**WORKSHOP ON**
**INTELLIGENT TRANSPORTATION SYSTEMS**
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# Human Machine Interface of ITS, and Driver's Overload

TRANSPORT RESEARCH CENTRE

# What is the HMI?

HMI = Interaction between the machine world/entity and the human world/entity

Examples of HMI use from the ITS world:

a) navigation reading by drivers

b) in-vehicle equipment control by drivers

Tasks of the drivers are both on the psychical and physical levels

# Comfort – that´s, what we like to

Yes to comfort! But not against safety and security...

The „comfortable“ in-vehicle devices or systems are to be designed and investigated from this point of view.

Driver´s overload as a main risk: let us to minimise it

- thank research, rules and standards, and also
- responsible behaviour of manufacturers, services providers and end users/customers/drivers

# Why the HMI research?

Limited human abilities in percpeption of form and understanding of content , and in time

Searching understandable interface of:

- machine´s „language, body and communication“ (considering SW, HW and CT opportunities incl. limitations and rules)
- human language, body and communication ways (considering our senses, thinking and behaviour, incl. our abilities and limitations, too)

# Human safety
# – the main goal also in transport

For ease communication between the machine system/s and the driver

- ergonometry (for the „hard“ side)
- audio, video and haptic messaging forms (for the „soft“ side)

This could, once, enable the synergy of a driver, a vehicle and infrastructure for enhancing safety, reliability and traffic control optimisation of the whole surface transport system

# Primary and secondary tasks (1)

Primary task of a driver:

- safe car driving till to the destination – „driving itself“

Secondary tasks of a driver:

- safe doing of anything else, when driving – „extra tasks“ (incl. smoking, portable using, entertainment etc) with the potential risk of the driver´s overload or distraction

The secondary tasks should never keep down the primary task to make driving unsafe!

# Primary and secondary tasks (2)

Secondary task of a driver related to the ITS:

- control of the in-vehicle information and/or supportive systems – „ICT equipment control“

Specific secondary subtasks of the driver:

- take a notice of a message existence
- perceive content of the message
- consider and decide his/her behaviour
- take a control (and his/her responsibility)

The secondary subtasks take a certain measureable time that shall be considered for a safe design

# ESoP – what is it?

ESoP = “Recommendation on safe and efficient in-vehicle information and communication systems: a European Statement of Principles on human machine interface”

ESoP takes in consideration:

- IVIS – In-vehicle Information Systems (ie navigation, in-vehicle VMS display etc)
- ADAS – Advanced Driver Assistance Systems (ie LDW – Lane Departure Warning, ACC – Adaptive Cruise Control etc)

# ESoP implementation principles

- Adopted  by EC in 1999, last version C(2008)1742
- Agreement of European car manufacturers to respect the ESoP (letter from ACEA)

ESoP contents:

- 3 overall design principles and
- 32 specific principles

Topics: system installation, information presentation, interaction with displays and controls, system behaviour and information about the system

# European ITS Action Plan

ITS Action Plan by the European Commission (EC):

- Level: ITS Action Plan & (mandatory) Directive
- 4 documents incl. impacts
- Objective: EU-wide coordinated ITS deployment
- Voted and agreed last year

Area 3: Road Safety and Security, target date: 2010

- Action 3.3: “Development of a regulatory framework on a safe on-board Human Machine Interface and the integration of nomadic devices, building on the ESoP …” what means standardisation, too

# CDV experience in the HMI (1)

ADVISORS (FP5)

Action for advanced Driver assistance and Vehicle control systems Implementation, Standardisation, Optimum use of the Road network and Safety

- Identification of a set of ADAS with high potential for safety, road capacity, driver behaviour and environmental load in several road types
- Identification of barriers
- Definition of assessment methodology and indicators, and implementation strategies

http://www.advisors.iao.fraunhofer.de

# CDV experience in the HMI (2)

HUMANIST project (FP6)

HUMAN centred design for Information Society Technologies

- Potential emergence of IVIS and ADAS use

HUMANIST Network of Excellence (NoE)

- 15 EU countries network after the project
- Matching between provided systems and services, and users´ needs and requirements, to improve road safety

http://www.noehumanist.org

# CDV experience in the HMI (3)

IN-SAFETY project (FP6)

INfrastructure and SAFETY

- The combination of intuitive and cost-efficient new ICT technologies with existing traditional infrastructure for the forgiving and self-explanatory nature of roads
- Best practices guideline

http://www.insafety-eu.org

# CDV experience in the HMI (4)

eIMPACT (FP6)

Socio-economic Impact Assessment of Stand-alone and Co-operative Intelligent Vehicle Safety Systems (IVSS) in Europe

- Policy options and the different views of users, OEMs, insurance companies, and society
- Indication of the prospects for introducing IVSS

http://www.eimpact.info

# CDV experience in the HMI (5)

INTERACTION (FP7)

Differences and similarities in driver INTERACTION with in-vehicle technologies

- Focus on technologies already widely used, adopted by most EU car drivers (ie communication or navigation systems, speed control, distance control etc)
- Patterns of IVT use in everyday driving, involuntary or voluntary misuses of the systems

http://interaction-fp7.eu

# CDV experience in the HMI (6)

2-BE-SAFE (FP7)

2-Wheeler Behaviour and Safety

- Behavioural and ergonomic issues mainly contribute to motorbikes crashes: the primary accident cause is the failure of two-wheelers drivers and their human errors
- Research on rider´s risk awareness and perception, development of new research tools, and recommendations for countermeasures

http://www.feast.org/projects/703

# CDV experience in the HMI (7)

COST 352

Influence of Modern In-vehicle Information Systems on Road Safety Requirements

- Scientific base for road traffic and vehicle equipment legislation, safety evaluation methodology and rules for drivers' education and training, for the appropriate use of IVIS to enhance road safety
- Road side experiment using car of CDV, equipped by IVIS and recording technology

http://cost352.epfl.ch

# Standardisation WGs for HMI

Close cooperation of two standardisation bodies:

- CEN/TC 278 WG10 Road vehicles, Human machine interface (HMI)
- ISO/TC 22 /SC 13/ WG 8 MMI (Man Machine Interfaces)

http://www.sae.org/standards

# Objectives of the HMI Standards

- Ergonomic parametres of visual and acoustic messages, their ways of publication and control
- Giving visual and acoustic information
- Managing a dialog between a driver and TICS/s
- Requirements for TICS use, when driving
- Integration of warning systems
- Ordination of messages in regard of their priority
- Distraction of driver´s attention from his basic driving tasks
- Dynamic load of the driver
- Methodology and characteristics of drivers sample for verification experiments

# Ergonomic standards (1)

Ergonomic aspects of transport information and control systems (TICS):

- ISO 15005 Dialogue management principles and compliance procedures
- ISO 15006 Specifications and compliance procedures for in-vehicle auditory presentation
- ISO 15008 Specifications and compliance procedures for in-vehicle visual presentation
- ISO 16352 Warning systems (bibliography study)

# Ergonomic standards (2)

Continuation: Ergonomic aspects of transport information and control systems (TICS):

- ISO 16673 Occlusion method to assess visual demand due to the use of in-vehicle systems
- ISO 16951 Procedures for determining priority of on-board messages presented to drivers
- ISO 17287 Procedure for assessing suitability for use while driving

# Visual behaviour standards

Measurement of driver visual behaviour with respect to transport information and control systems (TICS):

- ISO 15007-1 Part 1: Definitions and parameters
  ISO 15007-2 Part 2: Equipment a procedures

# New activities in standardisation

PWIs and other issues under preparation:

- ISO 26022 Simulated Lane Change to assess driver distraction (tests using driving simulator)
- ISO/TR 12204 Warnings Integration (warning systems and resources interacting together et the same time)
- NWI Calibration Task
- NWI Occlusion method to assess visual distraction due to use of IVIS
- PWI Peripheral Detection Task (ongoing discussion)

Revision of:

- ISO 15006 Auditory information
- ISO 15007-1 Measurement of driver visual behaviour

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Thank you for your patient attention

Eva Gelová

eva.gelova@cdv.cz

in the part of „hot news“ in standards, with a kind support of

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