ICT/ITS and Eco-Efficiency

"e-transport" session of the 2008 EU-Japan Cooperation Forum in ICT Research

Dr. Wolfgang Reinhardt

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Agenda

- The link between safety and environment
- Weight of safety systems vs. consumption
- Workgroup ICT for clean and efficient mobility
- The integrated approach
- The scope of “Green ITS” - related technologies and applications
- Impact of different applications
- How to measure?
- Recommendations

ICT can support safety and clean & efficient mobility

- Professional traffic flow management helps to improve road safety and contributes to a clean & efficient mobility
- Improved road safety helps to avoid accidents and, therefore, indirectly contributes to a smoother traffic flow
- Improved traffic flows/shorter driving times lead to lower fuel consumption
- Lower fuel consumption leads to lower emissions

… but infrastructure and driver behavior are still key

- Challenge to make infrastructure more intelligent
- Driver need to learn how to use intelligent systems and adapt their driving style base on real-time feedback
- Support a faster exchange of older and therefore less safe and less environmentally friendly vehicles

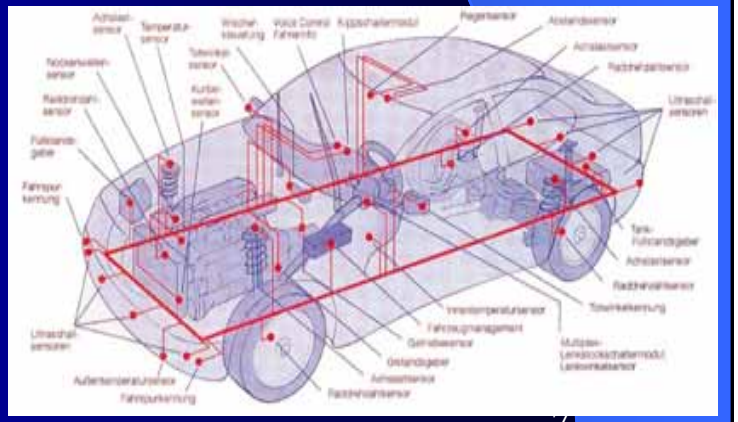
While vehicles became heavier …

- While further improving vehicle safety the average weight of vehicles in Europe has increased over the last 10 years due to
  - Customers select more safety option in addition to more standard safety features
  - Customers prefer larger vehicles with more comfort
  - Customer select more options in general for their own convenience and status

…not to forget the consumers

… many efforts were/are made for compensation

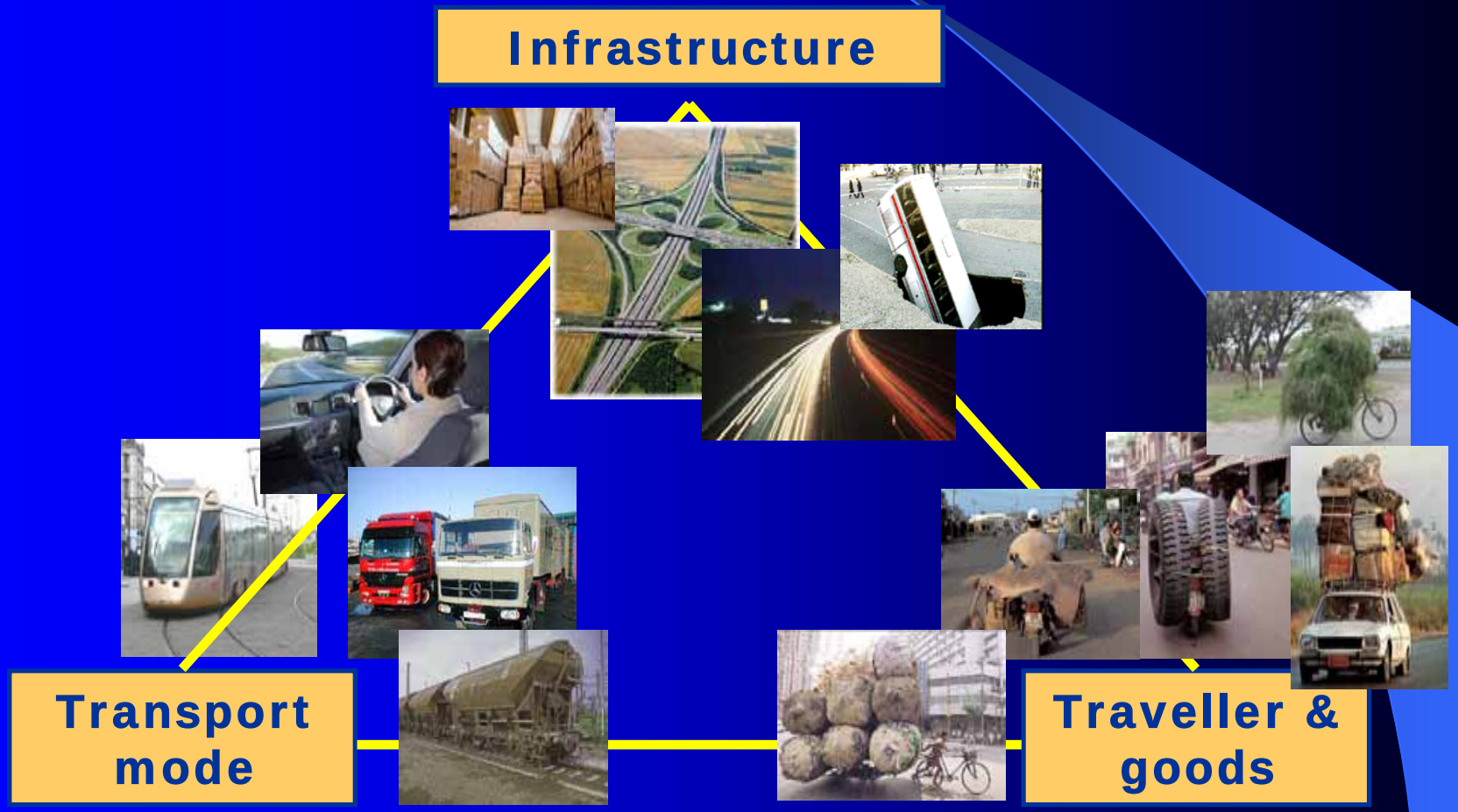
- Significant module specific innovations
- More (lighter) electronics/sensors to replace (heavier) mechanic and hydraulic parts
- More innovative and lighter materials like aluminum, PVC (polyvinyl chloride), etc.
- Alternative power trains (e.g. light alloy engines)
- Trend to fully integration of passive and active safety systems
- Future functionalities determined by software



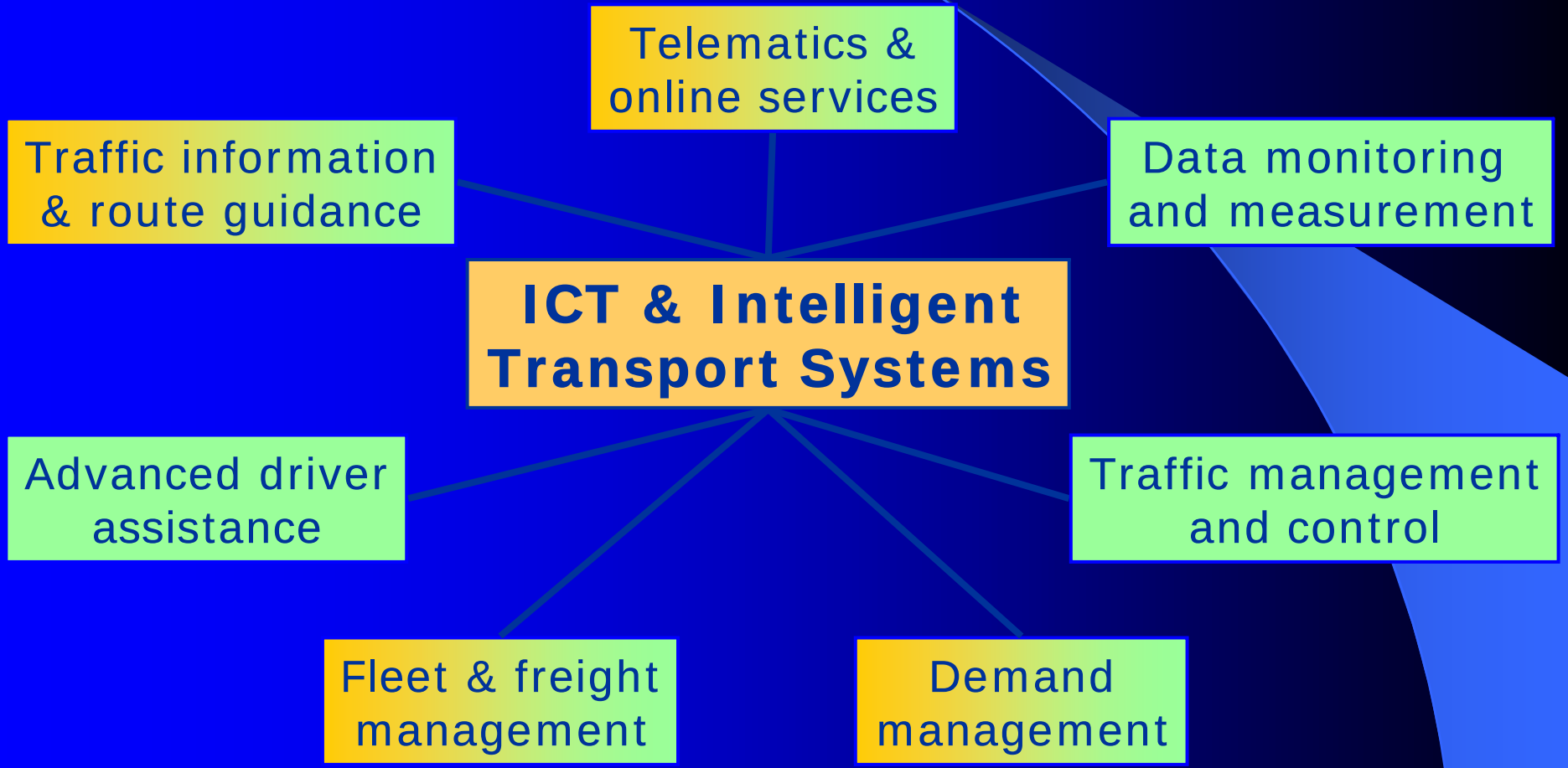
… but also to look for synergies

- Aim of the WG ICT for clean & efficient mobility is to:
  - "Identify and promote the potential benefits eSafety (ICT) technologies, applications & services can bring towards cleaner and more energy-efficient mobility for people & goods."

… using an integrated approach



“Green” ICT is possible in many areas

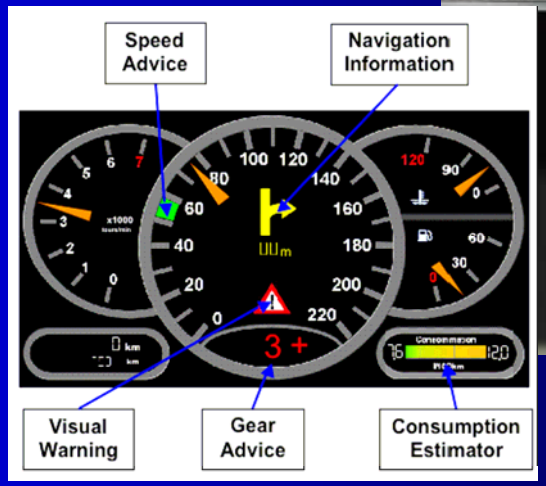


… using key technologies like

- Broadcast, two-way mobile communications
- Short-range radar, camera, video, sensor technologies
- Mobile internet, Telematics
- Automatic vehicle classification
- Access control
- Urban traffic control
- Navigation
- Digital map technology
- etc.

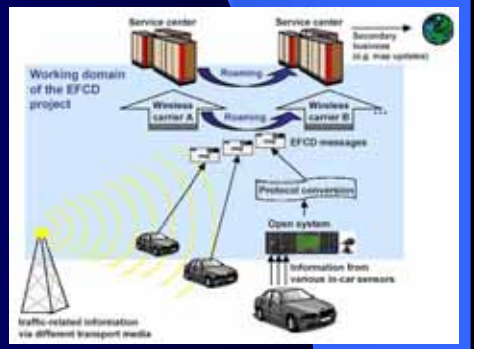
… and key applications for vehicles

- Mobile data collection (probe vehicles)
- Display of fuel consumption, emissions
- Enhanced engine & drive train management
- Fleet management under economic and ecological aspects



… for infrastructure

- Traffic light synchronization &VMS
- Adaptive network management & control using real data
- Individualised access control, charging and demand management
- Network-supported route & parking guidance
- Incident detection
- Ad-hoc journey & load sharing management
- Measurement, modelling, forecasting, database management



… for drivers

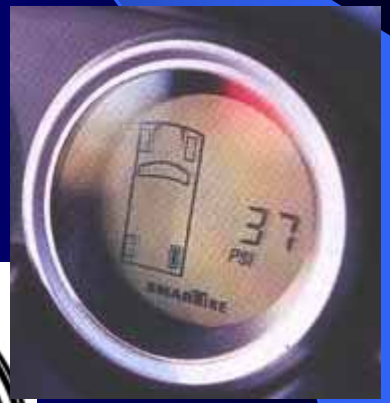
- Education & training
- Support for eco-driving behaviour
- Pro-active journey planning and route guidance/inter-modal support

… for the commercial driver

- Professional Fleet Management
  - Vehicle park optimization
  - Route, load and delivery optimization
  - Maintenance/inspection intervals
- Meeting legal driving requirements
- Motivation schemes

Impact: Eco-driving

- "Eco-Driving is a driving style designed to reduce fuel consumption, cut emissions and improve safety.
- By changing the way they drive, motorists can save up to 25% on fuel and fuel costs. (With no loss of mobility!)"
  - ICT could provide a valuable feedback to initiate voluntary behaviour change



Impact: Traffic Management

- The cost of traffic congestion accounts for about 2% of Europe's GDP
- Improved traffic management (new software + real-time traffic data in urban traffic control centres)
  - ➔ Reduction of up to 40% in traffic standstill and congestion
  - ➔ considerable energy savings
- Traffic Light Synchronization
  - Potential to optimised intersection throughput for private traffic by 15%

Impact: Access management

- Urban Traffic control could lead to up to 40% less delay & congestion = less fuel consumption & emissions
- E.g. reduction of 12% in emissions of NOx and PM10 from road traffic within London charging zone

Impact: Real-Time Dynamic Navigation

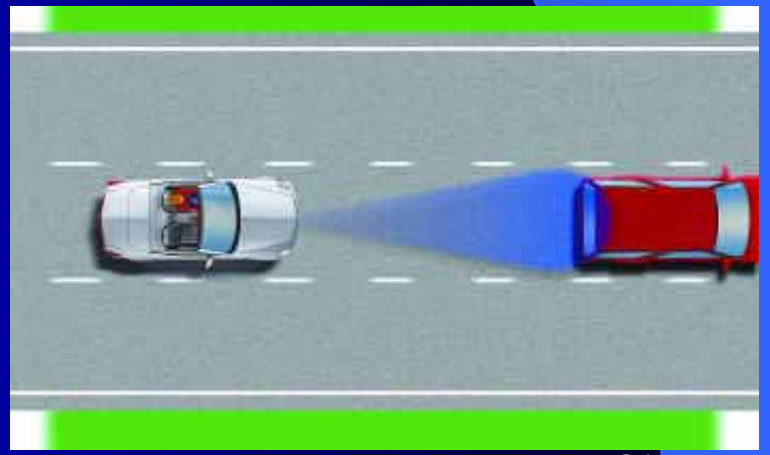
- Navigation systems
  - Linked to real time traffic information ➔ reduced driving time and fuel consumption, avoidance of traffic jams
    - Number of mileages driven reduced by 16% in unfamiliar areas (TNO study)
  - xTMC/digital maps with additional safety features

Impact: Cooperative systems

- Cooperative systems
  - System that allow communication between vehicles and with infrastructure (V2V, V2I)
  - INVENT subproject shows: equipment rate of only 20 % of vehicles could avoid traffic jams on the selected highway section leading to smoother traffic flow

Impact: ACC fuel savings

- 0.4 – 3.6% fuel savings in normal driving
- Up to 60% savings in stop-go conditions
- Extra 2% savings with predictive map support



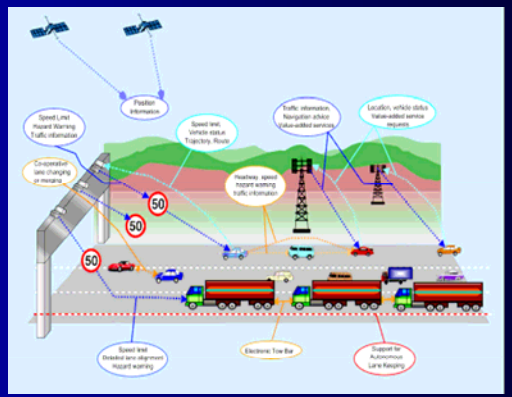
… but how to measure progress

- Targets: higher productivity, less emissions
  - Shorter travel time and less fuel consumption for same mileage driven
    - Smoother traffic flow, less traffic jams, less accidents
  - Same or less time and less fuel for less mileage driven
  - Less costs to come from A to B within same time frame
  - Less empty load driving
  - Less fuel consumption due to deployment of ICT measures for
    - Vehicles
    - Infrastructure
    - Driver behaviour

- Less fuel consumption can be easily translated into emission measurements

… for vehicle but also infrastructure measures?

- Best recommended measure for vehicle integrated systems are **large-scale field operational tests** to compare reference groups with and without system under different driving conditions
- Infrastructure improvements should be measured against number of less accidents, increased traffic throughput, less pollution/improved air quality
- Simulation models represent another important area to be explored



… and what to recommend?

- Explore the impact of eSafety and future Telematics systems on safe and efficient mobility and define priorities
- Investigate potential of cooperative systems with regard to safety and eco-efficiency
- Analyze the possibilities mobile devices can play in this respect and how to safely integrated them in the vehicle architecture
- Especially investigate the possibilities of “green” logistics using a multi-mode approach
- Expand work on R&D for environmental monitoring & modeling, methods of impact assessment and impact analysis, development/adaptation of simulation models
- Integration “clean ITS” in EC ITS roadmap and action plan

.. and more

- Public authorities/road operators should invest in state-of-the-art intelligent infrastructure, e.g. VMS, traffic control, speed management in those areas where it makes real sense
- National and local governments should cooperate and harmonize the approach to environment-friendly mobility, in order to ensure interoperability, lower costs and greater impact
- Countries should set up multi-stakeholder "Fora" for "Eco-ITS/Clean mobility" sharing best practices and promote standards for large scale roll out across the region

Thank you very much
for your kind attention