European developments towards connected, cooperative and automated driving

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Hermann Meyer, CEO ERTICO
Policy challenges

**Potential benefits**

of ITS deployment (by 2020) *

- **Economic Growth and Innovation**
  » Strong transport related industry in Europe

- **Urbanisation**
  » 2030: 60% of population in cities

- **Safety**
  » 95% of accidents linked to driver mistakes
  » 69% of road accidents occur in cities

- **Demographic Change**
  » 65+ generation will nearly double by 2030

- **Climate Change and Resource Scarcity**
  » Road transport contributes about one-fifth of the EU's total CO2 emissions

- **Behavioural Change**
  » More usage of “soft” transport modes
  » Home delivery of consumer goods

- 30% reduction in fatalities
- 30% reduction in seriously injured persons
- 15% reduction of congestion
- 20% improvements in energy-efficiency

…and it creates employment and economic growth via higher mobility and new industrial opportunities

* estimates from iMobility Forum for ITS potential contributions (2011-2020) assuming strong implementation efforts
ITS combine information and communication technologies, sensors, maps, and other data, for applications and services to enable seamless journeys of people and goods that are more affordable, safer, cleaner, more comfortable on road, rail, air, maritime.

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... highly advanced sensors and cameras

... already highly connected people

... more accurate and reliable positioning

... increasing needs to improve mobility

... big data capture and processing capacities

... faster, cheaper and more reliable communication

Trends
Challenges

... potential shifts in market power

... new business models and forms of cooperation

... new roles of stakeholders

... privacy and liability concerns

... quality of information and service

... investment decisions in a fast moving market
... Diagnose remotely

... and avoid recalls

... know better your customers

... Create added-value services

... improve products over their lifetime

... respond faster to potential product failures

... add data generation to business model

... add data generation to business model

Potentials

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Vehicle of the Future

- Internet of Things
- Cooperative-ITS
- Connected & Automated Driving
- Cooperative Traffic Management
### Annex 1: National, regional or local testbeds and corridors related to connected and automated driving

<table>
<thead>
<tr>
<th>Short name</th>
<th>Description</th>
<th>Type</th>
<th>Funding</th>
<th>Source</th>
<th>Timing</th>
<th>Link with Project</th>
</tr>
</thead>
<tbody>
<tr>
<td>Testfield Niedersachsen</td>
<td>Automated test bed</td>
<td>Urban and Highway Test Corridor</td>
<td>-</td>
<td>DE</td>
<td>2017</td>
<td>VW, T-Systems, BOSCH, CONTI, SIEMENS, (DLR)</td>
</tr>
<tr>
<td>Testfield Connected Car Baden-Württemberg</td>
<td>Urban tests (JUL, Karlsruhe, Ludwigsburg / Stuttgart) with focus is urban/sub-urban testing over next 5 years</td>
<td>Urban field test</td>
<td>-</td>
<td>DE</td>
<td>2017</td>
<td>Vodafone, Daimler</td>
</tr>
<tr>
<td>Port of Hamburg</td>
<td>Automated test bed planned for freight transport</td>
<td>Freight field test</td>
<td>-</td>
<td>DE</td>
<td>?</td>
<td></td>
</tr>
<tr>
<td>Aurora Snowbox</td>
<td>Equipped (LTE/ITS-G5) private testing ground managed by VTT</td>
<td>Snow/ice field test</td>
<td>-</td>
<td>FI</td>
<td>Operational</td>
<td>(VTT)</td>
</tr>
<tr>
<td>Ouluzone</td>
<td>Mobile machinery automation</td>
<td>Off-road test site</td>
<td>-</td>
<td>FI</td>
<td>2016</td>
<td>(FTA)</td>
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<tr>
<td>UrbanAutoTest</td>
<td>Testing the automatic functions of passenger cars in city traffic in Tampere and Rajamäki; Crossing, tunnel, parking house</td>
<td>Urban Field test</td>
<td>-</td>
<td>FI</td>
<td>Started</td>
<td>(VTT)</td>
</tr>
<tr>
<td>Belfort/Basel</td>
<td>Private testing ground on NATO airfield</td>
<td>Private field test</td>
<td>-</td>
<td>FR</td>
<td>?</td>
<td>Orange</td>
</tr>
<tr>
<td>Tornades FUI22</td>
<td>Equipped (LTE/ITS-G5) private testing ground managed by VEDECOM</td>
<td>Private field test</td>
<td>-</td>
<td>FR</td>
<td>Operational</td>
<td>Renault, PSA</td>
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<tr>
<td>Vislab</td>
<td>Urban testing of automated vehicle functions</td>
<td>Urban field test</td>
<td>-</td>
<td>FI</td>
<td>Running</td>
<td>(Vislab uniParma)</td>
</tr>
<tr>
<td>Scania test facility</td>
<td>5G test autonomous driving and connected vehicles in Södertälje</td>
<td>Private field test</td>
<td>-</td>
<td>SE</td>
<td>Scania and Ericsson</td>
<td></td>
</tr>
<tr>
<td>DRIVE ME</td>
<td>Gothenburg area; ring road and parking</td>
<td>Urban field test</td>
<td>-</td>
<td>SE</td>
<td></td>
<td></td>
</tr>
<tr>
<td>ASTAZERO</td>
<td>Equipped (LTE/ITS-G5) private testing ground managed by Chalmers</td>
<td>Private field test</td>
<td>-</td>
<td>SE</td>
<td>Operational</td>
<td>Volvo</td>
</tr>
<tr>
<td>Kista</td>
<td>5G test site</td>
<td>Urban field test</td>
<td>-</td>
<td>SE</td>
<td>2016</td>
<td>Ericsson</td>
</tr>
<tr>
<td>Scania Demo center</td>
<td>I2Matic Autonomous transport solutions (Mining industry)</td>
<td>Private field test</td>
<td>-</td>
<td>SE</td>
<td>2016</td>
<td>SCANIA, SAAB</td>
</tr>
<tr>
<td>Barcelona</td>
<td>Collaboration between Region of Catalonia, City of BCN, IDIADA, and RACC</td>
<td>Highway and urban tests</td>
<td>-</td>
<td>SP</td>
<td>?</td>
<td></td>
</tr>
<tr>
<td>IDIADA</td>
<td>Equipped (LTE/ITS-G5) private testing ground managed by IDIADA</td>
<td>Private field test</td>
<td>-</td>
<td>SP</td>
<td>Operational</td>
<td>OEMs</td>
</tr>
<tr>
<td>MIRA</td>
<td>Equipped (LTE/ITS-G5) private testing ground</td>
<td>Private field test</td>
<td>-</td>
<td>UK</td>
<td>Operational</td>
<td>JLR, Vodafone, Huawei, Siemens</td>
</tr>
<tr>
<td>UK Connected Intelligent Transport Environment (UKCITE)</td>
<td>Enable automotive, infrastructure and service companies to trial connected vehicle technology, infrastructure and services in real-life conditions in Coventry and Warwickshire in the West Midlands</td>
<td>Infrastructure and technology to be deployed on a mixture of different road types, including dual carriageways and city centre roads (40 miles)</td>
<td>-</td>
<td>UK</td>
<td>2017</td>
<td>JLR, Vodafone, Huawei, Siemens</td>
</tr>
<tr>
<td>London</td>
<td>100-cars field operational test (announced)</td>
<td>Highway and urban field test</td>
<td>-</td>
<td>UK</td>
<td>2017</td>
<td>Volvo</td>
</tr>
<tr>
<td>Greenwhich</td>
<td>Deployment area for fully automated vehicles</td>
<td>Urban Field test</td>
<td>-</td>
<td>UK</td>
<td>2016</td>
<td>(TRL)</td>
</tr>
<tr>
<td>Coventry-Milton Keynes-Birmingham</td>
<td>Deployment corridor for automated vehicles</td>
<td>Highway field test</td>
<td>-</td>
<td>UK</td>
<td>2016</td>
<td>Vodafone</td>
</tr>
<tr>
<td>Milton Keynes</td>
<td>Deployment area for fully automated vehicles</td>
<td>Highway field test</td>
<td>-</td>
<td>UK</td>
<td>2016</td>
<td>(TS Catapult)</td>
</tr>
</tbody>
</table>
Internet of Things
3-year project to pilot cooperative ITS services for deployment in 7 European cities ended in 2015

Objective:

• Deploying C-ITS services for road users to increase **energy efficiency** and **road safety**

C-ITS services:

• Energy Efficient Intersection Service (EEIS)
• Road Hazard Warning (RHW)
• Red Light Violation Warning (RLVW)

Vehicles & Infrastructure:

• Vehicles: 650+ (Heavy, Light & Emergency vehicles)
• Road-side units: 130+ (ITS-G5) + 150+ (3G/LTE)
• On-board units: 270+ (ITS-G5) + 450+ (3G/LTE)
• Drivers: 1200+
Continuation: large-scale deployment *strategy* (2016-...)

**Objective:**

- Move from pilot to large-scale deployment for self-sustained market

**Who & What:**

- About 50 public-private partners from all 7 cities committed to Compass4D continuation in 2016:
  - To overcome *vendor lock-in* for cities and achieve *continuity* of C-ITS services for users
  - To enable *economies of scale* and cost efficiency of the operation of C-ITS services
  - To create *trust* in the C-ITS technology and reach a *critical mass* of cities, suppliers and users
  - To ensure compatibility with *future evolutions* of C-ITS technology solutions
InterCor

Demonstrating a large-scale interoperable deployment of C-ITS

Foster four member states cross border interoperability

Provide C-ITS services on a broader scale by specifying, using and fostering an hybrid communication approach

Extend the strategic cooperation between C-ITS front running countries

Evaluate through a common evaluation framework the cumulative, real-life benefits of C-ITS applications

InterCor is a study of 1530 km of four Member States under the TEN-T Core road network connecting
Connected&Automated Driving
Connected & Automated Driving

CloudLSVA

Connected & Automated Driving

CloudLSVA

Start Point and incremental data sets available to CLOUD-LSVA

- Field Operational Test Data
- 1.2 Petabytes Day Zero Video Data
- Car Sensor and Telemetry Data
- Digital Cartography

Cloud Infrastructure

- Big Video Data
- Video, Sensor and Telemetry Fusion

Video Analysis
Deep Learning
ADAS Algorithm Creation
Map Creation

Device Dump Analysis results back to the Cloud Databases

Little Big Data - Devices Perform scaled down analysis of video and sensor data streams

Maps and ADAS Functionality deployed to Cars, Navigation Devices and Smart Devices as Software

Closing the Loop
Automated vehicles need to be connected, have access to and share data with other vehicles and infrastructure.

SENSORIS specify the interface for exchanging information between in-vehicle sensors and dedicated cloud as well as between clouds to:

- enable broad access, delivery & processing of vehicle sensor data
- enable easy exchange of vehicle sensor data between all players
- enable enriched location based services and automated driving

Main steps:

- **06/2015**: First specifications released by HERE
- **06/2016**: SENSORIS platform created & coordinated by ERTICO
- **09/2017**: New specifications as de-facto industrial standard.
Cooperative Traffic Management
Traffic management 1.0

- Loop Detectors
- ANPR
- Bluetooth tracking

Data Collection

Traffic Management 2.0

- GPS Locations
- Collect from PND, Smartphones or In-Car
- Collect data everywhere

Data Collection (FCD)

- Tailored to the users trip only
- Influence via Mobile Apps, In-Dash Navigation and PND’s
- Routes automatically adjusted

Influencing Traffic
Thank you!