ICT as an enabler of smart transport services and energy efficiency

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Business from technology

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ICT - ITS Research in VTT

HUMAN CAPITAL
- 80-110 experts
- Experience of over 150 projects at ITS area
- Annual revenue about 5 M€
- 15-25 scientific journal articles and inventions per year

FACILITIES
- **Mobile Test Laboratory**: Vehicle with the extensive sensor setup (BMW 525d)
- **Driver Monitoring**: Vehicle with hidden driver monitoring equipment (VW Golf)
- **Driving Simulator**: Simulator with driver monitoring reference system (FaceLab)
- **Converging Networks Laboratory:** Facilities for studying various (wireless) communication aspects
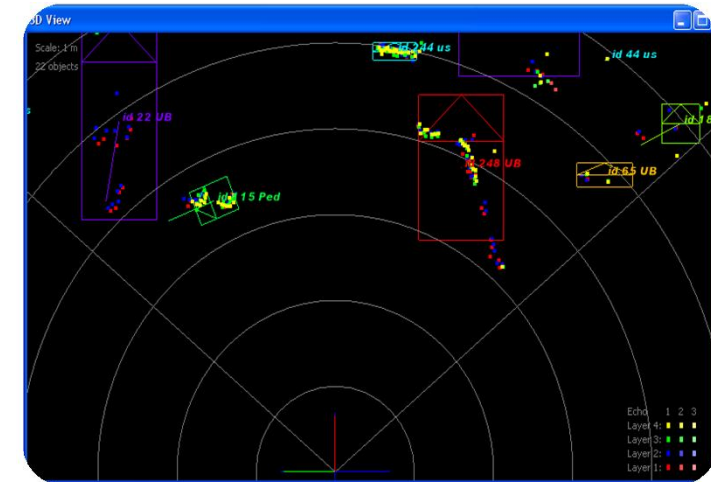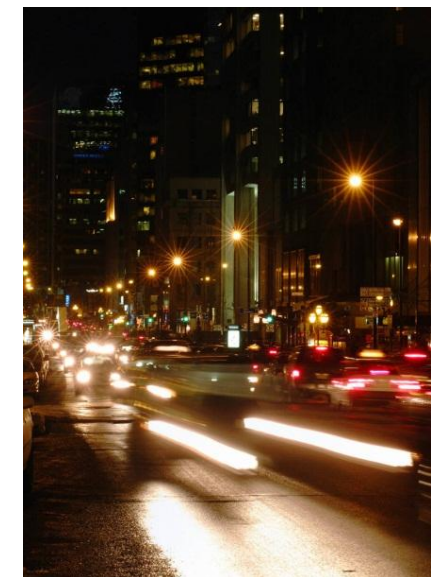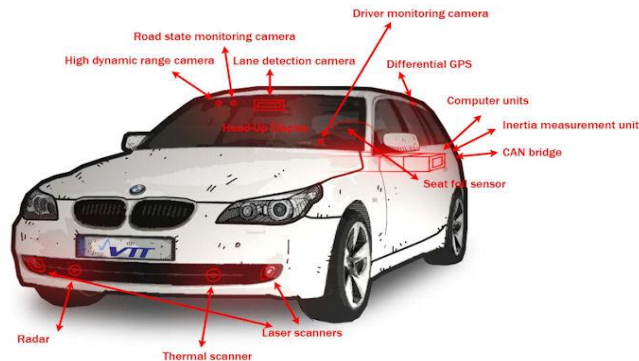
ICT in smart traffic

Terminals
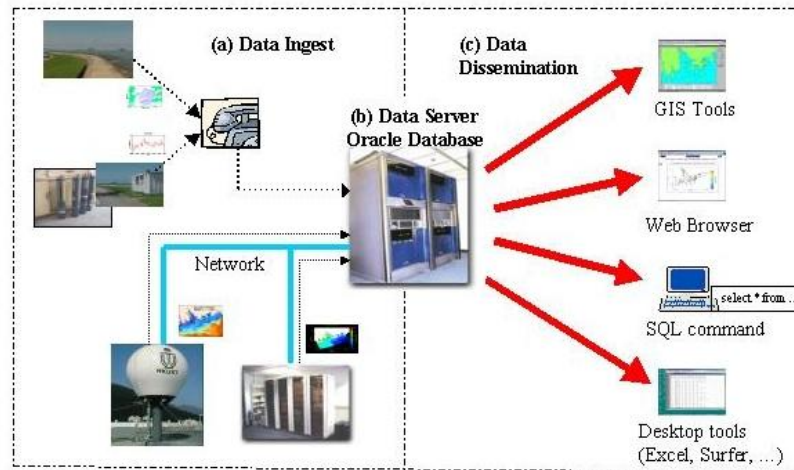
Service platforms

Smart vehicles

Users

Infrastructure

Role of ICT in transportation services

- **ICT is a key enabler** of energy efficient smart transport services:
    - Fast, mobile internet connections
    - Smartphone as the universal terminal
    - Common platforms enabling combining different services
- The major challenge is **interoperability of systems**
- Services supporting efficient mobility
    - **Flexible public transport** (changing modes, real-time route information) & multi-modality
    - **Services for smart vehicles** (e.g. driver support, safety, fuel optimization)
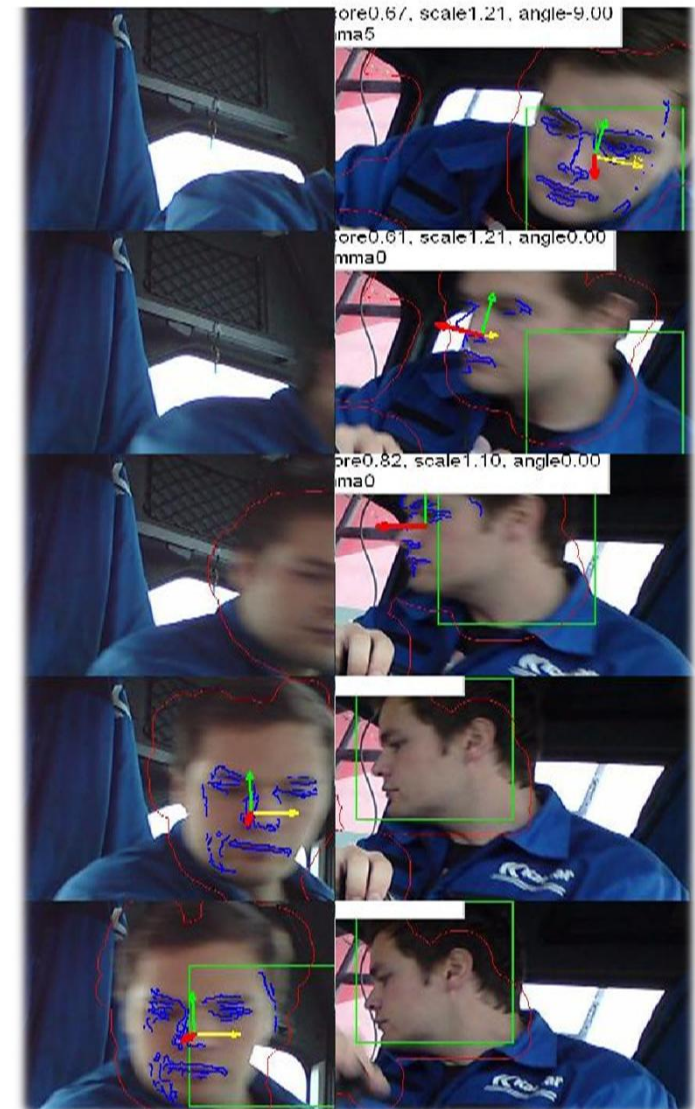   - **Intelligent transport management** (e.g. CO_2 optimisation)
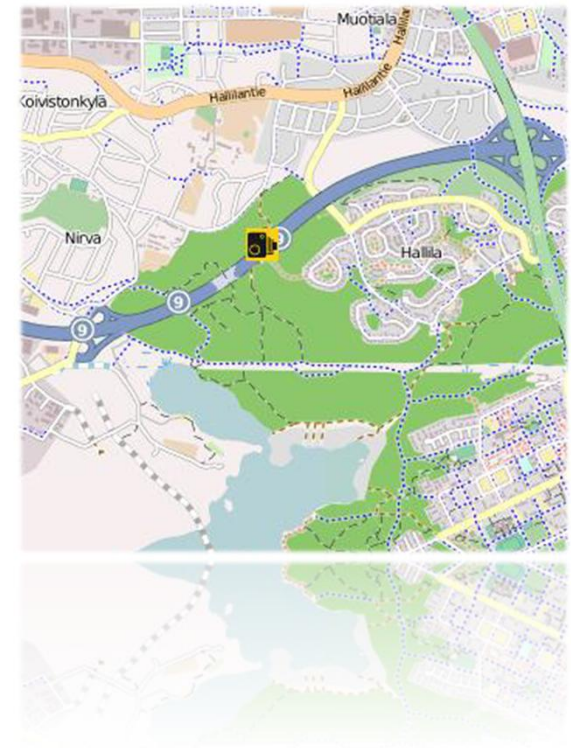
Public transportation and multi-modal services

- Encourage people to **use public transport** instead of passenger cars
- Demand **responsive transport**
  - Routes determined based on customer needs
- **Intelligent payment** systems
  - Making public transport easier to use
  - Virtual ticketing
  - NFC-enabled smartcards/smartphones
- **Ride-sharing**
 - Increasing the average occupancy of passenger cars

Service for Smart vehicles

- The aim is to make **driving more efficient and comfortable**
- **Driving behaviour ⇔ driver monitoring**
- **Active guidance** to drive more eco-efficiently / Fuel-efficient route choices
- **Tyre-pressure** monitoring system
- Real-time **traffic information**
- Services for **electric vehicles**
  - Locating charging stations
 - Route planning and guidance based on expected range

Intelligent transport management

- **Optimising the flow of traffic** on the transport network
- **Proactive transport management** (predicting incidents based on traffic and weather conditions)
- **Smart parking**: information concerning free parking spaces
- **Co-operative driving** (e.g. eco-efficient intersection)
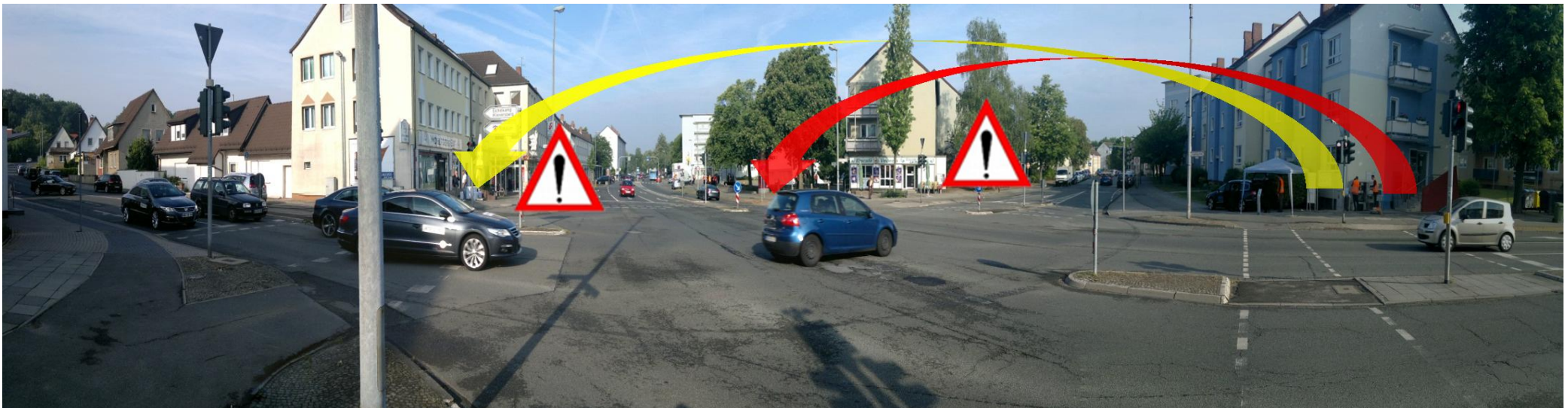
The ASSET-Road facts
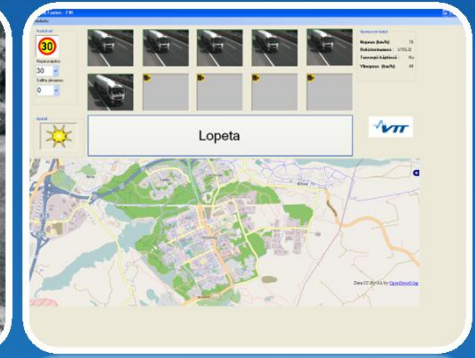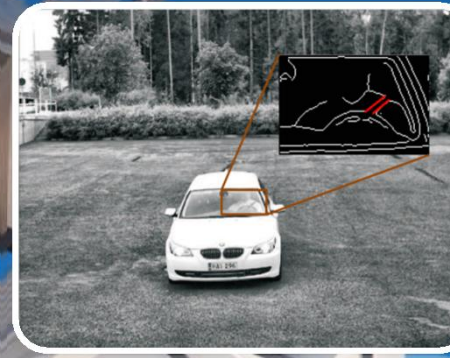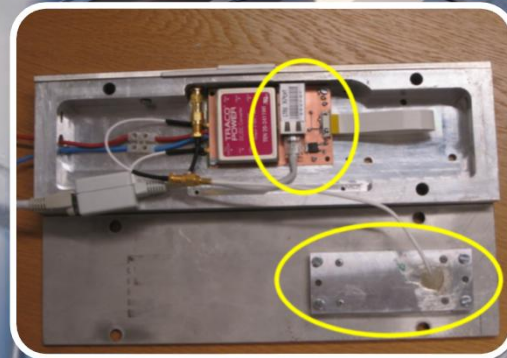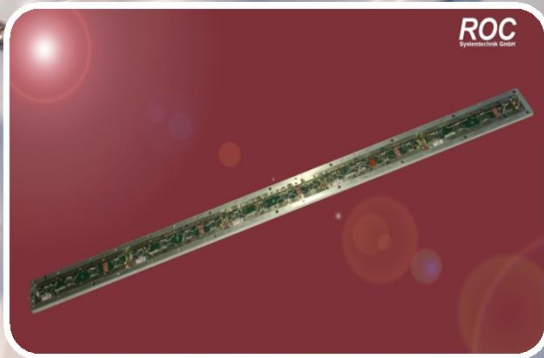
- Total budget of the project was 8,1 M€ (the EC contribution: 6,1 M€)
- 19 partners from Europe, India and Tanzania
- Coordinator: PTV AG (Germany)
- Field test sites in **Germany, Finland and France**
- Timeline: July 2008 - Dec 2011
- Vision: "**Integrated traffic surveillance and driver support**"

See. **www.project-asset.com**

ASSET-Road - System overview

- VTT has developed **a mobile monitoring unit** which is capable to estimate actual traffic emission
- **The calculation module** computes the emission parameters in real-time
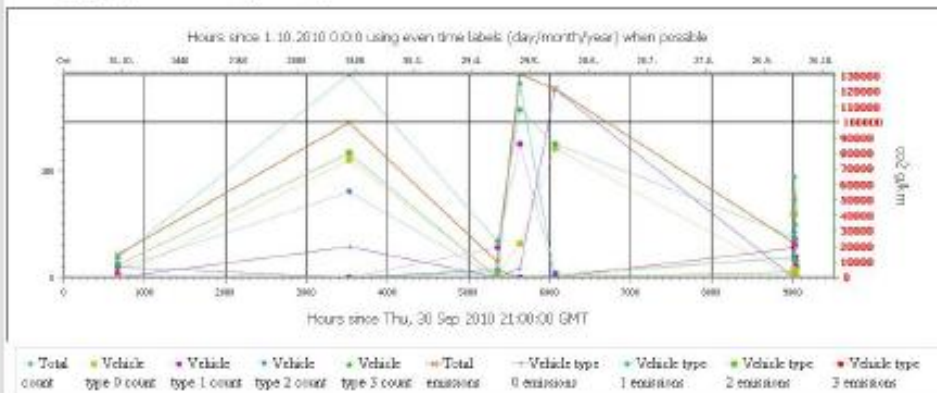- **The database module** consists of data and emission estimation model
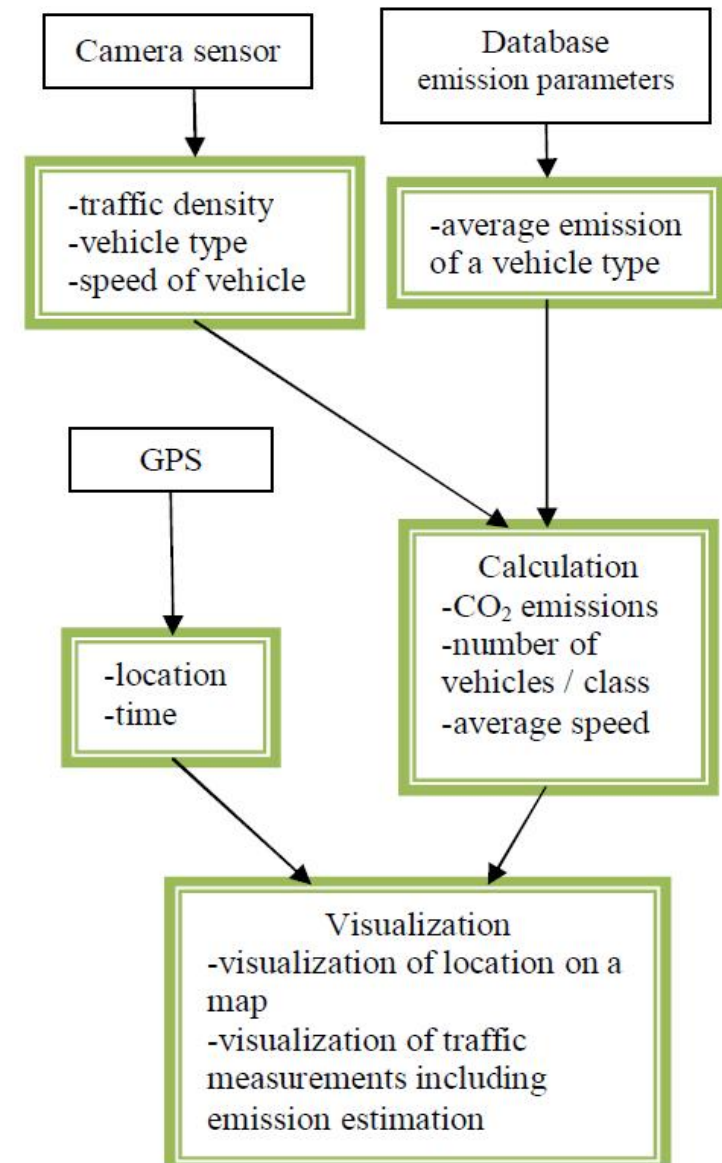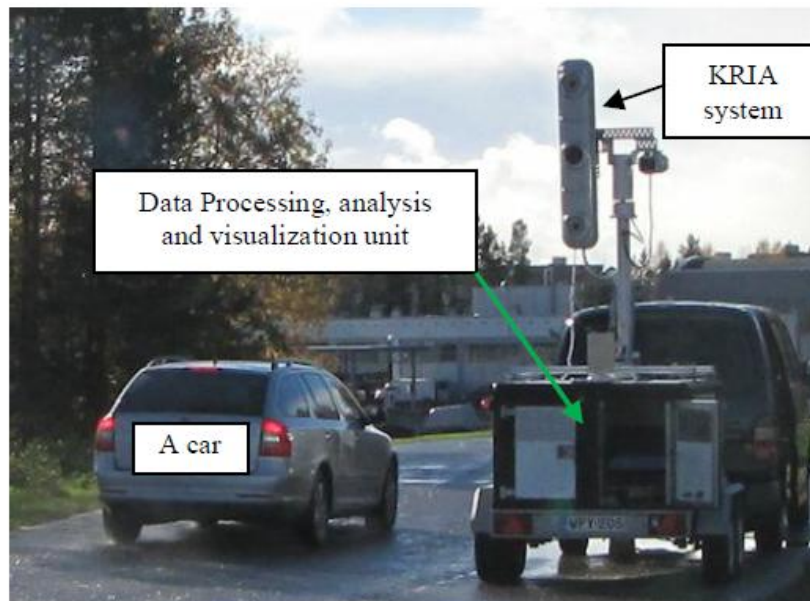
ASSET-Road: Data analysis module

- The calculated **vehicle densities, speed and CO2 emissions** are shown in the web interface
- The data is **transmitted wirelessly to the back-office servers** via cellular network

Monitoring Exhaust Gas Emissions

- **The road-side installed** monitoring unit
- Measures the emission gasses like **carbon dioxide (CO_2), nitrogen oxide (NO)**
- **Light beams of wavelength** corresponding to each of the gas of interest i.e. CO, HC, NO, CO_2
- The measurement is made with **using a spectrometer to detect optical absorption**

Summary

- **1980 – 2000: research was safety driven**
  - In-vehicle sensors
  - Improvements in passive safety
- **2000 – 2015: eco-efficiency**
  - Communication between vehicles
  - Advanced sensor and interventions
  - CO_2 reduction
- **2015 – 2030: automated transportation**
  - Situation awareness
  - Eco-efficien
  - Computer aided vehicle control

VTT creates business from technology