ICT-
Emissions

**Development of a methodology and tool
to evaluate the impact of ICT measures
on road transport emissions**

Zissis Samaras, Professor
Aristotle University of Thessaloniki

SEVENTH FRAMEWORK
PROGRAMME

Project Partners

CENTRO RICERCHE FIAT — CRF

berner & mattner
optimizing your development

LAT
LABORATORY OF APPLIED THERMODYNAMICS
ARISTOTLE UNIVERSITY THESSALONIKI

POLIS

SPQR

AVL

IVECO

TRANSYT

Telematics
Technologies
Transport
Traffic
Turin

madrid calle 30

European Commission
Joint Research Centre
Unit F08 - Sustainable Transport

ICT-
Emissions

SEVENTH FRAMEWORK
PROGRAMME

Contents

- Background
- Objectives
- Structure
- ICT Categories of interest
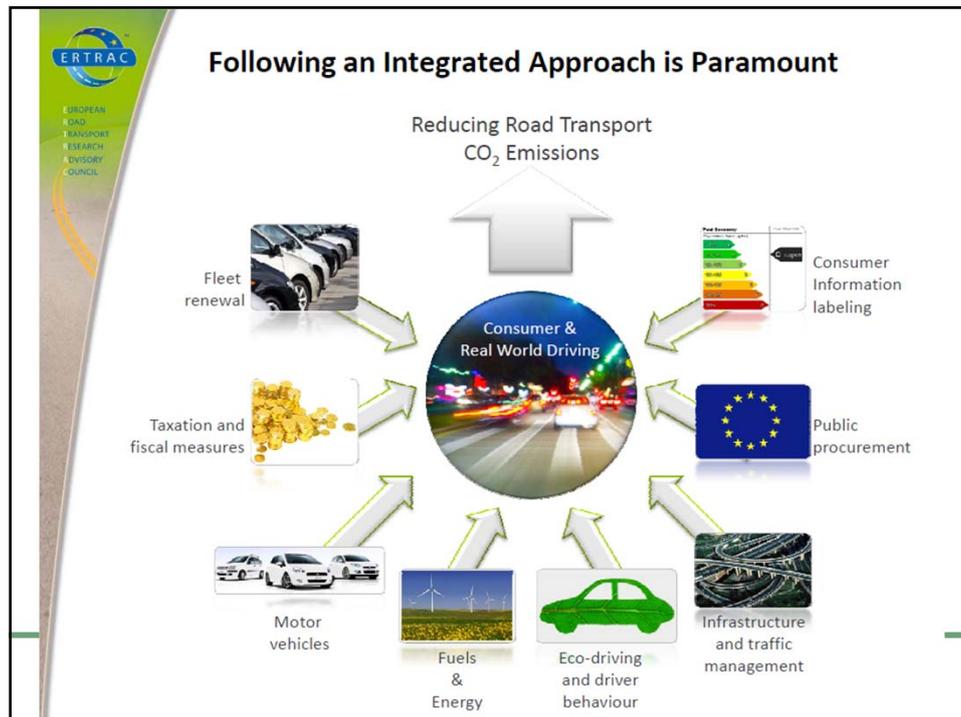- Methodological approach

ICT-
Emissions

Guided by clear and ambitious objectives for a 50% more efficient European Road Transport System by 2030

Achieving the objectives requires collaborative and synchronised action by public and private partners

	Indicator	Guiding objective
Decarbonization	Energy efficiency: urban passenger transport	+80% *
	Energy efficiency: long-distance freight transport	+40% *
	Renewables in the energy pool	Biofuels: 25% Electricity: 5%
Reliability	Reliability of transport schedules	+50% *
	Urban accessibility	Preserve Improve where possible
Safety	Fatalities and severe injuries	-60% *
	Cargo lost to theft and damage	-70% *

* = versus a 2010 baseline

Following an Integrated Approach is Paramount

Reducing Road Transport CO_2 Emissions

Consumer & Real World Driving

Fleet renewal

Taxation and fiscal measures

Motor vehicles

Fuels & Energy

Eco-driving and driver behaviour

Infrastructure and traffic management

Public procurement

Consumer Information labeling

Target of ICT-Emissions

- To answer questions such as:
  - How does an ICT measure affect the driving pattern of single vehicles?
  - How is the average driver's behaviour affected by the measure?
  - How does the technology of different vehicles respond to the modified driving pattern?
  - What kind of shifts (intermodal and other), at fleet level, does the measure induce?

ICT-Emissions

Decarbonisation: Key Research Priorities

- **Powertrains: Electric and Advanced Internal Combustion Engines**
  - Integrated Drivelines
  - Battery and Energy Storage Systems
  - Energy Management
  - High Performance from More Abundant Materials

Primary Energy	Energy Carrier	Powertrain
Fossil	Fuels	
Crude Oil	Diesel/Gasoline	Combustion Engine
Natural Gas	Gas	
Coal	Synthetic Fuels	
Uranium	Hydrogen	Fuel Cell
Renewable		Electric Motor
Wind		Battery
Water		
Solar		
Geothermal	Electric Power	
Biomass		

- **Biofuels and Advanced Fuels Production**
- **Integrated information and Communication Technologies**
  - Vehicles, Infrastructure, and Services

- Main concept of the project:
  - Develop an integrated methodology that can be used to quantify the CO_2 emissions of ICT solutions for road transport with a view to the future

ICT-Emissions

Steps

1. **Develop/adapt vehicle simulators** to calculate CO_2 emissions of cars when operating in ICT regimes
2. Use commercial traffic models to simulate the impact of ICT measures at the micro and macro scales, and link them to vehicle simulators
3. **Validate the methodology** on measured real-world ICT application cases
4. Collect the impact of ICT measures on traffic, energy and emissions in a library
5. Issue recommendations and implementation guidelines for use of best-practice ICT measures

ICT-
Emissions

Workpackages

1. Management
2. Data Collection and Methodology Elaboration
3. Energy and Emission Modeling
4. Traffic Modeling
5. Integration and Testing
6. Application and Impacts
7. Dissemination and Exploitation

ICT-
Emissions

Application range & boundary conditions

1. Passenger cars are the primary target and will be dealt with at both micro and macro scale

2. Trucks will be addressed only at the macro level

3. Urban scale

4. All current and future technologies of passenger cars
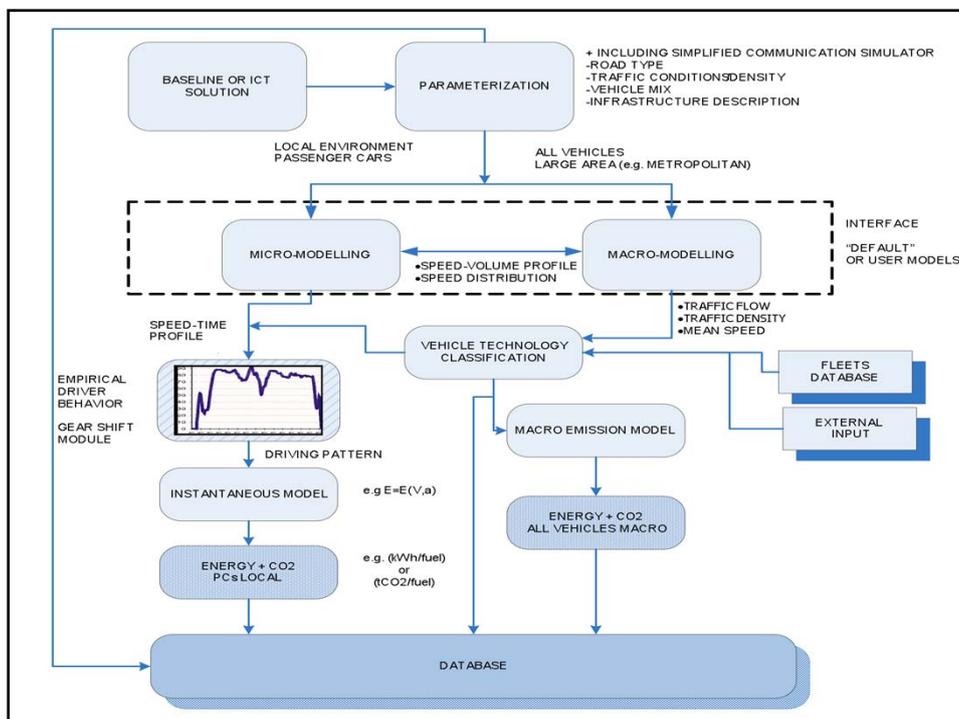
5. Buses and PTWs in a simplified manner
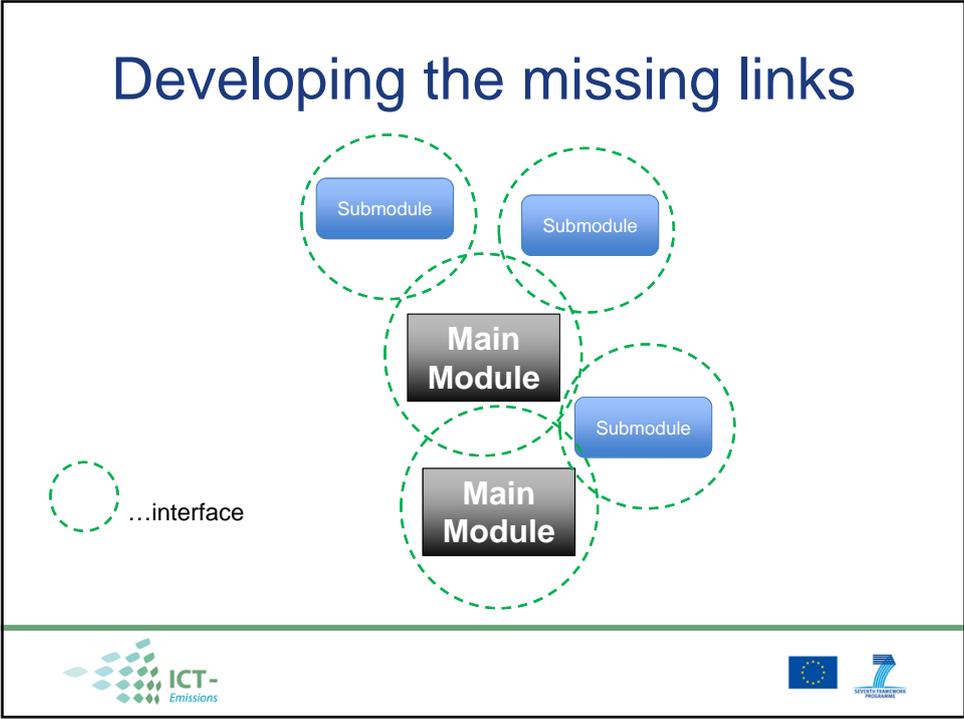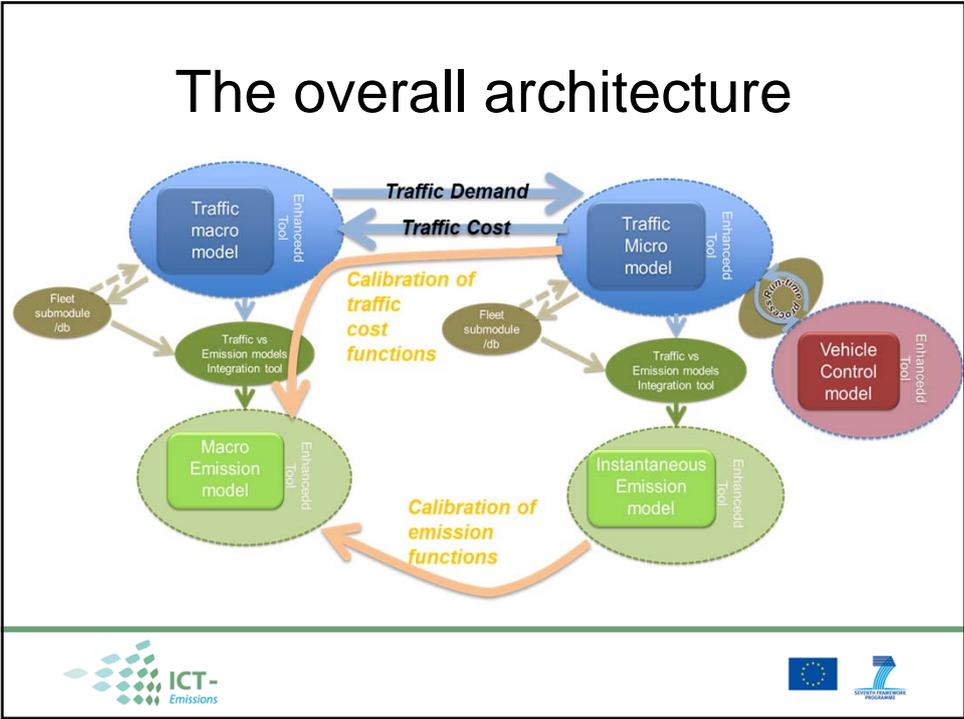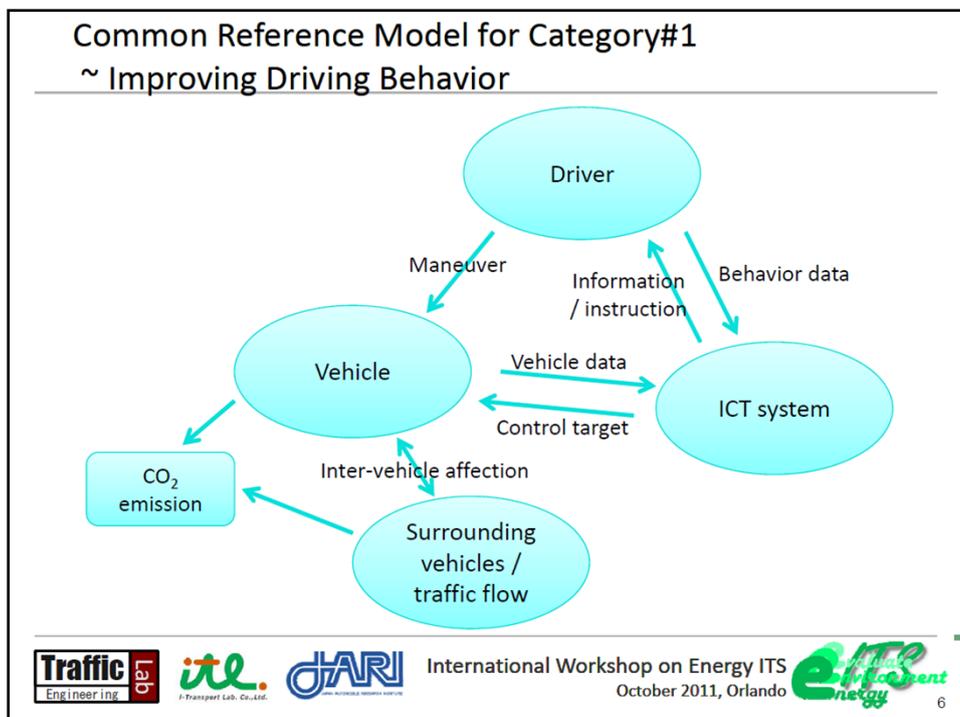

ICT categories of interest

Eco-driving and ADAS

~~Safety systems~~

Traffic management and control

~~Logistics and fleet management~~

Navigation and travel information services

Demand and access management
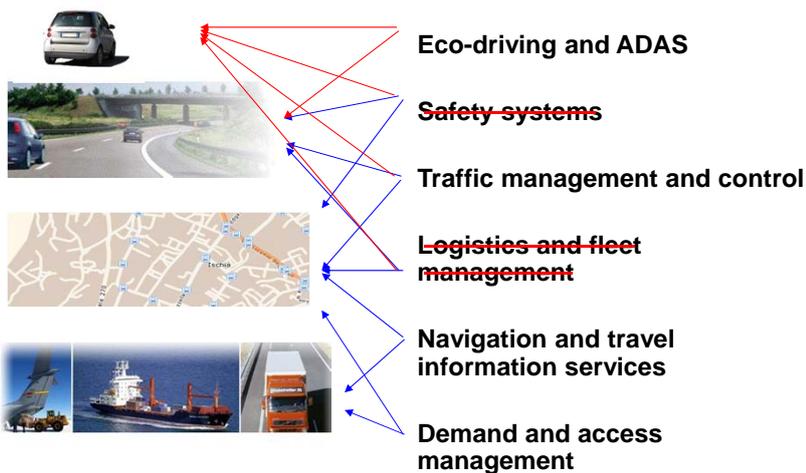
Beyond the State-of-the-art

➢ The ICT-EMISSIONS project attempts to establish the missing links between traffic and emission modelling at the micro and the macro scale

A flowchart of the methodology to realize this progress beyond the state of the art is given to the next slide

ICT-
Emissions

The overall architecture

Developing the missing links

Scales

1 Hz Velocity Profile

Mean speed/trip distance
Mean speed/speed fluctuation
Mean speed/quality indicator

Mean speed

Micro

Meso

Macro

ICT-Emissions

Common Reference Model for Category#1
~ Improving Driving Behavior

Driver

Maneuver

Information / instruction

Behavior data

Vehicle

Vehicle data

ICT system

Control target

CO_2 emission

Inter-vehicle affection

Surrounding vehicles / traffic flow

Traffic Lab Engineering i-Transport Lab. Co.,Ltd. JARI

International Workshop on Energy ITS
October 2011, Orlando

6

Cooperation with Ecostand

On the development of a standard methodology for determining the impacts of ITS on energy efficiency and CO$_2$ emissions

http://www.ecostand-project.eu/

- A CSA for the joint EU – US – Japan Task Force
- Several meetings: November 2011 Brussels, Feb 2012 Amitran Stakeholders Berlin, October 2012 – ITS Congress Vienna, a few teleconferences
- Main inputs from Ecostand: ITS categorisation, modeling structure, contact with Japan, wider dissemination
- Expected outputs: our methodology, case studies, libraries

Thank you for your attention!
http://www.ict-emissions.eu/