Navigation Update – CeBIT 2008

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Agenda

1. **Nomadic Device Market update (Europe)**
2. **CeBIT 2008 trends**
3. **Summary of the current Nomadic Device Market**
4. **Missed opportunities in the market so far**

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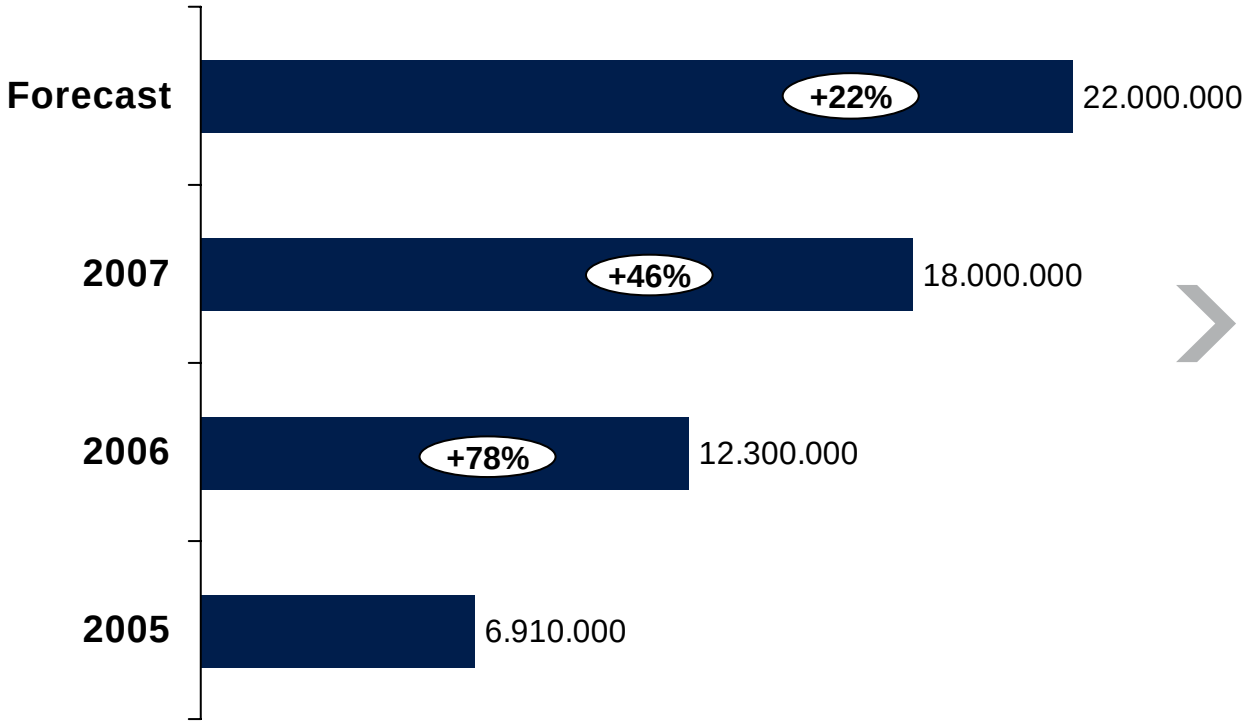
Market Development

Navigation Market (Europe), Unit Sales, 2005 – 2007



- Continuing growth in 2008
- Especially increasing growth in the smartphone and connected devices market expected

* Source: MEDION internal analysis

Market Situation

- **First sub-100-Euro devices (€ 89/99,-)** introduced into the market Christmas 2007, providing a full navigation experience based on 3,5“ screen and local map material

- **Trends that Canalys forecasts for 2008:**
  - Big steps forward towards **pedestrian navigation** (nomadic devices that will also be used outside of the car, e.g. for providing train and bus schedule information)
  - **Location based services finally kick-off** (LBS – based on “connected devices”)

- **Safety of navigation systems** becomes more aware among the press & industry
  - Several reviews about crash testings and safe & efficient use very recently made

- **Lots of players coming in, even more exiting!**
  → therefore lots of stock-clearing actions recently

*Canalys Report

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Premium Features become standard

- **Text-to-speech technology for detailed voice instructions (such as „In 200 meters turn right into Park Street“) gets more common even in low-cost devices**

- **Speed advisory becomes a popular feature and not only shows the current speed limit but also verbally warns you to slow down when speed limit is exceeded**

- **“Lane assistants” help to take the ideal lane, especially useful at big junctions**

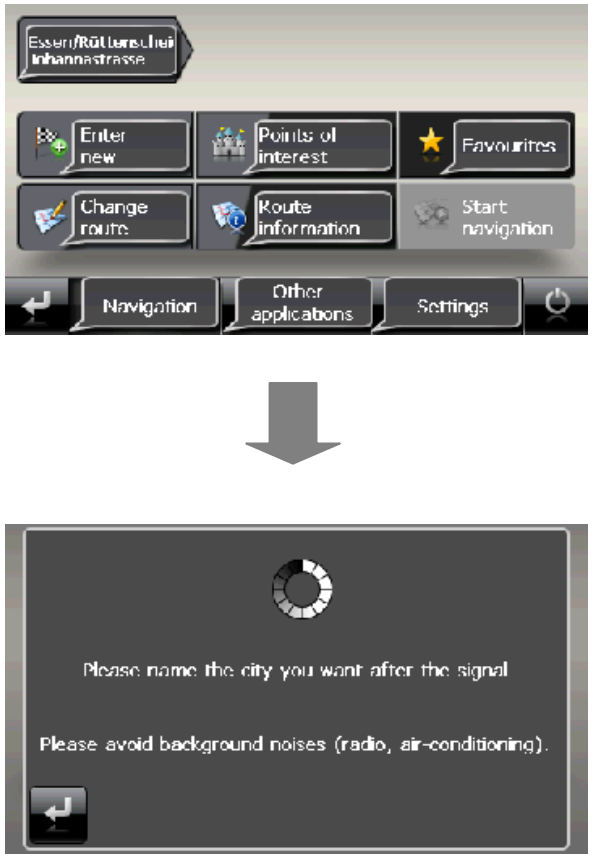
- **Split screens introduced on the bigger devices for a simultaneous view on the map and a simple arrow guidance**

Interaction

Speech Control brings voice operation to the next dimension

Speech control ensures a great deal of convenience but also enhances safety for the end user

- **With voice-based entry the needed physical interaction (& distraction) with the Nomadic Device can be significantly reduced**
  - Voice destination entry + voice command
  - Operating nearly all functions by using your voice
- **Address entry just by using your voice**
- **Just ONE touch to Speech Control**



Multimedia and More

Usage and promotion of other features next to route guidance

Pretty calm promotion of multimedia features during CeBIT 2008

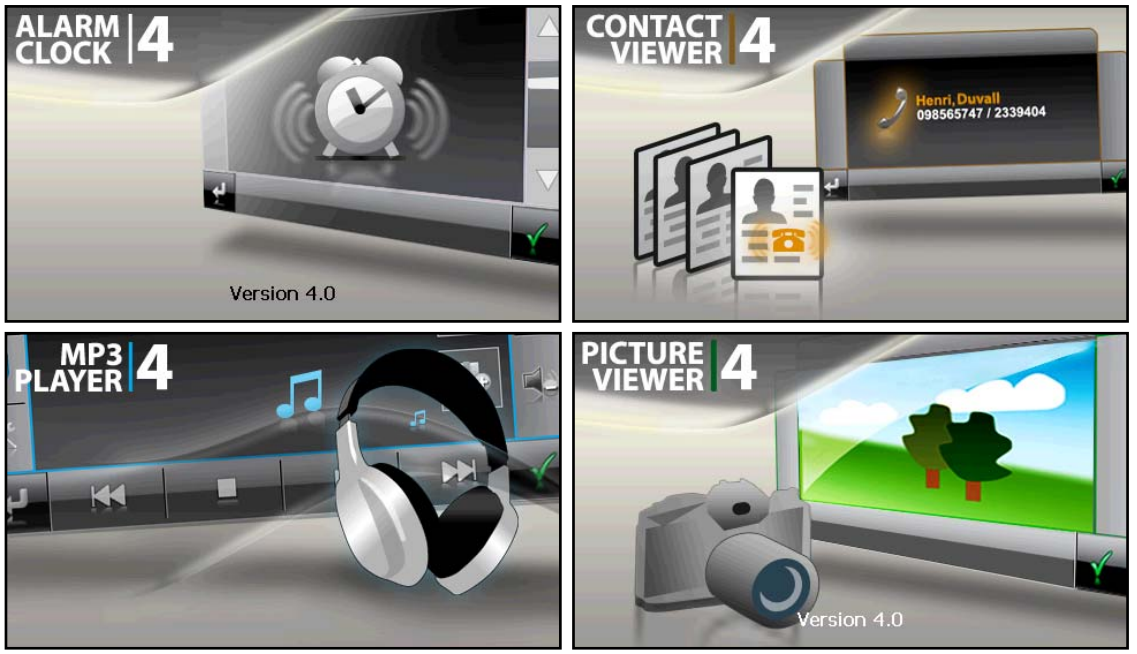
- **MP3 player functionality not advertised as stand alone functionality but usually only shown as better integrated and easy to use feature within the navigation menu**

- **FM transmitters for easier connection to the car stereo speakers**

- **Video players almost not shown as a feature**

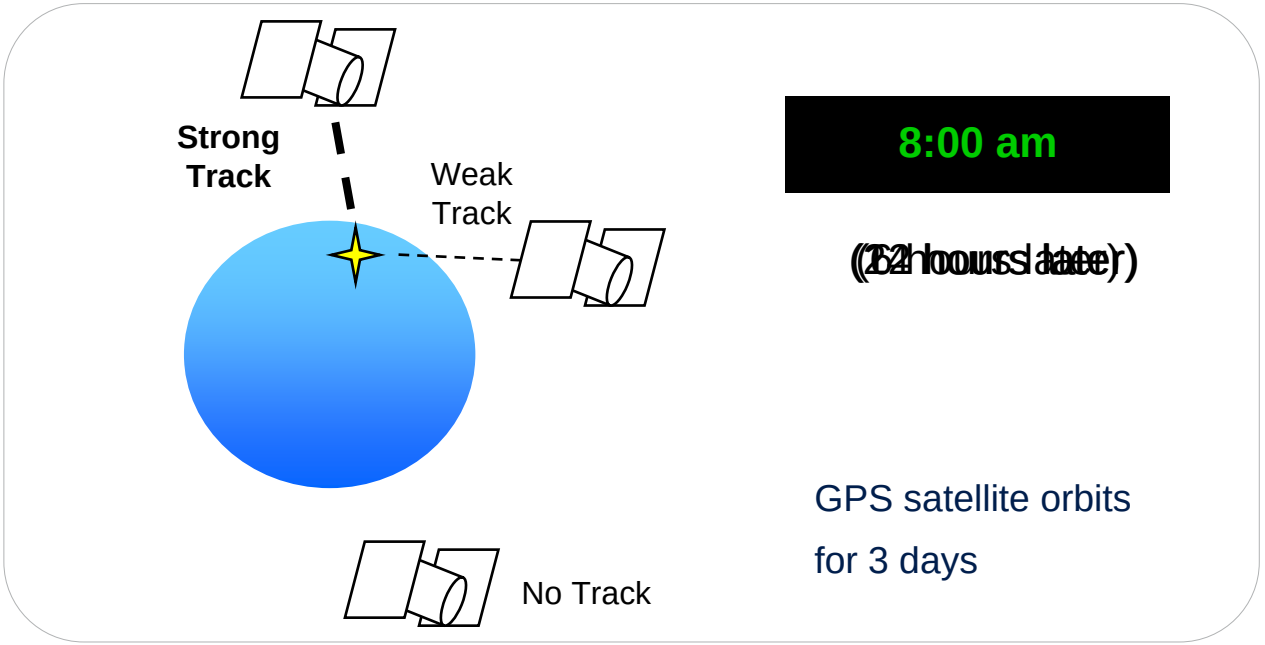
- **Address books integrated as a navigation database**

- **Travel Guides mostly shown as dedicated application (not to be used while driving)**



Positioning in seconds

- **With technologies such as SiRFInstantFixII, long times to first fix in Nomadic Devices for determining the satellite's position are now a thing of the past**
- **Thanks to this new GPS technology, the navigation system is ready to use at any time within just a few seconds, so the driver can start the guidance immediately**
- **important route information is being provided right when it is needed – quickly and reliably → 5 to 10 times faster**



New form factors coming up

4.8“ and 5“ entering the Nomadic Device market

NEW

- bigger 4.8”/5“ TFT-touchscreen-displays with 65.536 colours provide a better navigation experience, better view on the map and an easier menu interaction (e.g., bigger buttons)
- Usually combined with very powerful CPU‘s for fast and smooth 3D route guidance
- Integrated FM Transmitters further reduce the need of additional cables, providing a reasonable handsfree experience
- Speech operation with “Speech Control”
- Premium TMC Services become more popular
- Active cradle include TMC antennas + support Remote controls (e.g., for the steering wheel)

One step closer to Reality

With DTM and 3D Landmarks

NEW

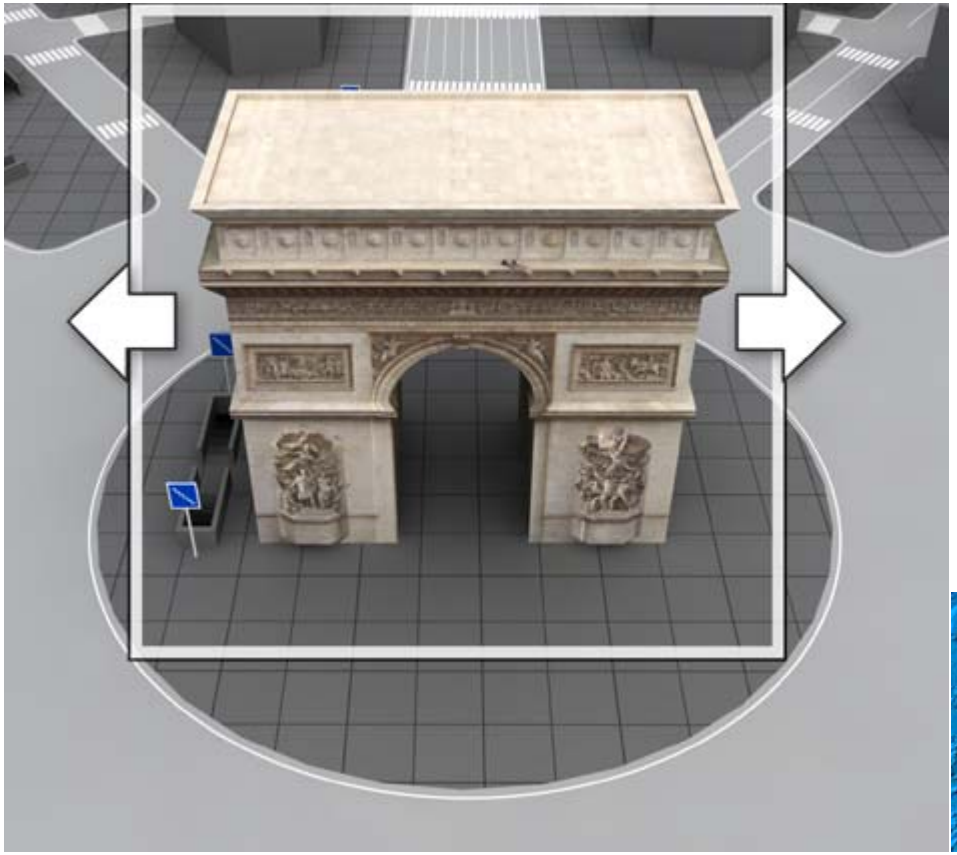
- **DTM (Digital Terrain Model) visually enhances the map display with 3D height information which gives the driver a better insight into country landscapes**
- **3D Landmarks show monuments, buildings or places of interest that are easily recognizable due to size, history or local appeal**

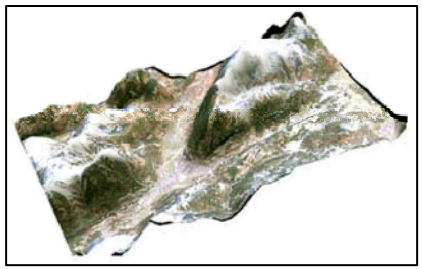
The additional visual map content *can* improve orientation and create a visual experience for the driver

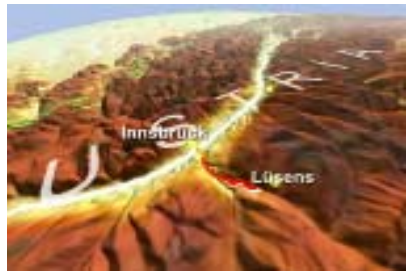
Examples for DTM and 3D Landmarks

NEW

- **3D Landmarks: realistic, fully textured 3D models of prominent landmarks**
- **Digital Terrain Model: visualising the terrain and texturing of the „bare earth“**



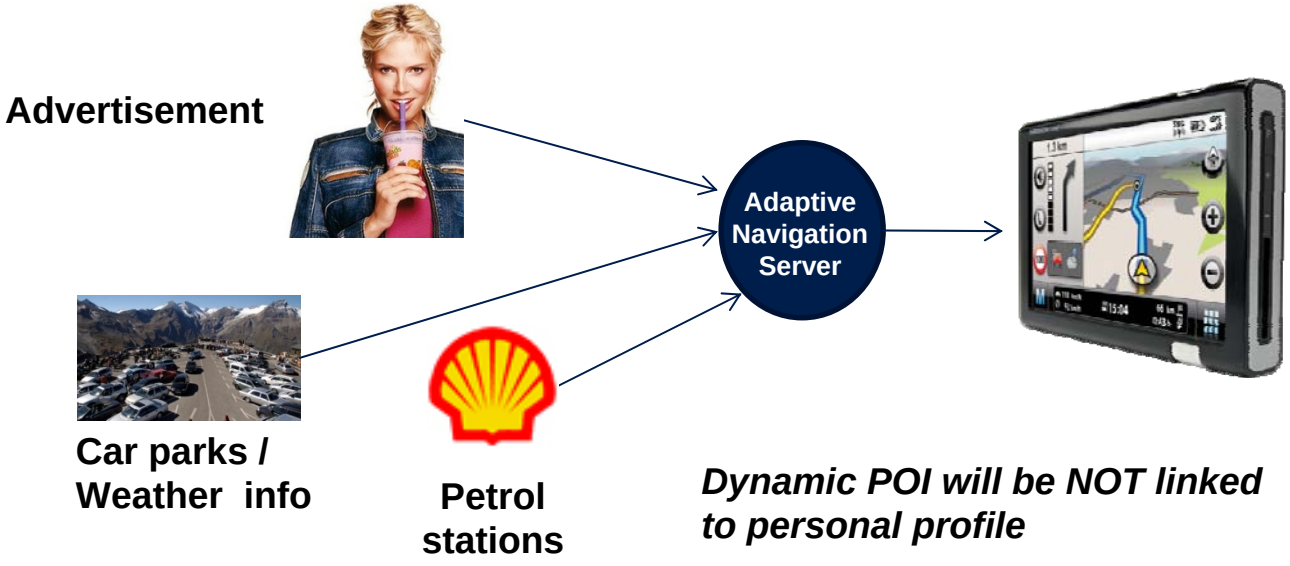




Content for connected devices

- **Server based solutions for content services**

- **Services which are offered at the beginning:**
  - Petrol pricing (cheapest pricing and best choice along the route)
  - Free parking space information (avoiding long search for empty parking lots)
  - Traffic information (more accurate than TMC and more dynamic traffic “shaping”)
  - Weather information (informing the driver early about hazardous road conditions)



“Green IT”

- **very popular term during this year’s CeBIT, very imprecise specification of what it really means**

- **however also very good examples that show how CO2 emissions can be reduced while manufacturing but also recycling the products**

- **“Green IT” for Nomadic Devices can even go much beyond:**

  - Traffic management helps to avoid jams on the motorways and in the cities
  - Parking information prevents the customer from driving in circles
  - “Economic routes” provide the best compromise between the fastest (sometimes very long) and shortest (sometime slow and time-consuming) route in order to actively reduce the CO2 emission

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Summary of the current Nomadic Device Market

- **A huge variety of products from € 89,- to € 799,- is available for the customer**

- **In order to differentiate from the low cost market, many ND manufacturers started to investigate in better guidance provision, convenient services and intuitive interfaces (e.g., remote & voice controls)**

- **Many smart solutions are being developed in order to provide a more efficient routing, including economic routes, traffic management and parking information**

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Missed opportunities so far

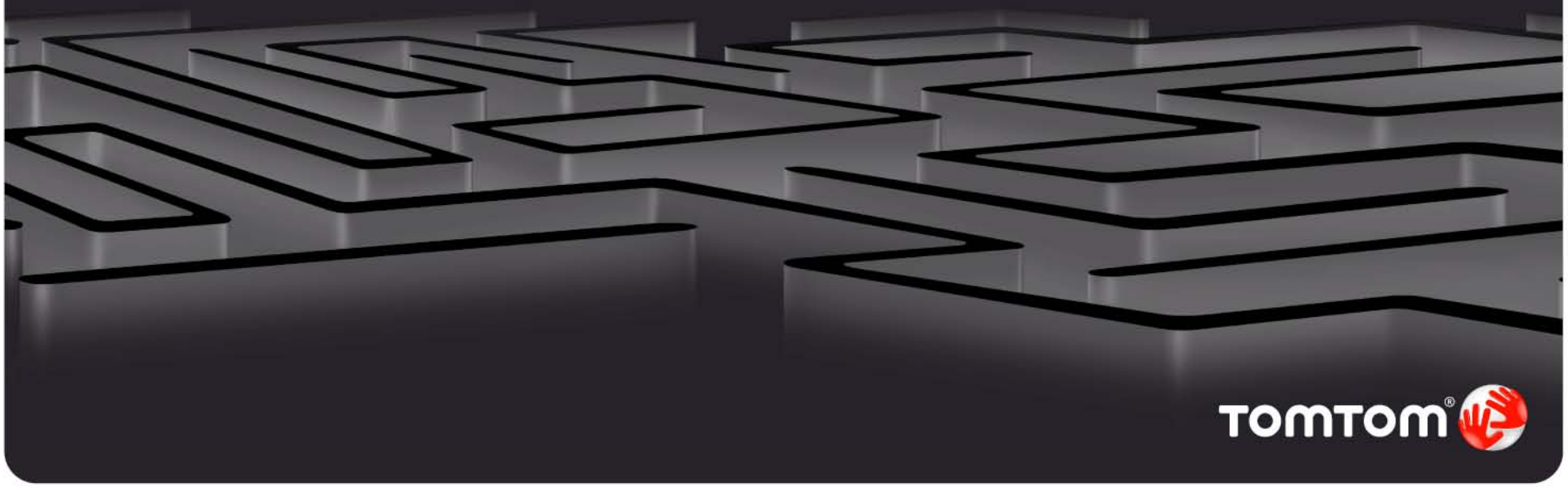
- **Safety: documentation about safe & efficient in-vehicle can be infinitely expanded for the Nomadic Device but has only limited use as long as there is no individual mounting solution (or even only -location) being assigned for the individual vehicle**

- **eCall: Connected Nomadic Devices already include GPS and GSM so they could easily provide eCall functionality, however the needed sensor data (e.g., for airbag deployment) is still missing**

- **CO2 Reduction: efficient route guidance could be enhanced with additional information about the individual driving behaviour and could graphically being displayed on the device if only sensor data would be available**

Thank you very much

PND and Safety



Outline

- Implicit Safety
- PNDs potential for *e*Safety
- *e*Safety achievements (TomTom)
- Future *e*Safety potential
- ‘External’ conditions for utilizing potential
- Summary and conclusions

Implicit Safety

Safety and TomTom

At TomTom, we've long felt in our hearts that satellite navigation has a positive impact on safety, driving behavior and performance. But till now we've not had any tangible evidence. Apart from our own experience behind the wheel, of course.

In 2007 TomTom and partners unveiled objective research that provides real proof of the positive impact of using a TomTom. On driver awareness and performance; on stress and distractions; on journey times and distances; on claimed damage costs; and above all, on safety.

Research partners

Research period: April 2006 –December 2006

Report TNO 2007-D-R0048/B and key findings dated February 2007

AON delta lloyd ATHLON CAR LEASE TNO TOMTOM

Safety related conclusions

1. NOT having a navigation system increases the number of claimed accidents by 12% and increases the claimed damage costs by 5%!

2. The use of a navigation system increases driver awareness and reduces stress!
   - 78% of drivers say that they feel more in control
   - 45% feels more alert

3. The actual Workload is reduced when driving with a TomTom navigation system!
   - 20% less stimuli missed
   - subjective workload (opinion) reduced by 55%.

PNDs potential for *e*Safety

PNDs as potential for eSafety (NL in 2008)

Population:	17.000.000
Total navigation sales:	1.150.000
Car Sales:	500.000
Line-fitted navigation sales (15%):	75.000
PND market:	1.075.000
Total market growth related to 2007:	38%

Huge potential for eSafety

Achievements

*e*Safety achievements at TomTom

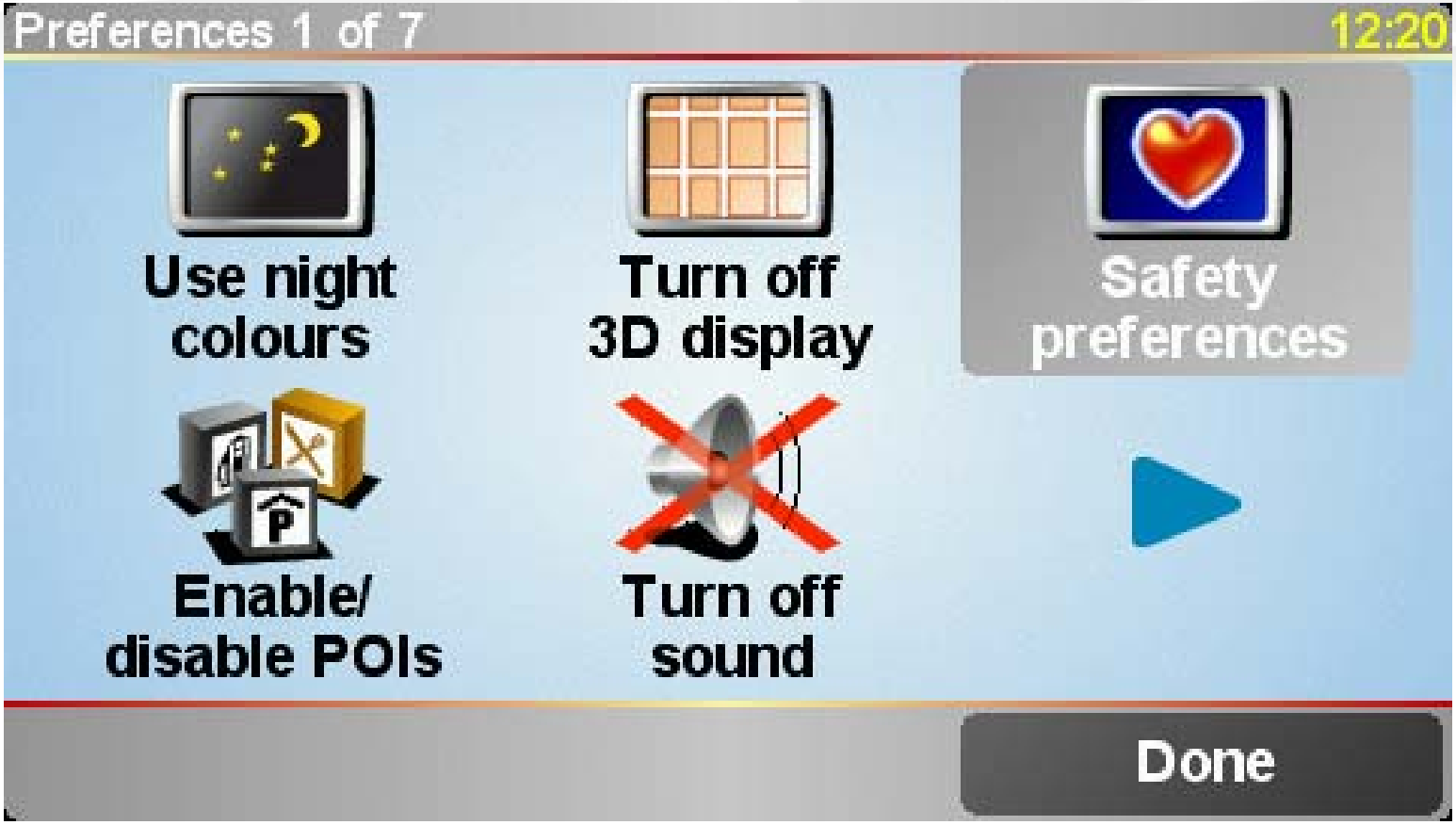
- Safe mounting
  - Proved by objective research executed
  - No indications of failure from the market
- Safety Lock
- RTTI implementations in HD Traffic™
  - Operational in NL; Planned UK and DE in 2008 and FR in 2009
  - 5 x more updates + additional manual updates
  - 10 x larger service coverage
  - Sources: road-infrastructure data + GSM network + FCD (GPRS)
  - High Location accuracy (≈ 100 m)

*e*Safety achievements at TomTom (cont.)

- Implementation of Speed Alert
  - In all products
  - Public data bases are far from complete
  - Involvement in the Flemish initiative to create and implement a Belgium Traffic Sign Data Base (blue print for Europe?)

- Safety related initiatives beyond *e*Safety
  - Map Share™ for getting better maps
  - Interface Protocol connecting to cars and in-vehicle equipment

Safety Preferences



Safety Lock

Safety preferences
12:21
Safety preferences
Enable safety lock
Disable safety lock
Done

10 x more roads covered

Road type Netherlands	Total km's	Coverage RDS-TMC	Coverage TomTom HD Traffic
High ways → 'A' roads	**5.300**	**45%**	**100%**
Secondary roads→ 'N' roads	**17.000**	**0%**	**100%**

10 x times more roads covered

- Available throughout the Netherlands in 2007
- Covering all major, regional and urban roads
- Accurate journey times on top of traffic jam queue lengths from door-to-door
- Improving the driving experience with a unique and unrivalled traffic information service
- Roll-out in Europe and the US

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Better traffic information from the GSM networks

TMC traffic view

Aggregated traffic coverage

Future potential

Future *e*Safety potential

- Continuous Speed Warning
  - Entire road network coverage (not only A and N roads)
  - Variable speeds (weather, schools, VMS, etc.)
- *e*Call
  - PND as enabler?
  - Benefits:
    - Mass market potential with fast growth
    - Low costs (GPRS inside TomTom)
    - Precise location
    - Back-up battery
- Extension HD traffic with urban traffic information
  - Covering 135.000 km in NL
  - Aim is getting rid of the ‘E’ in ETA

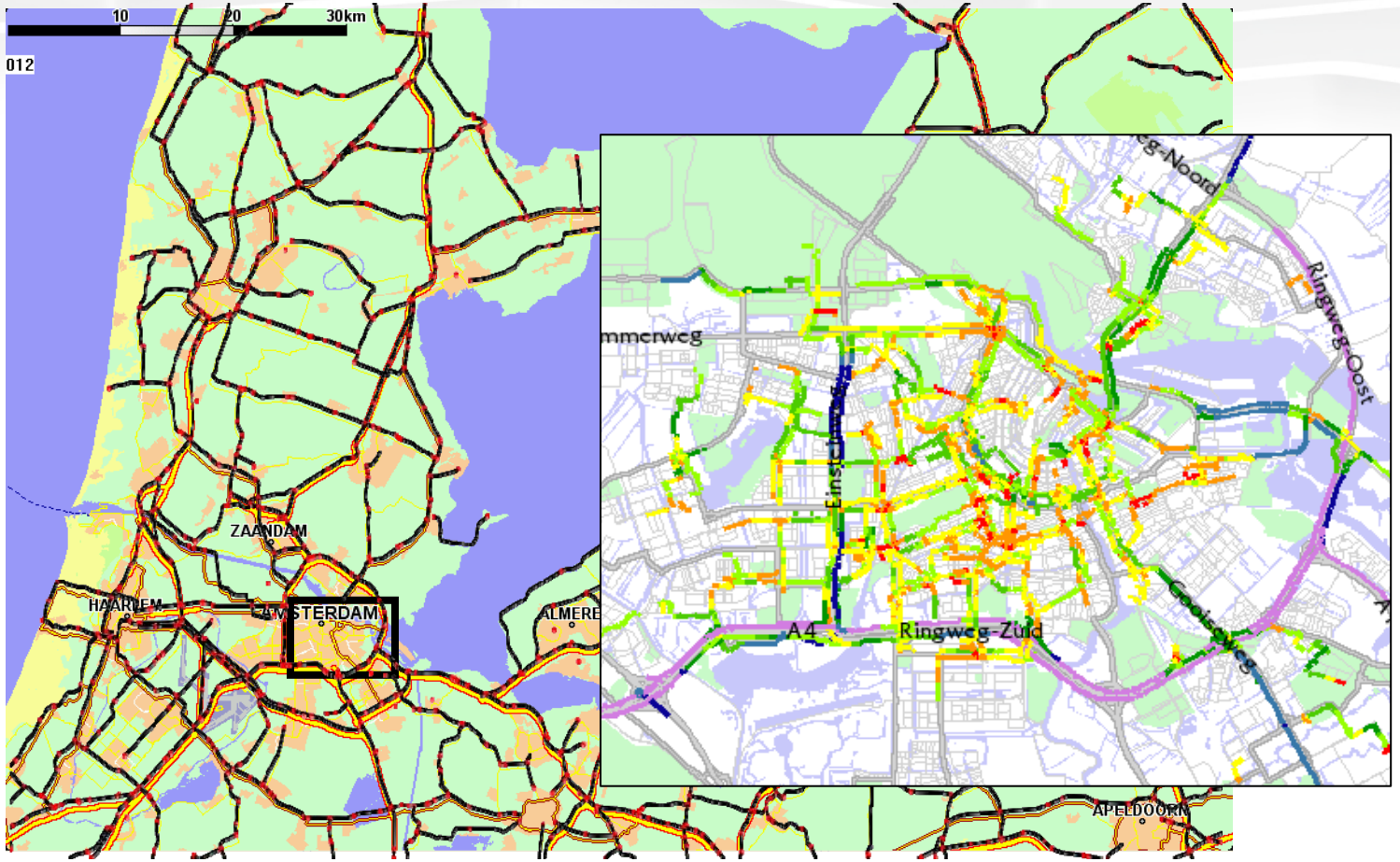
Future *e*Safety potential (cont.)

- Automatic Safety Lock

Potential requiring partnerships

- Local danger warning
- Extended FCD
- Dynamic traffic management (PPP?)
- Adaptive head lights (with OEM; eHorizon)
- Interface between (retail) PND and the car / head unit
- ……

Looking ahead
door-to-door traffic information



Into the city with more granular network

External conditions

External conditions

- Continuous Speed Warning requires:
  - Reliable speed limit databases
  - Velocity signal independent of GPS (tunnels)
  - Rain and other weather condition sensors
  - Access to latency free variable speed limits (avoiding an additional accessory)
  - On EU level: Alignment between technology and business model

- *e*Call requires:
  - Velocity signal independent of GPS (dead reckoning)
  - Airbag deployment notification

- Automatic Safety Lock requires:
  - Identification car environment
  - Velocity signal (preferable)

External conditions (cont.)

- Local danger warning requires:
  - Decision on bearer: Broadcast, GPRS, WLAN?
- Auto select car – truck navigation requires:
  - Electronic identification vehicle type
- Extended FCD requires:
  - Access to sensor data and business model
  - Potential 3 options:
    1. Used by PND applications only
    2. Delivery to others by GPRS channel of PND (business model issue)
    3. Combination

TOMTOM

Summary

- Navigation improves traffic safety
- Currently over 90% of Navigation is PND/PDA. Exiling these products means ‘destroying’ current achievements of PND:
  → 12% less accidents and 5% less insurance claims
- ESoP 2007/78/EN and *e*Safety may push these figures beyond 12% / 5%.
- Car sensor data is essential for fast roll out of *e*Safety.
- TomTom aims at:
  - Best maps
  - Best routing
  - Easiest to use
  - Leadership in safety

TOMTOM

HARMAN/BECKER
AUTOMOTIVE SYSTEMS

ESoP: Applicable for Nomadic Devices?

Analysis of currently available PND Devices

Andreas Weimper, Driver Distraction & Safety Affairs

HARMAN INFOTAINMENT

Inspired by Vision.

Agenda

HARMAN/BECKER AUTOMOTIVE SYSTEMS

Company Overview

Development Process Harman/Becker

Applying ESoP to Nomadic Devices

- Design Goals
- Installation Principles
- Information Presentation Principles
- Interaction with displays and controls principles
- System behaviour principles

Conclusion

Harman International

Corporate Structure

harman international

Consumer Group

Professional Group

Automotive Group

Automotive Group Overview

HARMAN/BECKER AUTOMOTIVE SYSTEMS

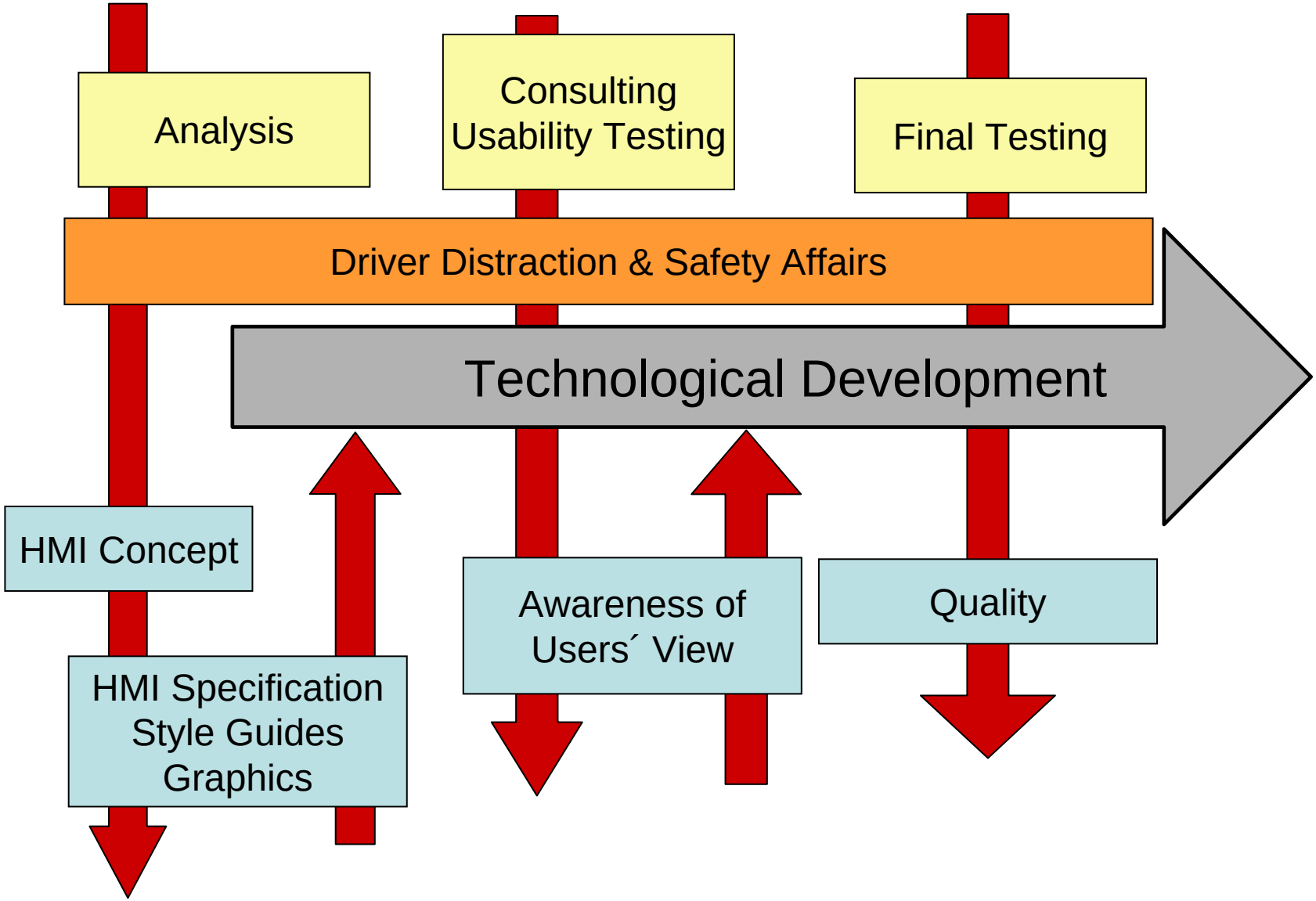
- Headquartered in Karlsbad (Germany)
- 7800 employees worldwide
- Designs and produces complete state-of-the-art Information, Communication and Entertainment Systems
- World leader in Branded Automotive Audio Systems combining World-Class acoustic know-how with high-value brand names
- European market leader in high-end Infotainment Systems with Leading-Edge technological advancements
- Has dedicated OEM facilities around the world

OEM Projects

“Nomadic Devices“

HARMAN/BECKER AUTOMOTIVE SYSTEMS

Development Process



Applying ESoP to Nomadic Devices

HARMAN/BECKER AUTOMOTIVE SYSTEMS

- **Originally ESoP was developed for OEM Systems**
- **ESoP refers to other norms and standards also first and foremost developed for fix installed (OEM) systems**
- **Life time cycle**
  - OEM systems: several years
  - Nomadic devices: several months
- **Development time**
  - OEM systems: several years
  - Nomadic devices: several months
- **To test feasibility of ESoP for Nomadic Devises one Becker Navigation system and up to four systems of our competitors had been analyzed**

Overview Design Goals

Design Goal I (Do rising of hazardous behaviour)	**Passed**
Design Goal II (Driver's attention compatible to driving task)	**Passed**
Design Goal III (No distraction or visual entertainment of driver)	**Passed**
Design Goal IV (No increasing of hazardous behavior)	**Passed**
Design Goal V (External consistency)	**Passed**

Overview Installation Principles

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Installation Principle I (securely fitted)	**Passed?**
Installation Principle II (driver's view)	**Passed**
Installation Principle III (obstructing controls)	**Passed**
Installation Principle IV (close to line of sight)	**Passed**
Installation Principle V (no glare or reflections)	**Action Required**

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System should be located and securely fittedin accordance with relevant regulations, standards… - Passed?

- **Most windshield mountings are stable**
- **Detailed test procedure not provided by ESoP**
- **Known weak point is the combination of airbag and some mounting positions for nomadic devices**

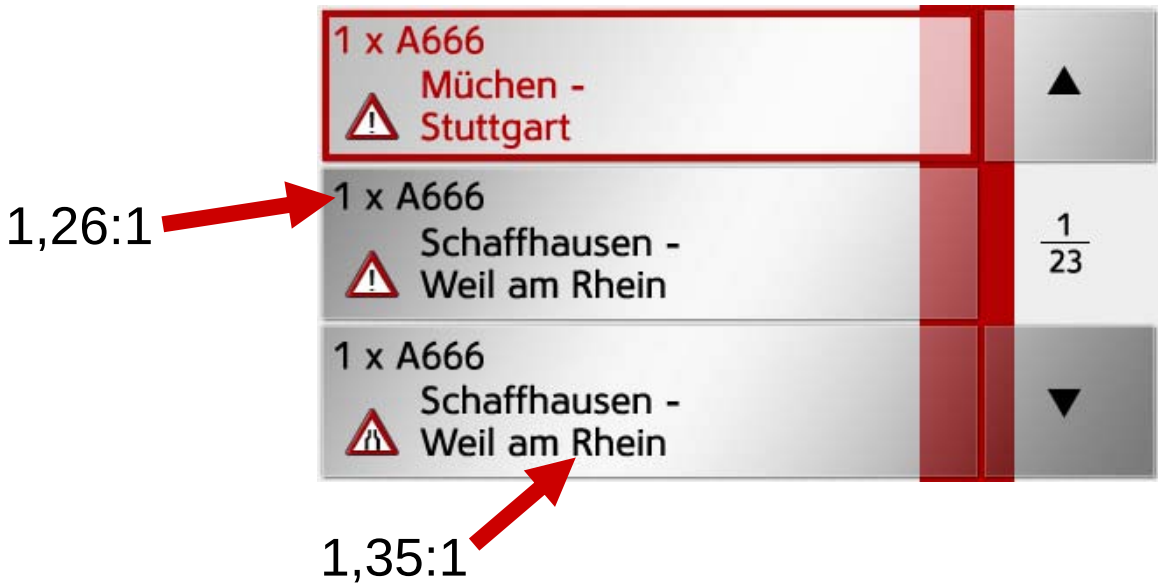
Solution:

Short term: Define test procedure which easily can be tested – preferably without need of a crash test

Long term: Common interface in all cars provided by car manufacturers

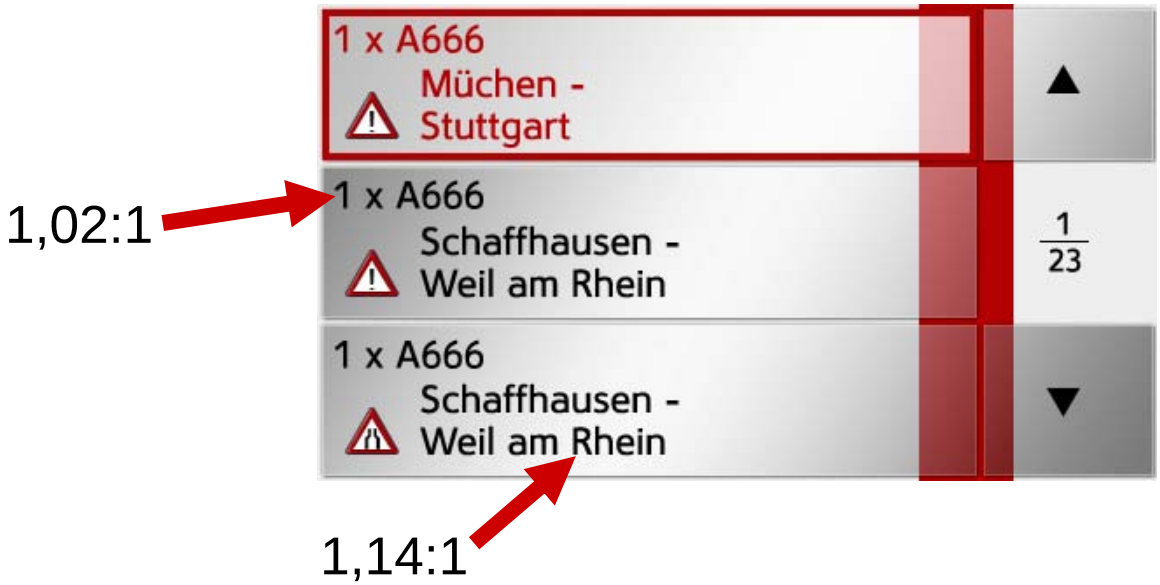
Installation Principle V: Luminance Contrast

- Luminance contrast for day conditions based on ISO 15008 is 3:1
- Measured value for Becker reference system is from 1,26:1 to 1,35:1
- Maximum value for used display is 2,7:1 (black and white)
- Competitor's systems have similar values



Installation Principle V: Luminance Contrast

- Luminance contrast for sunlight conditions based on ISO 15008 is 2:1
- Measured value for Becker reference system is from 1,02:1 to 1,14:1
- Maximum value for used display is 1,2:1 (black and white)
- Competitor's systems have similar values



Installation Principle V: Luminance Contrast

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- **Technical problem areas:**
  - Antireflective coatings to be improved
  - Touch screen foil absorbs brightness
  - More brightness is necessary to increase luminance contrast
  - Brighter displays would consume more power

- **Financial problem areas:**
  - Antireflective coating, brighter display and increased battery could increase the price by €20 or more
  - Significant increase of costs since Nomadic devices start at €100

Overview Information Presentation Principles

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Information presentation principle I (Visual information with a few glances)	**Not Applicable**
Information presentation principle II (agreed standards for legibility, icons, words…)	**Action Required**
Information presentation principle III (appropriate, timely information presentation)	**Passed**
Information presentation principle IV (Prioritizing of information)	**No relevance**
Information presentation principle V (no distraction by sound)	**Passed**

HARMAN/BECKER AUTOMOTIVE SYSTEMS

Visual displayed information can be catched with a few glances without affecting driving - Not Applicable

- Refers to ISO15007-1 and ISO15007-2
- ISO15007 cannot practically be used
- Short developmental periods of a few months for a PND device are different of OEM developmental periods of several years

Solution: allow inspections as long as other methods like the Lane Change Test are not fully developed

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Font Size – Action Required

- Assumption: Maximum viewing distance 900 mm
- For all tested systems, font size is much smaller than described in ISO15008
- ISO15008 (2003) font size (acceptable): 4,7 mm
- ISO15008 (draft 2007) font size (acceptable): 4,2 mm

System	Common Font Size	Smallest Font Size
Becker reference system (4,3” display)	3,2mm	2,4 mm
Reference system 1 (4,3” display)	2,8 mm	2 mm
Reference system 2 (2,7” display)	1,8 mm	1,2 mm
Reference system 3 (4,3” display)	3,0 mm	2,0 mm
Reference system 4 (4,8” display)	2,7 mm	2,2 mm

Information Presentation Principle II

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- ISO15008 (draft version with smaller font size) can be adapted to Nomadic Devices with screen size 4,3” and up
- For smaller displays, especially very small devices like cellular phones correct use of ISO15008 is not feasible

Solution:

- For medium sized screens and up: increase font size
- For small screens: prohibit inputs while driving?

Overview Displays and Controls Interaction Principles

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Displays and controls interaction Principle I (One Hand on the steering wheel)	**Passed**
Displays and controls interaction Principle II (No long uninterruptible system interaction)	**Passed**
Displays and controls interaction Principle III (Resuming of interrupted sequences)	**Passed**
Displays and controls interaction Principle IV (No time critical responses necessary)	**Passed**
Displays and controls interaction Principle V (No adverse impact on primary driving controls)	**Passed**
Displays and controls interaction Principle VI (Driver can control loudness of auditory information)	**Passed**
Displays and controls interaction Principle VII (System's response clearly and predictable)	**Action Required**
Displays and controls interaction Principle VIII (Capability to switch off dynamic information)	**Action Required**

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Response Time – control activation level – Action Required

- A response time of 250 ms is required on the control activation level
- All tested systems achieved this requirement in most situations
- All tested systems failed this requirement in some situations

System	Maximum Response Time
Becker reference system	640 ms
Reference system 1	400 ms
Reference system 2	840 ms

- **Solution: Improve response time where necessary**

HARMAN/BECKER AUTOMOTIVE SYSTEMS

None-safety related, dynamic information to be swichted off while driving– Action Required

- At all tested systems use a combination of map and turn-by-turn information
- Map cannot be switched off

Solution: Introduce turn-by-turn navigation – as available by most OEM systems- or voice guidance

Overview System Behaviour Principles

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System Behaviour Principle I (No visual distracting information while driving)	**Not Applicable**
System Behaviour Principle II (No interference with primary driving task)	**No relevance**
System Behaviour Principle III (Use of functions not suitable while driving)	**Action Required**
System Behaviour Principle IV (Information about status and malfunction)	**Passed**

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No visual distracting information like TV or Video available while drivning – Not Applicable

- It cannot securely be detected if a system is in motion or not (coverage of GPS signal in tunnels or in narrow streets with tall houses) since no speed signal is available
- It is not possible to detect if Nomadic Device is used by a driver or not
- Some Systems can be used in the font to entertain the kids
- Some systems are built for multi purpose use (e.g. TV, Video, Games and Navigation)

Solution: Allow exception in ESoP for Nomadic Devices as long as no other solution is available. Exception could include locking distracting information as long as navigation is switched on

HARMAN/BECKER AUTOMOTIVE SYSTEMS

Use of functions not suitable while driving– Action Required

- **It cannot securely be detected if a system is in motion or not – preferred solution of locking function while vehicle is in motion is not possible**
- **Adequate warnings, e.g. before entering a Video menu, are not implemented by most currently available systems**

Solution: Introduce clear warnings for functions not intended to be used while driving

Conclusion

- **Currently available systems fulfill ESoP in most areas**
- **To comply to some principles of ESoP, more effort is necessary by all Nomadic Device manufacturers**
- **Two principles should be adapted since the current version of ESoP is not applicable for Nomadic Devices**
  - Information presentation principle I – method is to complex
  - System behaviour principle I – no speed signal available

Thank You

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AIDE final results

Nomadic Device Forum, 2008-04-10, Brussels

Gustav Markkula, Volvo Technology Corporation

Outline

- About the AIDE project
- Nomadic device related developments in AIDE
- Results of evaluations with end users
- Future research needs

The AIDE Integrated Project

- Adaptive Integrated Driver-vehicle interfacE
- FP6 Integrated Project
- 31 partners
- March 2004 – April 2008
- 12.3 M€ budget (7.3 M€ EC contribution)

Researching and developing:

- Adaptive and integrated in-vehicle human-machine interfaces (HMI)
- Methods for evaluating adaptive and integrated HMI
- Models of behavioural effects of using in-vehicle information systems and driving support systems

Final Workshop and Exhibition in Gothenburg next week

Background

Based on the following key insights:

- Considerable functional growth in vehicles
- Great potential benefits in terms of safety, comfort, mobility
- But too many HMI controls in the vehicle is costly, difficult to pack and difficult to use
- Also, importantly, there is a limit to how much information the driver can safely process while driving – risk of information overload
- And this limit varies with the driving context

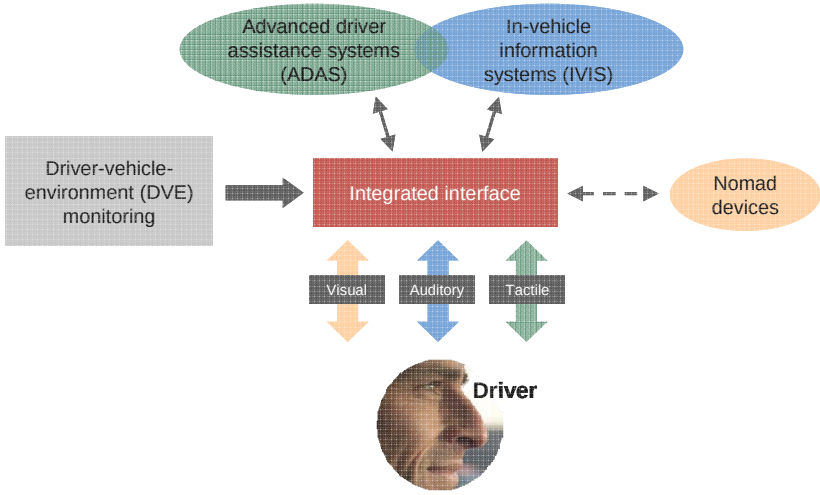
Adaptive and integrated HMI

To maximise benefits and minimise safety risks, the AIDE HMI:

- Allows applications to share input/output controls (integration)
- Coordinates centrally all application interaction with the driver (integration)
- Uses driver-vehicle-environment monitoring as a basis for decision (adaptivity)

Examples:

- The driver interacts with his nomadic device functions via in-vehicle input/output controls (integration)
- Low priority information (e.g. an incoming SMS) is postponed while the driver is overtaking
- High priority information (e.g. a forward collision warning) is given earlier or with greater intensity if the driver is distracted



ND related developments

Nomadic Device Gateway part of the full integrated and adaptive HMI, implemented in three demonstrator vehicles

Nomadic device functions accessible via in-vehicle controls:

- Telephony
- SMS
- Calendar reminders
- MP3

Vehicle functions accessible via nomadic device: Truck axle load monitoring

I.e. no focus on portable navigation…

Fiat

Volvo

SEAT

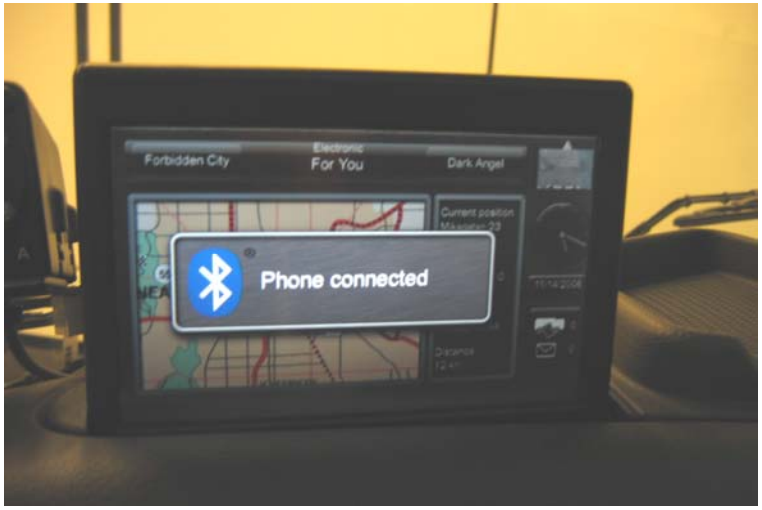
Technical gateway solution

Motorola BlueTooth gateway

- Uses standard BlueTooth profiles when available
- New profiles (based on serial profile) have been developed when needed

The main new development is the Gadget(/AIDE) BlueTooth profile

- Coordinates other profiles
- Needed for the adaptivity – blocks low-priority information based on central AIDE decisions



Evaluation of demonstrators

All three demonstrator vehicles subject to evaluations with end users

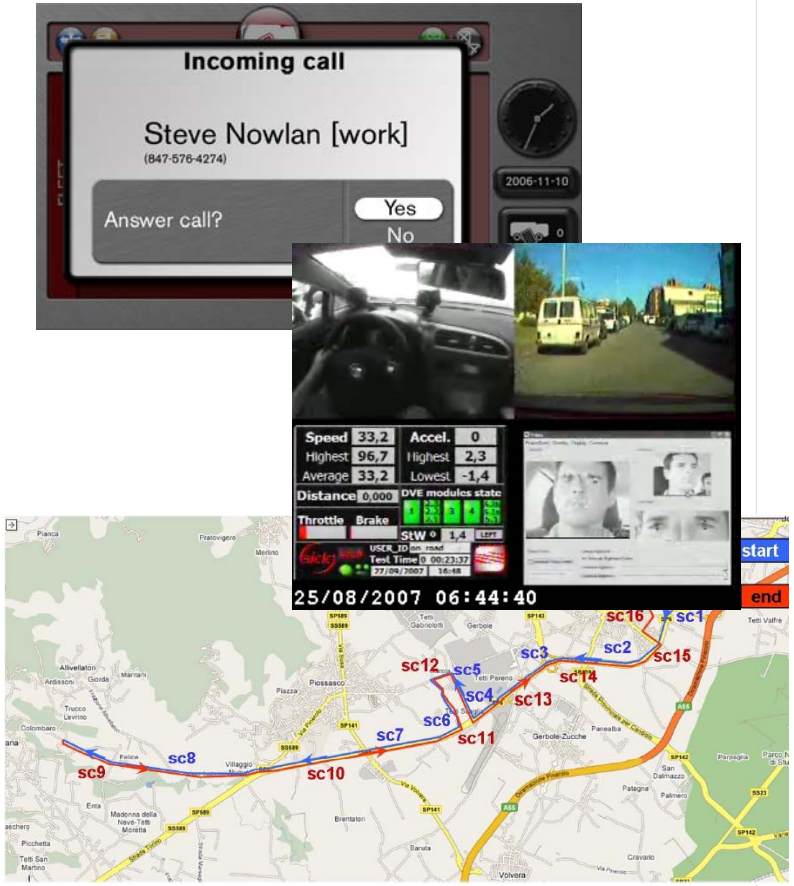
In Sweden, since handset use while driving is not prohibited, the experiment could include direct comparison of integrated / non-integrated solution

Following ND use cases included in the Volvo truck evaluation:

- Incoming phone call on integrated visual-manual controls vs on handheld phone
- Outgoing phone call initiated via integrated voice control vs manually on handheld phone
- MP3 song on device started via integrated visual-manual controls vs on handheld phone

Related use case:

- Incoming phone call delayed while driving in intersection vs phone call let through in intersection



ND related use case evaluation results

Below only significant effects between AIDE (integrated) and non-AIDE (non-integrated) solutions are reported

Incoming phone call (UC2)

- Glance behaviour – drivers **looked more at road ahead** with AIDE solution

Outgoing phone call (UC3)

- Glance behaviour – drivers **looked more at road ahead** with AIDE solution
- Lateral control – drivers **weaved less in lane** with AIDE solution

MP3 song (UC4)

- No significant effects

Phone call in intersection

- ”Tactile detection task” – drivers had **better reaction times** with AIDE solution
- Subjective ratings – drivers experienced **less workload** with AIDE solution

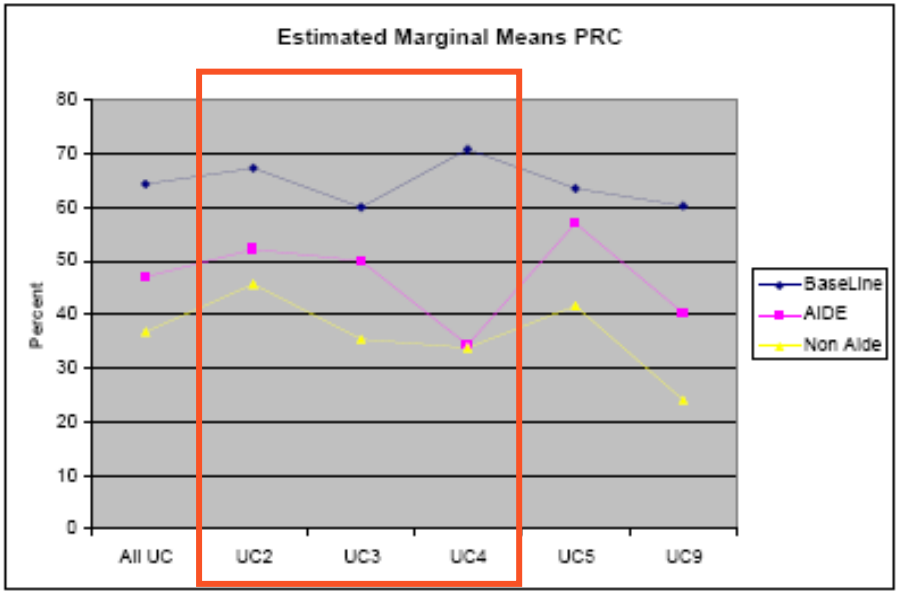


Figure 74 Estimated Marginal Mean Values for PRC per Use Case and for the three experimental conditions

ND related conclusions from AIDE

- The AIDE solutions including the ND integration seem to have some positive effects on driver behaviour
- BlueTooth functionality needed to implement the AIDE adaptivity features is currently non-standard

HMI related future research needs:

- Future trends and user needs for in-vehicle use of nomadic devices
- Integration gateways implement these user needs
- Optimal HMI for integrated solutions (related question: is there a limit to HMI integration?)
- Better understanding of actual safety impact of in-vehicle use of nomadic devices (non-integrated and integrated)
  - E.g. by means of larger scale experiments focused on nomadic devices
  - One example issue: The impact of auditory/cognitive secondary tasks (e.g. speech control)

CE4A
Consumer Electronics for Automotive

Cross car manufacturer working group for active standardization of mobile devices interfaces

VDA Workshop
March 31st 2008, Frankfurt

VDA Verband der Automobilindustrie

VDA Workshop
March 31st 2008, Frankfurt

Agenda:

9:30 a.m. until 10:00 a.m.: Come-together

10:00 a.m. until 12:30 p.m.: Presentation of CE4A and its Expert Groups

12:30 p.m. until 13:30 p.m.: Lunch Hour

13:30 p.m. until 16:30 p.m.: Break-Out-Sessions

CE4A | Motivation

Seamless interfacing to Consumer devices is not a differentiating feature, it is a MUST for all car OEMS.

Functional integration

Life-time-cycle-decoupling

Handling of variety mobile terminal devices

HU integration

New HMI functions

HMI concept for integration of CE Devices

Geometric integration

Interface

Communication interface

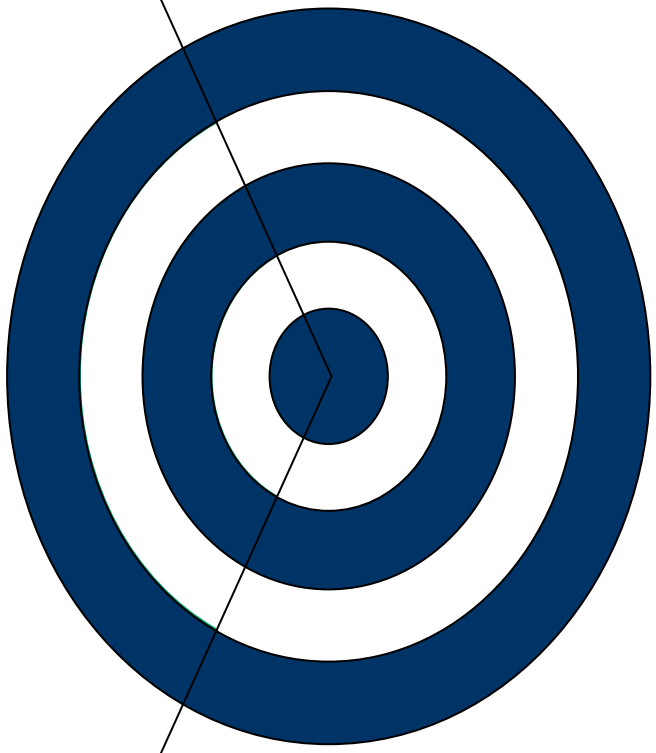
Standardization

CONSUMER ELECTRONICS FOR AUTOMOTIVE

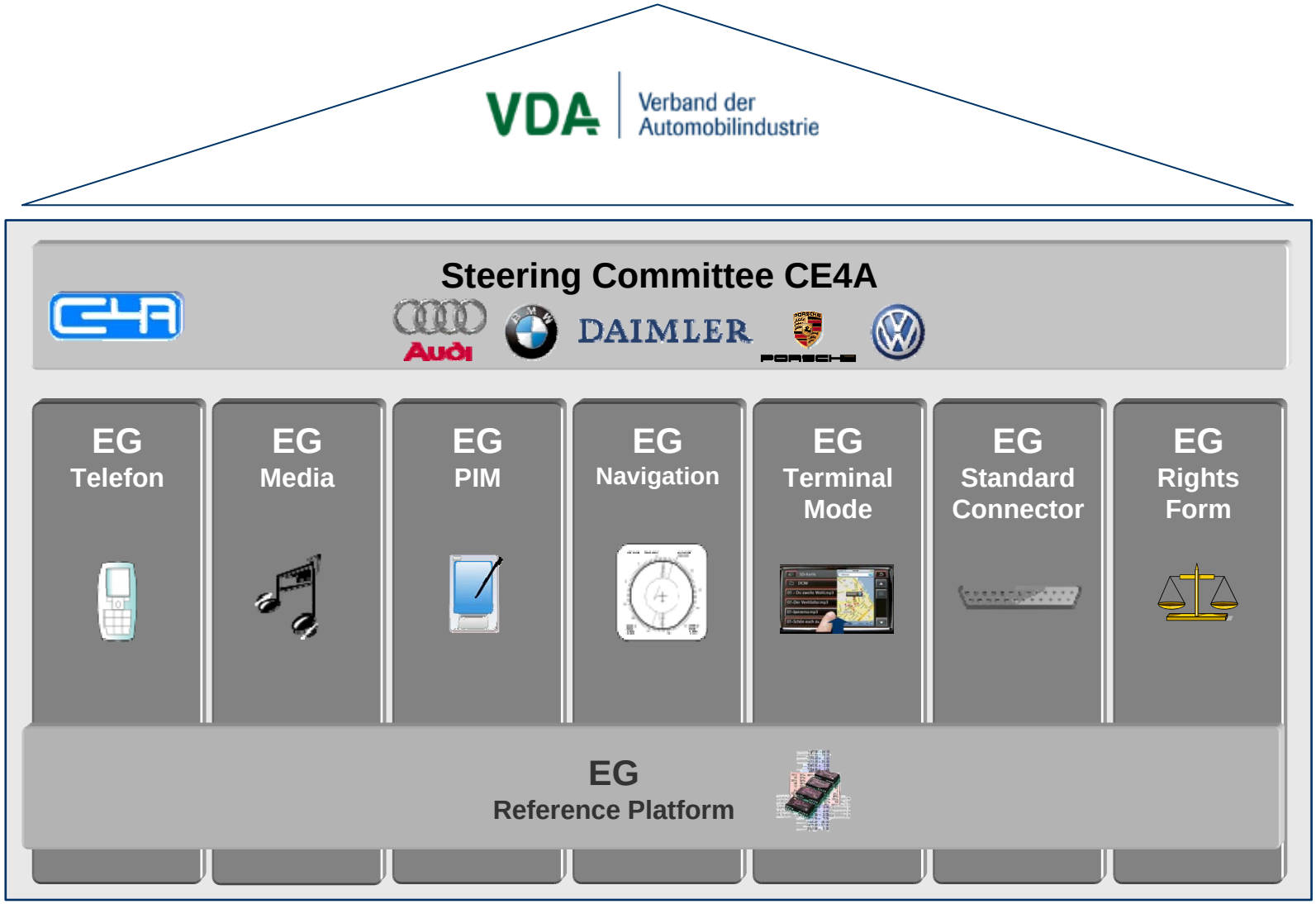
VDA Verband der Automobilindustrie

CE4A | Objectives

- No development of own proprietary interfaces, but taking existing standards of the Consumer Electronics (CE) industry instead.
- Focus on those standards gaining popularity in the consumer market
- Participation in standardization committees, e.g. Bluetooth SIG and USB IF forum.
- United, unanimous actions by the vehicle manufacturers to gain attention and influence in the CE industry.
- Joint effort with the CE manufacturers
- Common reference platform for harmonization of implementation on both the vehicle-OEM side and the CE-terminal-device side .



CE4A | Organization



CE4A | History

- Formation of CE4A in 2006 to centralize existing joint efforts and activities amongst the German OEM
- Founding members are Audi, BMW, Daimler and Volkswagen
- CE4A becomes a committee of VDA in 2007
- Porsche joining in 2007
- VDA Congress Baden Baden 2007: CE4A goes public
- Objectives for 2008:
  - Consolidate organization
  - Talks to other OEMs regarding membership

CE4A | Achievements

CE4A | EG Telephone

EG Telephone

- **Create well defined standardized interfaces for seamless and user friendly mobile phone vehicle integration**
  - Adopt Bluetooth Wireless Technology for in-vehicle use cases
  - Apply Wired Technologies for in-vehicle mobile phone integration
  - Define and implement premium usability experience in the vehicle
  - Interoperability requirements, testing and defect management

- **Important activities:**
  - Representation of OEM interests in the Bluetooth Car Working Group
  - Two Interoperability test sessions per year
  - Two road-mapping meetings per year with mobile phone manufacturers
  - Contact to network operators
  - Positioning papers:
    - Automotive Premium Phone Integration
    - AT-Commands for Automotive Premium Phone Integration

CE4A | EG Media

EG Media

- **Standardization** of Music- and Video-Player/ automobile interfaces
- **Representation** of OEM interests in relevant **standardization committees**
  - USB IF Forum
  - BT Audio/Video-Working-Group
  - DLNA
- **Relationship** to media focused **CE manufacturer**

- **Important activities**:
  - Contact to manufacturers (*Microsoft, Apple, Philips, iRiver*, ...)
  - Regular Interoperability Tests based on unified test cases
  - Contact and collaboration in MTP standardization over *USB.org*
  - Contribution to AVRCP 1.4 standardization (Bluetooth Audio-Streaming)
  - Definition of media use cases for *Reference Platform EG*
  - Positioning papers:
    - Media Player integration into the car environment
    - Multi-Profile Interoperability and Testing

CE4A | EG Personal Information Management

EG PIM

- **Standardization** of interfaces for an optimal integration of Personal Information Management (PIM) functions.
  - contacts
  - messaging
  - terms, tasks
  - notes

- **Important activities**
  - Contacts to manufacturers (*Nokia, RIM*, ...)
  - Contact and collaboration in BT standardization over BT SIG
  - Review MAP standardization (Message Access Profile)
  - Develop and define new standards for future use cases and functions
  - Positioning paper:
    - Personal Information Management integration into the car environment

CE4A | EG Navigation

EG Navigation

- **Standardization** of interfaces to integrate navigation functionality of portable devices into the car system
- **Representation** of OEM interests in relevant **standardization committees**
  - BT SIG
- **Relationship** to navigation focused **CE manufacturer**

- **Important activities**:
  - Contact to manufacturers (*Nokia, TomTom, Garmin*, …)
  - Contribution to standardization Bluetooth Navigation Profile within the Car Working Group
  - Positioning paper:
    - Use Cases
    - Technology evaluation
    - General interoperability requirements

CE4A | EG Standard Connector

EG Standard Connector

- Work with CE OEMs and standardization bodies to **influence decision making,** to **create standards** and to gather **recommendations and requirements for the need of the automotive OEMs**.
- **Create connectivity (physical and logical) solutions** to CE devices that can be commonly used in CE4A member automobiles.

- **Important activities**:
  - Define a common connector as an interface to a Media Gateway on the automotive side.
  - Authentication solutions for portable players, e.g. iPod, Zune
  - Automotive “Wireless Charging” solution for CE devices.

CE4A | EG Terminal Mode

EG Terminal Mode

- **Standardization** of **interfaces** to make applications and functions of portable devices applicable to the car system
- **Representation** of OEM interests in relevant **standardization** bodies
- **Relationship** to **CE manufacturer**

- **Important activities**:
  - Define Use Cases
  - Identify applications
  - Identify relevant interfaces and protocols
  - Establish relationship to CE manufacturers and standardization bodies
  - Positioning papers are being created

CE4A | EG Reference Platform

EG Reference Platform

- **Definition** of a **clear standard** for interfaces between automobile and mobile devices to CE-industry.
- **Definition** of **common requirements** of all OEMs to a reference platform.
- **Specification** of a reference platform to be used by CE companies to test the interoperability of terminal devices.
- **Aggregation** of OEM comprehensive test-settings and test-results

- **Important activities:**
  - Creation of specification for reference platform
    - Modular, extendable
    - PC based, ready for embedded implementation
    - Including debug ports
  - Definition of test cases by reusing existing test environment at OEM's
  - Implementation start to be expected in mid 2008

CE4A | EG Rights Form

EG Rights Form

- Handle **legal terms** for CE4A in **public**
- Provide guidance for legal matters **within** CE4A
- **Reservation** of label and logo
- Translate **VDA requirements into CE4A**
- **Formulate** CE4A **objectives and goals**
- **Formulate terms** of **business**

- **Important activities**:
  - Reservation of label and logo
    - Done for Germany
    - International reservation for EU-Member-States and USA is ongoing
  - Definition of Terms and Conditions for joining CE4A
  - Handle all legal terms of CE4A
    - Representation of CE4A in standardization bodies
    - Relationship to other organizations and companies

CE4A | Terms of Condition

- Terms of Condition of *VDA Organization* applies
  - Members can be German car OEMs and suppliers with major business activities in Germany
- Motivation to join CE4A needs to be explained
- Acknowledgement of the CE4A objectives and goals
- Payment of admission fee
  - Equivalent to efforts already undertaken by the CE4A members
  - 75k€ for joining in 2008
- Equal Contribution to running costs (shared by all members)
- No refund of cost in case of cancellation of membership
- Attendance in at least 2 EGs
- Regular participation in CE4A entities
- Readiness to take responsibility (e.g. managing an EG)

Thank you for your attention!

www.ce4a.org

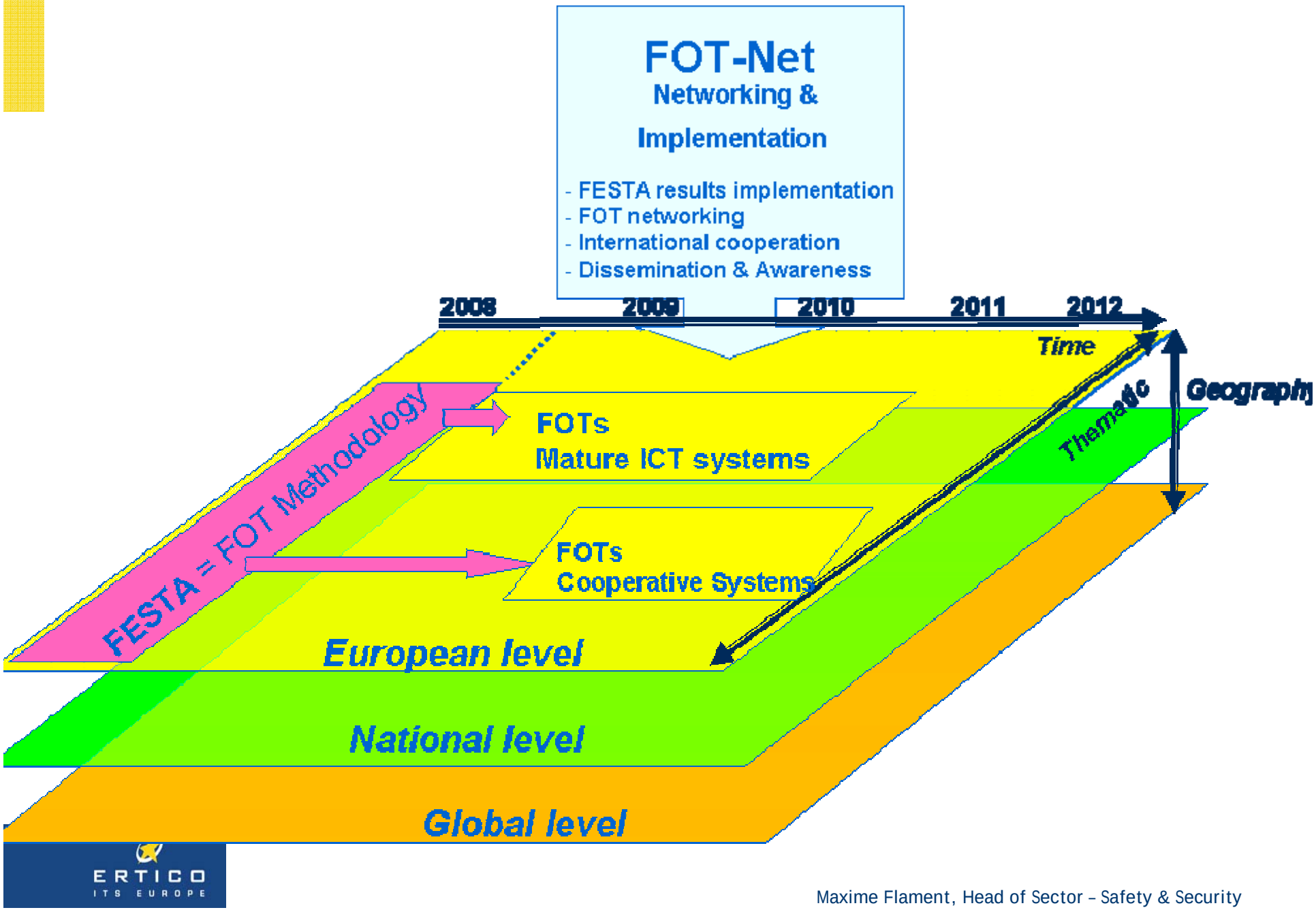
Short overview on FOT support actions

FESTA – Methodology for FOT

FOT-NET – Networking platform for FOT stakeholders

ERTICO ITS EUROPE

FOT = Field Operational Tests

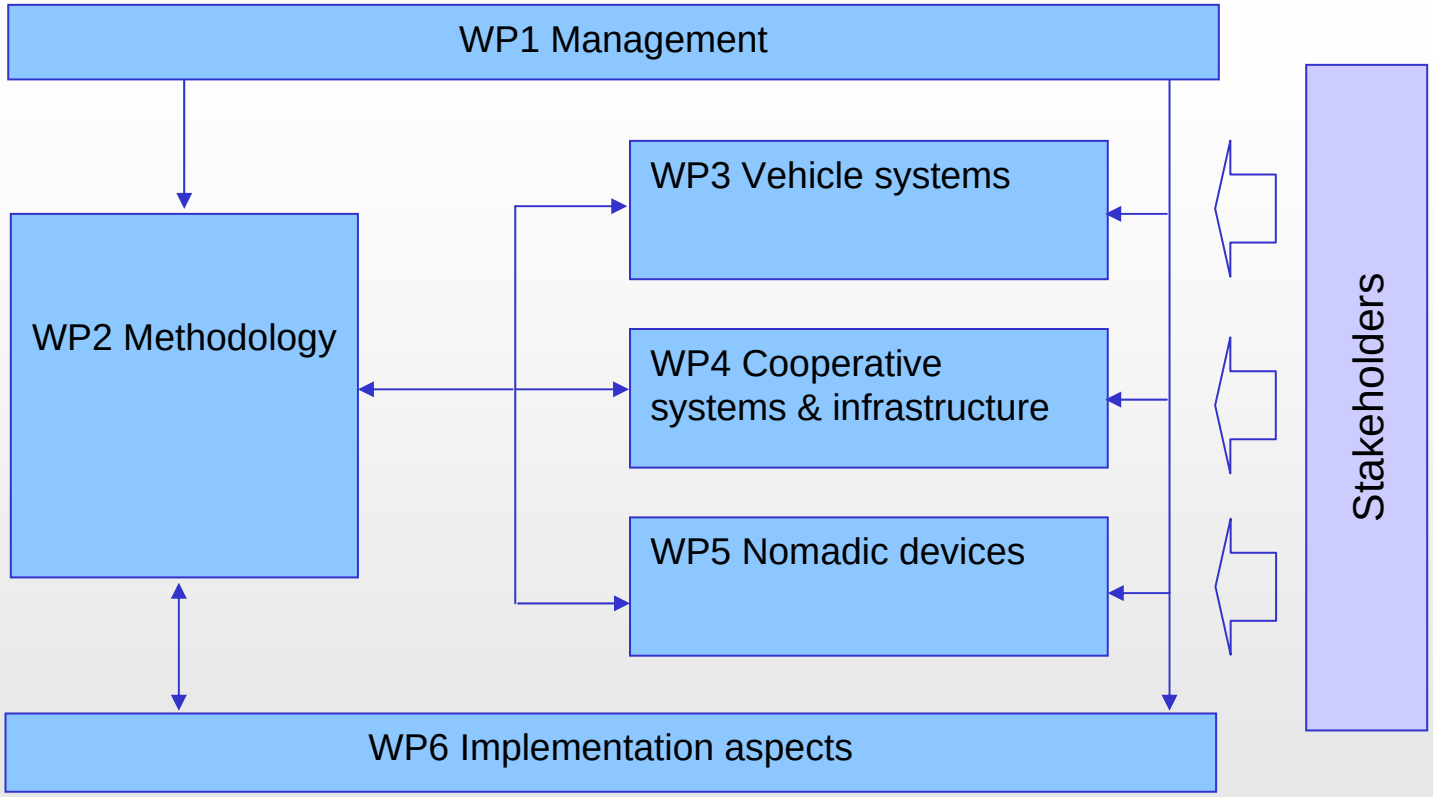

FOT-Net
Networking &
Implementation
- FESTA results implementation
- FOT networking
- International cooperation
- Dissemination & Awareness
2008
2009
2010
2011
2012
Time
Geography
Thematic
FESTA = FOT Methodology
FOTs
Mature ICT systems
FOTs
Cooperative Systems
European level
National level
Global level

FESTA Objectives

- FESTA develops a common methodology and guidelines (handbook) for future European FOT

- This handbook will allow :
  - Faster setting up of FOTs
  - Robust impact assessment;
  - Comparable results;
  - Save effort by avoid duplication of work especially on methodology
  - Reuse of tools, equipments, etc.
  - Establish a common European Vision of FOTs

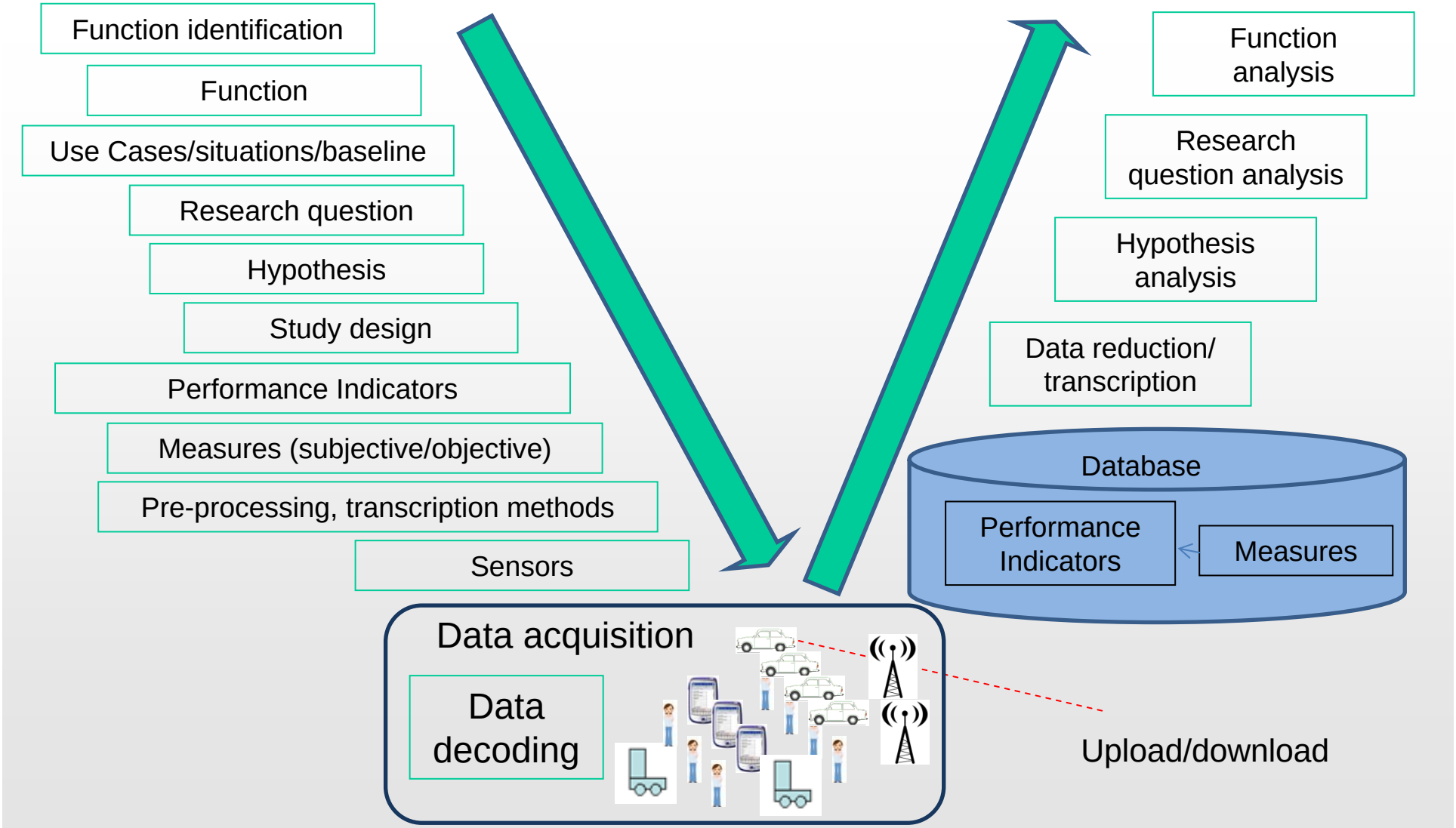
Project Structure



WP 2 Methodology

- Performance Indicators
  - to describe and compile performance indicators aimed at describing traffic safety, efficiency, impacts on the environment, driver behaviour and driver acceptability
- Data acquisition, storing, analysis
- Experimental Procedures
  - to provide guidance on the overall experimental design of FOTs in order to ensure experimental rigour and scientific quality
- Data Analysis Methods
  - Structured analysis and modelling of the data is required to properly assess the impact of the systems tested on driver performance, behaviour and safety Data Analysis
- Implementation Plan
- Socio-economics impacts

Detailed FOT-chain



WP3-WP4-WP5 – Field Operational Tests

1. Autonomous in-vehicle systems
2. Cooperative Systems
3. Nomadic Devices

Activities:

- Process for Selection of Use cases
  - Technology aspects
  - User/application aspects
- Process for Identification of benefits & shortcomings to be tested in an FOT with focus on safety, environment, mobility, efficiency
- Process for Potential behavioural effects and risks
- Define a common vision and provide input for adaptation of methodology, testing conditions and expected results

Handbook - Index

Executive Summary - 3 pages
Guidelines for the implementation of FOTs (10 pages)
Legal and ethical issues in the execution of FOTs (5 pages)
Types of ICT functions considered (18 pages)
Performance indicators (10 pages)
Experimental Procedures (10 Pages)
Requirements and guidelines for data handling (15 pages)
- **Data acquisition**
- **Data storage**
- **Data analysis tools**

Robust statistical procedures for data analysis (10 pages)
Scaling up (5 pages)
Related cost-benefit analysis (10 pages)
Conclusions (3 pages)
References
Annex 1.

FOT-NET Support Action

ERTICO ITS EUROPE

Networking platform for FOT Stakeholders

Overall objectives of the project

Involve all FOT stakeholders

- Establish a European networking body for National, European and Global FOT activities where all stakeholders from public and private sectors are represented.

Promotion the implementation of a common FOT methodology (FESTA results)

- Improve significance, visibility, comparability and transferability of available FOT results at National and European level by

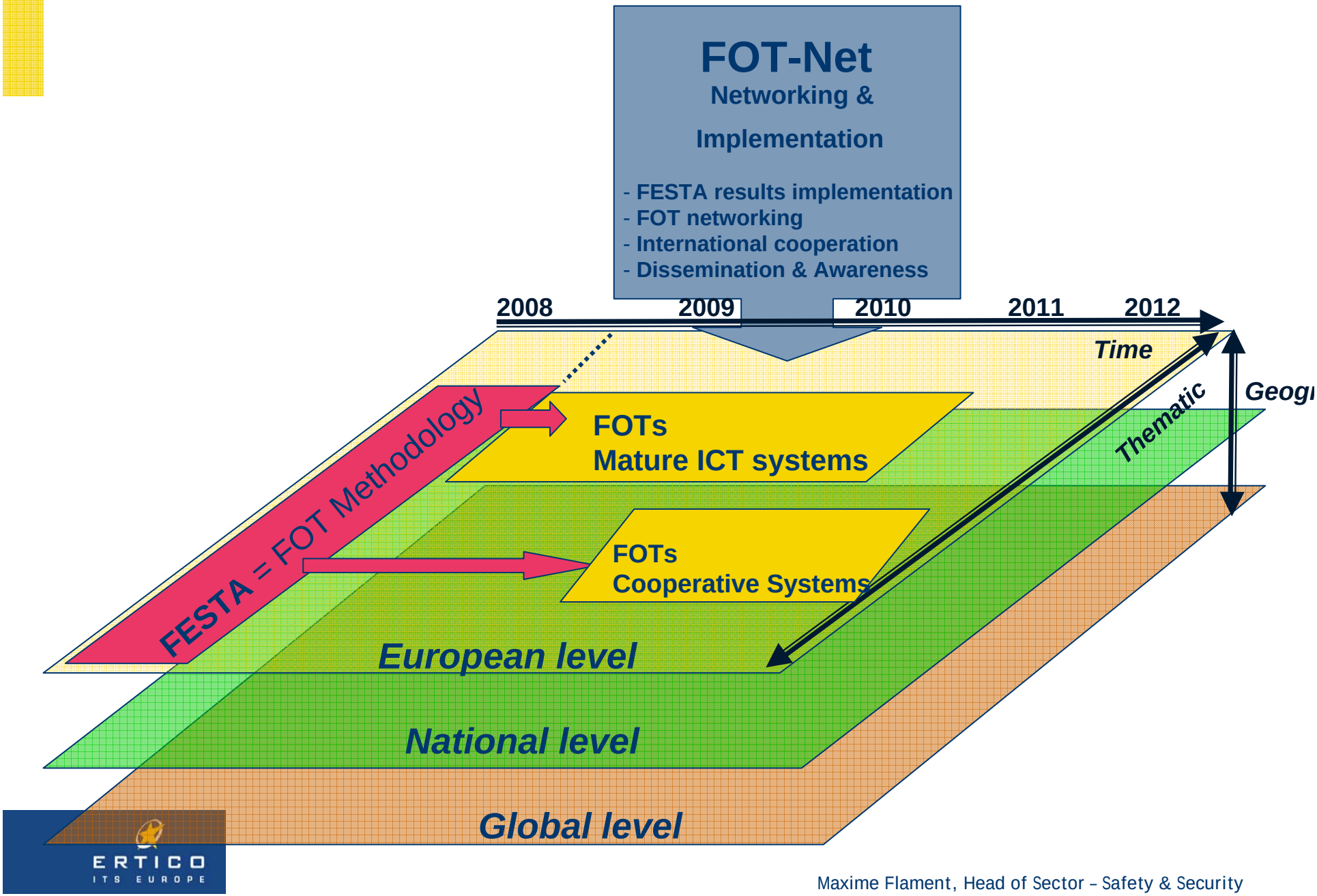
FOT Networking and cooperation

- Maintain a catalogue of the National and European FOT activities
- Regular stakeholders workshops on FOT activities and methodology harmonisation
- International workshops on FOT planned in NY (2008) and Japan (2009)
- Output a common FOT roll-out plan to support coherent development and implementation of FOTs in Europe at national and EC level

ERTICO ITS EUROPE

FOT Implementation support (WP3 - TNO)

- Focus on dedicated actions that are needed to implement FOTs in Europe
- Hold a series of seminars for promotion of a common FOT methodology based on the FESTA outputs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2008
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Time
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Thematic
FESTA = FOT Methodology
FOTs
Mature ICT systems
FOTs
Cooperative Systems
European level
National level
Global level

TeleFOT

Field Operational Tests of Aftermarket and Nomadic Devices in Vehicles

Overall budget 14.4 meuro / funding 9.7 meuro

Start date 1 June 2008 / End date 31 May 2012

Coordinator Mr. Petri Mononen (VTT)

petri.mononen@vtt.fi

Shortlist of partners

VTT (co) (*FI*), ADAC (*DE*), Blom (*ES*), BroadBit (*HU*), CRF (*IT*), CERTH (*GR*), Chalmers (*SE*), CIDAUT (*ES*), Destia (*FI*), Elektrobit (*DE*), Emtele (*FI*), Electronic Trafic S.A. (*ES*), ICCS (*GR*), IKA (*DE*), Logica CMG (*NL*), Loughborough University (*GB*), Magneti Marelli (*IT*), Metasystem (*IT*), MIRA (*GB*), Navteq (*NL*), ORANGE (*FR*), Rücker Lypsa (*ES*), Swedish Road Administration (*SE*), Telefonica (*ES*), University of Reggio Emilia (*IT*)

25 partners: Greece (2), Finland (3), France (1), Germany (3), Great Britain (2) Hungary (1), Italy (4), The Netherlands (2), Spain (5), Sweden (2)

Northern test community (5), Central (9), Southern (11)

Scope - assessing the impacts of "flagging"

Vision

Traffic safety and efficiency is considerably improved after a wide-scale deployment of Intelligent Vehicle Safety Systems. Aftermarket and nomadic devices accelerate this development by mature technologies, affordable and user friendly applications.

General objective

Assess the impacts of aftermarket and nomadic devices used in vehicles for driver support. Raise wide awareness of the functions and potential these devices offer.

Technical objectives

1. Build, mobilise and integrate European test communities for long term testing and assessment of driver support functions through aftermarket and nomadic devices.
2. Create a methodological framework for executing the tests and analysing the data.
3. Study aftermarket and nomadic devices in different technical contexts (= with and without ADAS).
4. Focus on functions and services for safe, efficient and economical travel.
5. Study different levels of impacts on drivers and society.
6. Investigate the contents of functions provided for cooperative driver support.
7. Develop effective procedures of enhancing awareness and take-up of driver support ICT systems among the public.
8. Focus also on aspects in the use of aftermarket and nomadic devices that may decrease safety.

What tested and where

Real Time Traffic Information	In all three test communities
Driving conditions warning	
Speed limit information	
Speed Alert	
Navigation assistance	
‘Green driving’	
Insurance (‘Pay-as-you-drive’)	Northern, Central
Telediagnostics of car network management	Central, Southern
Floating Car Data, FCD (‘Car as a sensor’)	Northern
eCall	Northern, Southern?
Functions for professional drivers	Northern

Major expected achievements of the project

- Concerning ***usability*** of the devices: How to fix and use aftermarket and nomadic devices correctly in vehicle, how to get the most out of them

- Concerning ***traffic behaviour***: imacts on travel speeds, speeding, hazards, proactive driving overall, impact on work load (also usability issue) and resulting vehicle control > preliminary information on the impacts of future Cooperative driving functions

- Concerning ***efficiency, green driving, transport system***: possible impacts on traffic flow and fuel consumption, exposure, accident costs

- Concerning ***business models***: willingess to pay, desirability of Location Based Services (LBS)

Cooperation

- Cooperation with other FOTs, especially FOT-Net and EuroFOT. Share methodology.
- Stakeholder Forum: open forum (to a limit); currently 20 partners. The purpose is to exchange views on aftermarket and nomadic devices testing and increase awareness among major user groups.
- TeleFOT User Forum open to work with Nomadic Devices Forum / possible follower

ESoP: Evolution

- 1st **Commission Recommendation** on 21 December 1999
  - triggered by request of high level expert group from Member States in 1995/1996
  - Report on the expansion of principles published in July 2001 by expert group appointed by the Commission
- eSafety **Working Group** on **HMI** joined stakeholders &
  - delivered recommendations in 2005
  - Expert group established to draft the 2006 update of the ESoP (with support of HUMANIST & AIDE projects)

SEVENTH FRAMEWORK PROGRAMME
European Commission Information Society and Media

ESoP: Status

- **Commission Recommendation** of 22 December 2006
  - published on 06 February 2007 (OJ L 32/2007)
  - addressing in-vehicle information and communication systems (not ADAS yet)
- **Clarification** (on request of ACEA) on **visual displays' mounting** under preparation
  - excluding type N1 vehicles from the "30 degree rule" in Installation Principle IV
  - Commission's adoption expected in spring 2008

SEVENTH FRAMEWORK PROGRAMME
European Commission Information Society and Media

ESoP: Nomadic devices

- **Nomadic devices' integration**
  - is a specific challenge: requires cooperation between automotive industry and nomadic devices manufacturers
  - addressed in the Nomadic Device Forum, established in the AIDE project, now under the umbrella of the eSafety Forum
- **Nomadic Devices Forum**
  - is preparing a Memorandum of Understanding (MoU)
  - Next meeting on April 10th, 2008 in Brussels

SEVENTH FRAMEWORK PROGRAMME
European Commission Information Society and Media

ESoP: Implementation

- **ESoP Implementation**
  - (formal) commitment of industry is expected after the adoption of the clarification on N1 vehicles
  - Member States' reports on dissemination activities carried out as well as the results of the application of the 2006 ESoP is expected for summer 2008
  - Review meeting with Member States and stakeholders planned for autumn 2008

SEVENTH FRAMEWORK PROGRAMME
European Commission Information Society and Media

Nomadic Device Forum Activities

Angelos Amditis, ICCS

Retrospection

AIDE explores a number of issues related to Nomadic devices use by drivers including:

- Safety issues raised by the introduction of the Nomadic Devices in the vehicle.
- Integration of Nomadic Devices and definition of a gateway concept.
- Requirements both from OEMs but also from device manufacturers point of view.

For this scope the AIDE Nomadic Devices Forum was created in early 2005.

Nomadic Devices Forum – Launch meeting, January 2005

The first European Nomadic Device Workshop was held at Volvo AB in Brussels on 20 January 2005 with the following objectives:

- Create a cross-sector European interest group concerned with all aspects of nomadic device integration and use in the vehicle.
- Inform about the AIDE project and its work on nomadic devices.
- Identify/confirm key issues for nomad devices: safety, design, integration, installation, use, standardisation.
- Validate use cases and user/stakeholder requirements for the AIDE project.
- Initiate a “European Nomadic Device Forum”.

1st Year's Activities of the European Nomadic Device Forum

During the launch workshop, it was decided to establish a number of Working Groups to advance the work in specific areas. The following Working Groups (WG) were established during 2005:

- WG A: Definition of "Smart Vehicle-Device Gateway".
- WG B: Safety and HMI Issues.
- WG C: Business Case.

The principal activity of the NDF Y1 comprised:

- a nomadic device workshop during the AIDE User Forum on 16/03/2005;
- the launch workshop of the NDF on 23/06/2005;
- workshop of Working Groups on 05/10/2005;
- workshop of Working Groups on 25/11/2006.

1st Year's Achievements of the European Nomadic Devices Forum

- Establishment of an important European working forum of key stakeholders in the field of vehicle-portable device integration;
- Alignment and coordination of the separate work on nomadic device integration in the AIDE and GST integrated projects;
- Identification of the principal expected use cases for nomadic device integration;
- Beginning of the definition of system requirements for a vehicle-device gateway;
- Review of the applicability of the European Statement of Principles (ESoP) on HMI to nomadic device integration, and identify other safety-related issues;
- Identification of business scenarios and use cases for nomadic device integration;
- Description of first steps on "roadmap" towards automotive-portable device collaboration.

2nd Year's Activities of the European Nomadic Device Forum

During NDF Y2, WGA and WGC continued their activities to advance the work in specific areas, while after some initial discussions in Working Group B, its members agreed there was not sufficient interest to maintain a separate WG.

The principal activity of the NDF Y2 comprised a number of working meetings:

- a WGA & WGC meeting on 15/05/2006;
- a Plenary and round table meeting on 16/05/2006;
- a WGA workshop on 25-26/10/2006;
- a WGC workshop on 27/11/2006.

2nd Year's Achievements of the European Nomadic Devices Forum

- Use cases definition for nomadic device integration.
- Investigation of system requirements for a vehicle-device gateway.
- Enrichment of the Nomadic Devices working forum with key stakeholders in the field of vehicle-portable device integration.
- Continuation of the support on the coordination of the nomadic device integration in the AIDE and GST integrated projects.
- Further investigation of business scenarios and use cases for nomadic device integration.

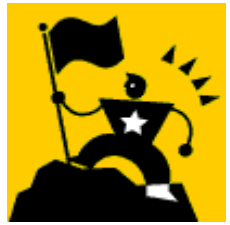
3rd Year's Activities of the European Nomadic Device Forum

The key event of the NDF Y3 comprised of a workshop on 24/10/2007.

During the 3rd Year the main topics of discussion were:

- The need to promote ESoP 2 as the main platform providing the key recommendation needed for the safe integration of Nomadic Devices within vehicle interior.
- The need for an agreement on the specifications of a common (even standardised) gateway for Nomadic devices within vehicles.
- The identification of market opportunities and of win-win scenarios for all key stakeholders in order to promote the previous two issues.

3rd Year's Achievements of the European Nomadic Devices Forum (1/2)



The 2007 AIDE Nomadic Devices Forum Workshop aimed to define a roadmap for achieving two important goals:

- The wide approval and implementation of ESoP by all stakeholders in the area of Nomadic devices usage within the vehicle including OEMs and ND manufacturers.
- The definition of a common (even standardised) gateway for Nomadic Devices (NDs) within the automotive vehicles.

During the workshop plenary presentations from representatives of all key stakeholders were performed while specific issues were analyzed in parallel sessions (ESoP, Business models, Common Gateway).

The workshop closed with an open discussion on issues related to the main goals of the workshop including also proposals for the continuation of the Nomadic Devices Forum after the end of AIDE project (early 2008).

The full details of the event are uploaded in the AIDE web site "www.aide-eu.org" and the e-Safety web site where the final minutes and the presentations of the workshop can also be found.

3rd Year's Achievements of the European Nomadic Devices Forum (2/2)

The Nomadic Device Forum is expected to become part of the eSafety initiative of the European Commission.

NDF Chair					
ACEA (Wolfgang Reinhardt)				MEDION (Mark Jendrzok)	
NDF Steering committee					
ACEA	MEDION	EC	VTEC	ERTICO	ICCS

*ERTICO & ICCS are also responsible for the daily operation of the Forum and the organisation of events.

The NDF Steering Committee:

- drafted the Terms of Reference (ToR)
- is preparing a Memorandum of Understanding (MoU) on safe integration of infotainment systems.
- Drafted a list of activities for 2008-2009

Thank you for the attention!

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Terms of Reference

Wolfgang Reinhardt, ACEA
Angelos Amditis, ICCS

Terms of Reference

- Version: v3 third draft prepared by ICCS, VTEC, EC and ERTICO
- Editors: EC, ACEA, ERTICO, ICCS, VTEC, MEDION
- Date: 15/2/2008

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Background

- The challenges of the European Nomadic Devices Forum:
  - Driver distraction and increased safety risk caused by ND.
  - Added costs, inconvenience and perhaps risks for the user because of lack of standards.
- History of the European (AIDE) Nomadic Devices Forum and outline of its activities:
  - Established by the AIDE integrated project (6th FP, *e*Safety Strategic Objective).
  - Active for the last 3,5 years.
  - Workshops and meetings to discuss nomadic devices use within the vehicle.
- Information on the decisions taken during the last AIDE NDF meeting at Brussels on 2007/10/24:
  - Need to continue the Nomadic Device Forum following the end of the AIDE project.
  - Proposal was accepted by the *e*Safety Forum Steering Group to host the NDF.

Aim and Objectives

Nomadic Device Forum - a multi-sector working group aiming at:

- Safe, effective and user-friendly nomadic device integration and use in vehicles.
- New business opportunities related to the in-vehicle use of nomadic devices.

To achieve these objectives, the Forum will:

- Act as a European consensus platform to reach cross-sector agreement on issues relating to nomadic device safety, technical harmonisation, in-vehicle integration and their safe use.
- Act as a bridge between the research projects on nomadic device issues and also between Europe and the rest of the world.
- Provide advice to the EC on nomadic device issues.
- Identify requirements for new work items, handled e.g. by of sub-working groups of the Forum, research initiatives, standardisation bodies etc..

Work items

The main work items identified up to now are:

- Establishing and promoting a MoU on implementation of the European Statement of Principles (ESoP II) for NDs.
- Promoting the creation of commonly accepted gateways for in-vehicle integration of nomadic devices, in terms of mechanical mounting, electrical connection and device-vehicle information exchange.
- Identifying business opportunities specifically in the areas of public-private services (e.g. eCall, speed advice, traffic information, cooperative systems).

The Forum may identify new work items. Proposals may be submitted by any member.

Organisation

New operation scheme: Working Group under the umbrella of the eSafety Forum.

Chairs:

- Wolfgang Reinhardt, ACEA (Forum Chair, Vehicle manufacturers' association)
- Mark Jendzrok, Medion (Forum co-chair, ND Manufacturer)

Organizing Committee:

- The two chairs
- Angelos Amditis, ICCS
- Peter Christ, ERTICO
- Wolfgang Hoefs, EC DG INFSO
- Gustav Markkula, VTEC

Responsibilities: Organization of plenary meetings and working sessions of sub-working groups. Continuous reporting on activities and results. Reporting to the eSafety Forum at least annually.

In between meetings, the Forum and its sub-working groups will use web tools and other means of collaboration.

Any interested party may apply to become a member of the Organizing Committee.

Membership (1/2)

The Nomadic Device Forum is open to any interested organization that wants to actively support the Forum's activities.

Especially representatives of related stakeholders are welcome such as:

- Vehicle manufacturers
- Portable navigation system manufacturers
- Pocket PC/PDA manufacturers
- Automotive suppliers
- Navigation map suppliers
- Mobile telecom operators
- Service providers
- Public authorities
- Research organisations & academic bodies
- Associations related to the field

Membership (2/2)

- Interested parties will apply to the Organizing Committee for membership in the Forum.
- Members are expected to regularly take on responsibility for tasks such as contributing to sub-working group activities, preparation of reports etc.

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Nomadic Device Forum 2008-2009 Activities

- Promotion of the Forum to attract members from all stakeholders.
- Creation of a Memorandum of Understanding (MoU) on ESoP II.
- Promotion of the uptake and application of the ESoP II by relevant stakeholders.
- Discuss and identify business opportunities in the areas of public-private services (e.g. eCall, speed advice, traffic information).
- Organization of a first Plenary meeting on April 10, and then at least one more Plenary meeting during 2008.
- Organization of dedicated sub-work groups and their meetings.
- Establishing contact with the CE4A working group to get their input on nomadic gateway issues.
- Liaison with current and new research projects related to NDs (e.g. FESTA, TELEFOT, etc.), e.g. by organization of common workshops.

Currently existing sub-working groups (1/2)

The following Sub-working groups exist at present and are expected to continue work.

- Nomadic Device Safety and ESoP II
  - For nomadic devices/applications in use, make expert assessment of likely risks related to driver use and device installation
  - Agree principles and propose harmonised guidance for safe use and installation of nomadic devices
  - Make recommendations for action by all responsible organisations to implement guidelines
  - Promote ESoP and its wide uptake of all stakeholders.
  - Propose updates of ESoP if needed.

Currently existing sub-working groups (2/2)

- Business Opportunities
  - Discuss and identify business opportunities in the areas of public-private services (e.g. eCall, speed advise, traffic information)
  - Discuss and identify other business opportunities where a cooperation between OEMs and ND manufacturers is needed
  - Identify legal, and organisation issues and propose solutions
- Nomadic Device Gateway
  - Compile and agree scenarios and use cases for nomadic device-vehicle cooperation (installation, interaction, integration)
  - Identify functional and system requirements
  - Define system architecture for a nomadic device-vehicle solution
  - Outline specifications for a “smart” vehicle-device gateway (including intermediate gateway for information management), including physical, data, functional and application interfaces
  - Standardisation efforts, best practices, guidelines.

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Thank you for your attention!

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