3 of price to buyer
- **Include in-vehicle OPEX costs?:** No
- **Include infrastructure cost savings?:** Yes

If "Cost Savings = Yes", then click here for further input.
Societal Costs and Benefits, with Infrastructure Savings

![Bar chart showing societal costs and benefits with infrastructure savings for two scenarios.](image)
Business Case for Road Authority, with Infrastructure Savings

- Infrastructure cost savings
- Benefits
- In-vehicle costs
- Scenario 1
- Roadside wireless beacons
- Costs
- Back office etc.
- Infra. cost savings
- Benefits
- In-vehicle costs
- Scenario 2
- Roadside wireless beacons
- Costs

Monetary value (Euros)
Business Case for Road Authority, with Infrastructure Savings

![Graph showing monetary value (Euros) with different scenarios and cost-benefit analysis.]

- Total benefits
- Total costs
- Total benefits minus total costs

Scenario 1:

Scenario 2:

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Demo of Model