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**DECOMOBIL Nomadic transport services for multimodal mobility: issues and perspectives.
Deliverable 3.4**

Annie Pauzie, Lucile Mendoza, Fabien Moreau

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Nomadic transport services for multimodal mobility: issues and perspectives

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Abbreviations

Abbreviation	Meaning
ECTRI	European Conference of Transport Research Institutes
ESoP	European Statement of Principles
EURNEX	EUropean rail Research Network of EXcellence
FERSI	Forum of European Road Safety Research Institutes
FEHRL	Forum of European National Highway Research Laboratories
FOT	Field Operational Test
GPS	Global Positioning System
HMI	Human Machine Interaction
ICT	Information and Communication technology
IHYD	Insure How You Drive
ISA	Intelligent Speed Adaptation
ISO	International Standardisation Organisation
ITS	Intelligent Transport System
ND	Nomadic Device
OEM	Original Equipment Manufacturer

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Executive summary

The scientific seminar on “*Nomadic transport services for multi-modal mobility*” organized in the framework of DECOMOBIL has been held the 15th of November 2012 in Lyon, France, hosted by Ifsttar. The aims of the event were to present the scientific problematic of ergodesign and safety use of the nomadic applications in transport, in order to discuss with key stakeholders challenges to face, process and approach to develop, methods to use, future priorities and perspectives to identify in this domain.

Speakers have been identified as experts in the area, presenting main issues, scientific bottlenecks and results, based upon their involvement in research projects such as Mobiville, Infomoville, Optimod, TeleFOT, EcoDRIVER, Instant Mobility, in guidelines/standardisation process such as ISO and ESoP or in developing applications for ecomobility such as Ecogyser system and Nomadic Solutions. In addition to the European presentations, an exceptional presentation from an expert belonging to the Brazilian university of Ergodesign (PUC-Rio) shared with the European audience the Brazilian on-going research activities, projects and methodologies in the area of nomadic development and design.

This report gathers the following information: a brief CV of each speaker, a summary of their presentations and the full set of their slides in annex.

In addition, all the presentations (slides and video recordings of the presentations) are available for downloading on the DECOMOBIL website <http://decomobil.humanist-vce.eu/Downloads.html>.

Following the workshop, a questionnaire has been sent to the participants in order to gather their points of view and positions linked to future research priorities for Nomadic Devices in transport in terms of safety, maturity of technology, guidelines and design recommendations in addition to ecomobility impact. The main results of this investigation have been summarized in this report as a conclusion.

Announcement and Agenda of the Nomadic Workshop



15 November 2012, Lyon, France

WORKSHOP

**HUMAN CENTRED DESIGN FOR NOMADIC TRANSPORT
SERVICES IN MULTI-MODAL MOBILITY**

**DECOMOBIL project (user centred Design for ECO-multimodal MOBILity)
Support Action funded by the DG Connect (2011-2013)**

The objective of DECOMOBIL project is to develop and to widely disseminate knowledge in the area of human centred design of ICT for sustainable transport by organising scientific seminars and international conferences, developing a research roadmap and participating to the Joint Research Initiative setting up. Contribution to acceptability and usability of ICT for cleaner and safer mobility will be made through animation of discussion with the relevant stakeholders involved in this area and dissemination of updated data and know-how in Human Machine Interaction and Human Centred Design areas towards the ITS community at a European and international level.



Humanist

Announcement and Agenda of the Nomadic Workshop



15 November 2012, Lyon, France

WORKSHOP

HUMAN CENTRED DESIGN FOR NOMADIC TRANSPORT SERVICES IN MULTI-MODAL MOBILITY



- 10:00 Welcome, JP Medevielle, President of Humanist
- **Session on human centred design of nomadic**
- 10:15 Issues on human centred design of nomadic for multimodal travel, A. Pauzié, Ifstar/LESCOT, Mobiville project
- 10:45 Issues on nomadic services to improve mobility of impaired people, M-F Dessaigne, Ergonomos, University Parit descartes, LATI, Infomoville project
- 11:15 Issues on design of nomadic devices in Brasil, M. Quaresma, PUC-Rio University/LEUI, Rio de Janeiro
- 11:45 Lunch
- **Session on future of nomadic services: ecomobility**
- 13:30 From exclusive car use to combination of urban mobility services through nomadic tools, J-L Gauducheau, CityWay & J Coldefy, Grand Lyon, Optimod'Lyon project
- 14:00 Field operational tests of aftermarket and nomadic devices in vehicles, A Morris, University of Loughborough, TeleFOT project
- 14:30 Design and Development of mobile service for ecodriving, O Orfila, Ifstar/LIVIC, ecoDriver project
- 15:00 Acceptability of ecodriving via nomadic device, Ph Orvain, Nomadic Solutions, Ecogyser system
- 15:30 Acceptability and social community issues for ridesharing and multimodal success, N Dubus, Orange & A. Attour, Ecole des Mines de Nancy, Instant Mobility project
- 16:00 Round Table with all the speakers
- 16:30 End of the day

Registration FREE of CHARGE <http://tr.amando.com/nomadic.html>.

Scientific organisation: annie.pauzie@ifstar.fr organisation & registration: lucile.mendoza@humanist-vce.eu

1. Introduction

1.1 Aim and context of the Nomadic workshop

In the framework of the DECOMOBIL project, organisation of this scientific seminar on “Nomadic transport services for multi-modal mobility” aims at presenting the scientific problematic in terms of ergodesign and safety use of the nomadic applications in transport, in order to discuss with external stakeholders challenges to face, process and approach to develop, methods to use, future priorities and perspectives to identify.

Speakers have been identified as experts in the area, presenting main issues, scientific bottlenecks and results, based upon their involvement in research projects (Mobiville, Infomoville, Optimod, TeleFOT, EcoDRIVER, Instant Mobility), in guidelines/ standardisation process (ISO, ESoP) or developing applications for ecomobility (Ecogyser system, Nomadic Solutions), in addition to their willingness to share with a European audience the running research activities, projects and methodologies used in Brazil (PUC-Rio).

The workshop announcement was made firstly via e-mail, disseminated to the HUMANIST VCE mailing list (1100 names), a more focused dissemination was then made to European networks working in European Transport Research (ECTRI, FERSI, FEHRL & EURNEX) who disseminated the information to their member institutes and/or universities. The DECOMOBIL partners were also asked to disseminate the information to their respective networks. Announcement of the happening has been made via social networks such as LinkedIn in various thematic groups such as Applied Cognitive Psychology, Certified Human Factors and Ergonomics Professionals, Cooperative Systems, Decade of Action for Road Safety, Driver Distraction, Ergonomics, ERTICO - ITS Europe, EURO Working Group on Transportation, European Transport Research, FP7 Information and Communication Technologies (ICT), HFES Europe Chapter, Horizon 2020, Framework Programme for Research and Innovation, Human Factors, Human Factors and Ergonomics Society (HFES), Human Factors professionals, iMobility Forum, International Ergonomics Association (IEA), ITS - (Intelligent Transport Systems), Road Safety International and SAFERIDER.

Finally, a announcement was also made on the project website (<http://decomobil.humanist-vce.eu>) and in the project newsletter 3 published in September 2012.

During the workshop, each participant was given a document containing all printed presentations. In order to increase the results dissemination, it was decided to take videos of each presentation in order to make them available for downloading on the internet after the workshop. All lecturers gave us agreement for video recording and dissemination of their presentations on internet (<http://decomobil.humanist-vce.eu/Downloads.html>).

1.2 Context and issues of nomadic design in multimodal transport

There is an increase potentiality of accessing to multi-modal mobility knowledge and real time information for citizens due to:

- the spreading out of a diversity of informative media and devices
- the wide ratio of equipped travelers and drivers in the population of citizens
- the availability of complex functionalities such as internet access and geo-location on these nomadic devices such as mobile phone

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This context linked to nomadic functionalities allows an important part of the population of travelers and drivers to be informed “anywhere” and “any time”. This easy access to information has high potential benefits for a clean and efficient multi-modal mobility :

- incentive to use public transport and self-serve bicycles,
- avoidance of traffic congestion,
- encouraging and supporting car-sharing,...

Nevertheless, the widespread use of smartphone services while driving can create an increase in critical road safety conditions.

The benefits in using low cost mobile services supporting ecomobility could be counterbalanced by a negative impact in terms of road safety when smartphones are used while driving if their design is not compatible with this context. Furthermore, testing methodologies to assess the safety and usability of integrated mobile services and guidelines supporting the design process for developers still need to be developed.

Presentations of this workshop covered the various aspects of the question, with diversified points of views and approaches to the problem. Discussions allowed the audience to debate with the speakers about their position and the perspectives of this issue in terms of research.

2. Presentations

2.1 Welcome and overview of the DECOMOBIL project (J.P. Medevielle, former President of Humanist)



Jean-Pierre Medevielle, Deputy General Director of IFSTTAR (ex INRETS, the French National Research Institute for Transport and Safety Research) for the last 13 years graduated from Ecole Polytechnique and Ecole Nationale des Ponts et Chaussées. He has been research manager for the last 27 years including ICT and transport. He served as a scientific adviser of CCETT (Centre Commun d'Études de Télévision et Télécommunications, Rennes, France) in 1985-1989 at the time of the launching of the CARMINAT- EUREKA project. For the last 15 years, he has served at the International Program Committee of Intelligent Transport Systems (ITS) World Congresses. He has been involved within ITS research international cooperation from 1999 till now with USA, Japan and Australia. He was Secretary General of ECTRI from 2003 to 2007 and is a member of the Steering Committee of the eSafety Forum (Co-Chair of the RTD Working Group) and of ERTRAC.

After welcoming the participants to Ifsttar, the main purposes of the Decomobil project have been presented to the audience.

2.2 Issues on Human Centred Design of nomadic for multimodal travel (Annie Pauzié, Ifsttar)



Dr. Annie Pauzié, is Research Director at IFSTTAR/LESCOT, she got her PhD in 1985 in "Ergonomics and neurosciences", then Research assistant at University of California, Los Angeles. Since 1988, her research activities at INRETS (newly IFSTTAR) are focused on ergonomics of Information and Communication Technology (ICT) based upon Human Centred Design approach. For 20 years, she has been involved in several European and national projects. Member of the coordination team of the virtual center of excellence HUMANIST, she is also involved in the European projects AIDE, Saferider & Safeway2school. She is an international expert, representing the French Ministry of Transport at the International Harmonised Research Activities-ITS working group and expert for the investigation about the European Statement of Principles in the eSafety Working Group on HMI.

Full video of the presentation available at <http://decomobil.humanist-vce.eu/Downloads.html>

Summary

Due to the spreading out of a diversity of nomadic devices, with availability of complex functionalities such as internet access and geolocation, an important part of the population of travelers and drivers can be informed "anywhere" and "any time.

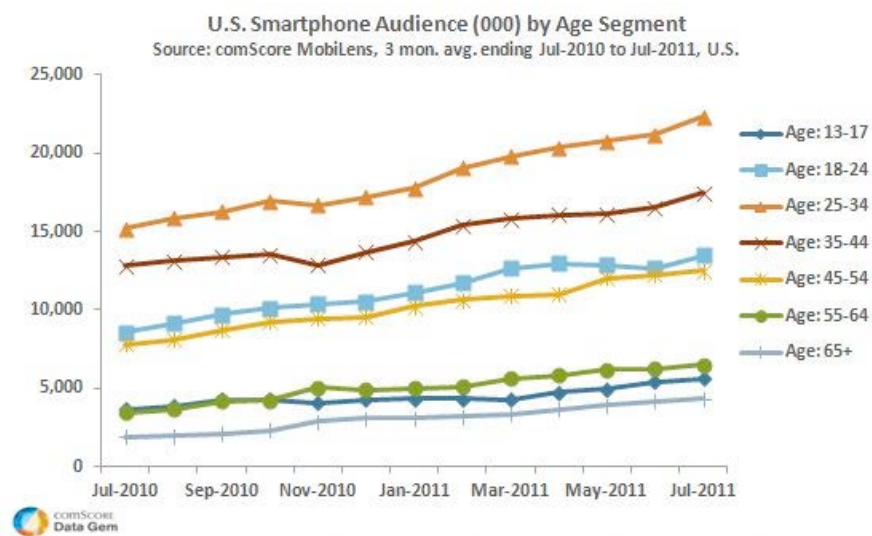


Fig.1: For transport smartphone applications, senior's needs and requirements have also to be taken into account

Nevertheless, even if there has been a great improvement in their technology these last years (bigger screen, vocal recognition), designing a user friendly interface for these systems is a challenge, with the issue of efficiency of the service for multimodal travelers and road safety for drivers. Easy access to information through nomadic devices has high potential benefits for a clean and efficient multi-modal mobility: incentive to use public transport and self-serve bicycles, avoidance of traffic congestion, encouraging and supporting ride-sharing, etc... In this framework, the methodology consisting in developing ergonomic mock-up to support human centred design for nomadic devices has demonstrated its efficiency as:

- **a tool for the ergonomists:** allow to test in a realistic way several options such as space to display visual information, usability and optimisation of the dialogue
- **a tool of communication between ergonomists and developers:** allow a complete description of the functions and the HMI to be discussed with the other partners

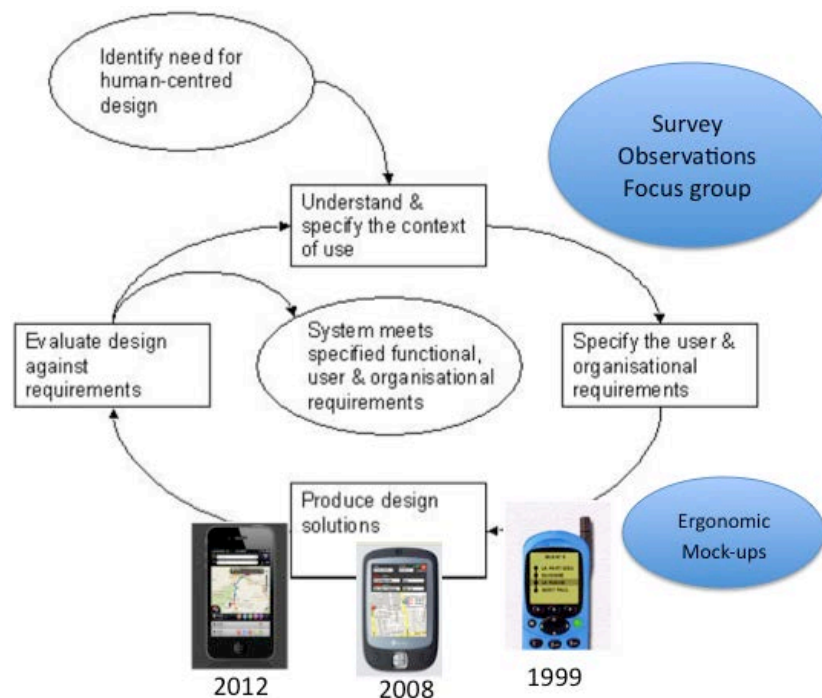


Fig. 2: Method of human centred design processes for interactive system (ISO norm 13407)

The French project Mobiville is an example aiming at developing multimodal travelers information on a mobile phone:

- Development of a mobile service prototype for multimodal traveler based upon the ergonomic mock up principle
- Evaluation of the service among 92 travelers in the city of Lyon (usability, acceptability, preferences, design)
- Specific focus on senior travelers (65-74 and over 75 years old): this investigation showed that there are specific difficulties for senior travelers using mobile services linked to functional abilities and to cultural background of

generational belonging. Results were in terms of design recommendations adapted to the variability of the users population.

Nomadic devices can be a great support of citizens' changes toward more sustainable transport behaviour (ridesharing, ecodriving, traffic information via social community,...) but presents critical aspects in terms of road safety (increase use while driving). For these reasons, it is important to understand nomadic usability, taking into account elderly and novices users and to set up design criteria and recommendations to support design process of developers.

At the end of the presentation, a short movies showing an experimental crash of a vehicle with a nomadic device plug on the windshield. The images demonstrated how the support of the nomadic is smashed by the inflatable air bag.



Fig.3: Some pictures of the movie showing the nomadic support smashed by the air bag during the crash test of a vehicle.

2.3 Issues on nomadic services to improve mobility of impaired people (Marie-France Dessaigne, Ergonomos, Université Paris Descartes/LATI)



A technical problem prevented to make available the full video of the presentation, the slides of the presentation available at <http://decomobil.humanist-vce.eu/Downloads.html>.

Summary:

The infomoville project is a project investigating the development of a real time information, communication and localization service for improving the mobility of travelers with visual or auditory disabilities in Public Transports.

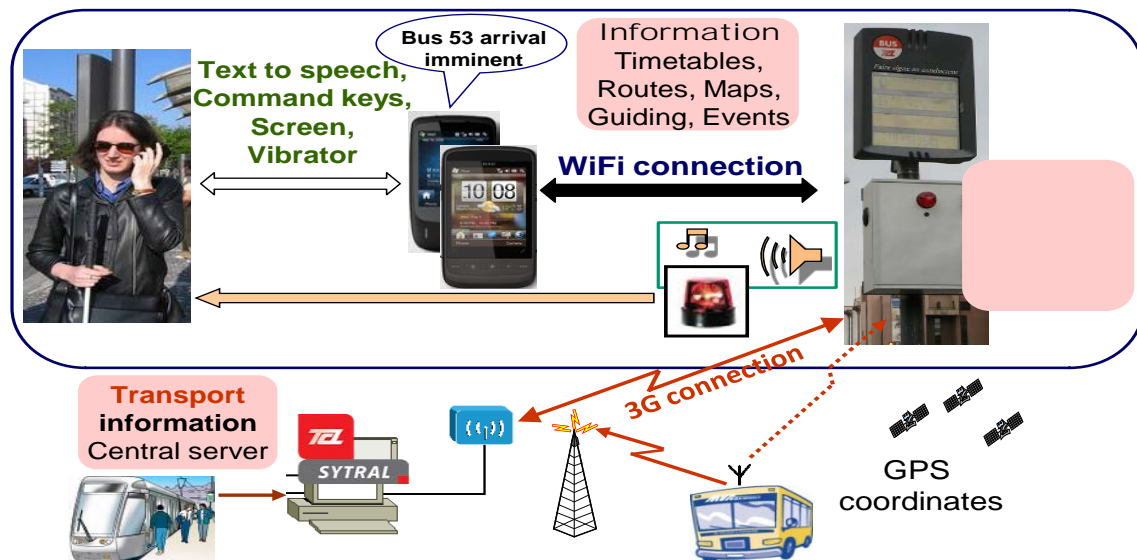


Fig.4 Illustration of Infomoville project

Issues of nomadic devices for people with impairments is to understand what information is needed, which strategies are developed and how to develop an integrated tool to support this population. To support human centred design, the followed process was to watch a sample of persons in a "real situation", use different analysis' methodologies of the interviews, analyse and characterise their moving scenarios, identify avoidance strategies because of disability. Results from real situations analysis guide the ergonomist for the systems' design. In the framework of this project, the talk-to-speech functionality allowed the development of a specific and innovative feature, a barrel voice guidance on inter-station path.

The Guidance provides many supports: first, a global information about the entire inter-station path to do: listen it full or rewind then, an information « by segment » for each part of the walking itineraries.

The form is adapted for each disability:

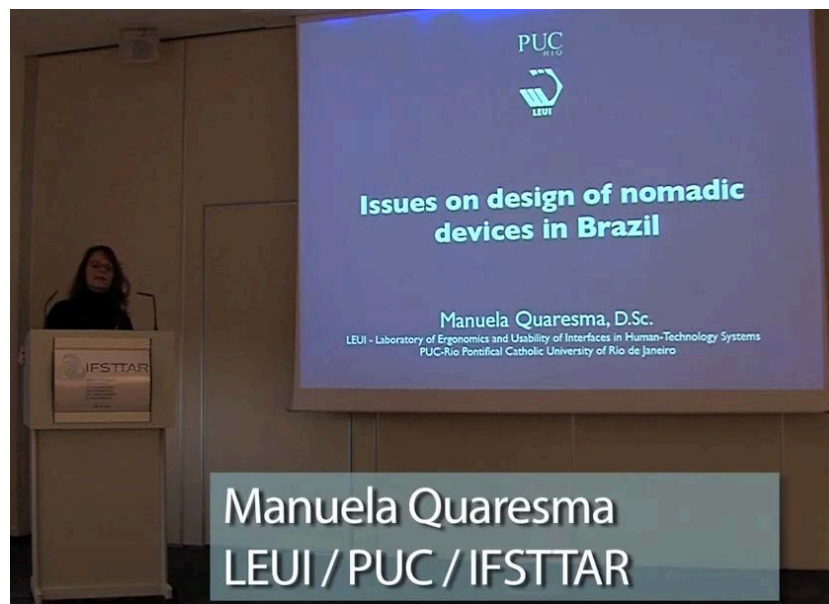
- Oral construction of the speeches.
- The « by segment » description help the memory.
- At any time, being able to advance, rewind or stop the guidance to listen to it entirely or just one segment.
- Work on the emplacement of the emergency speeches.
- Construction of syntax, semantics and prosody.

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In terms of results and expectation, this project showed that users appreciated the simplicity of use of this system and its adaptation to their specific needs. They would like in addition the creation of two distinct formats (experts and novices) and the Integration of the 2 functions they use with different tools on their mobile phone (the Kaptan GPS and the « pedestrians voiced crossing light »).

It has to be noted that all the new technologies that were tested can work but their costs repel to bring them into use.

2.4 Issues on design of nomadic devices in Brazil, (Manuela Quaresma, LEUI, PUC-Rio Pontifical Catholic University of Rio de Janeiro)



Manuela Quaresma has a B.Sc. degree in Industrial Design (UniverCidade, 1996), M.Sc. degree (2001) and D.Sc. degree (2010) in Design (Pontifical Catholic University of Rio de Janeiro - PUC-Rio). She is assistant professor and researcher at Arts & Design Department and coordinator of the specialization course in Ergonomics of PUC-Rio; she works in consultancies projects related to means of transportation, interfaces usability and workstation design; and she coordinates the Ergodesign, HCI and Transport Technical Group of ABERGO (Brazilian Ergonomics Association). She has experience in Industrial Design with emphasis in Ergonomics, acting in the following topics: ergodesign; product and human-computer interaction usability; automotive ergonomics; transportation ergonomics.

Full video and slides of the presentation available at <http://decomobil.humanist-vc.eu/Downloads.html>.

Summary:

Manuela Quaresma is a senior researcher from the Laboratory of Ergonomics and Usability of Interfaces in Human-Technology Systems (LEUI) in the Pontifical Catholic University of Rio de Janeiro (PUC-Rio) in Brazil. First, she presented to the European audience of the workshop the activities and approaches developed in her laboratory, in terms of research and training programs in the field of ergonomics and usability of information system, Human-Computer Interaction and transport systems. The ergodesign concept and approaches, in addition to the methods/techniques for analysis and evaluation, used by her research team have been detailed: task analysis combined with contextual inquiry, questionnaires, card sorting, heuristic evaluation and usability tests. Several examples of usability principles applied to design of mobile applications in terms of compatibility, legibility, information density and immediate feedback have been described.

Statistics about smartphone owners in Brazil have been given, in addition to the top ten of the most popular navigation applications downloaded in this country.

SMARTPHONES IN BRAZIL

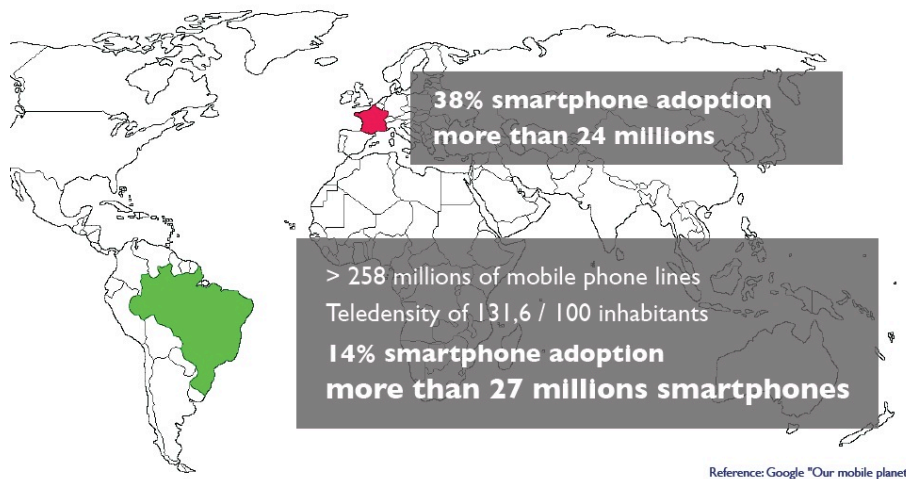


Fig.5 Smartphones in Brazil

A comparison of usability and ergodesign of two navigation applications and their potential consequences in terms of distraction for the drivers has been conducted following the method of the Extended Keystroke Level Model (KLM) technique.



Fig.6: iGO Primo App

Several tasks such as setting a destination by address, selecting destination of the gas station closest to the current position and storing a new home address have been tested following this method. The main results showed that the visual demand afforded by automotive navigation systems is directly related to the amount of screens that should be read in the data entry process. Indeed, the more screens are required to complete a task, more attention the user will have to spend with the system and the greater are the risks of driver distraction. Moreover, it is important to apply the OS features in navigation apps because, aside from the reduction of time, it also meets the usability principle 'compatibility'.

2.5 Guidelines and recommendations for nomadic design (Alan Stevens, TRL)



Alan Stevens BSc PhD, MBA, FIET. He is the Chief Research Scientist and Research Director, Transportation at TRL where he has been working on the application of new technology to transport for 25 years. He is an internationally recognised expert in "Human-Machine Interaction" (HMI) in the driving environment and was co-author of the authors of the "European Statement of Principles on HMI" through his work within the eSafety initiative, where he co-chairs of the HMI Working Group. He was also an active member of the responsible international standards committee regularly participating in meetings with European, US, Canadian and Japanese colleagues. He was recently appointed to the EU-US Working Group on Driver Distraction following the EU-US High Level Cooperation agreement and continues to be involved in the international IHRA (International Harmonized Research agenda) group and on the Management Committee of IBEC (International Benefit Evaluation and Costs) group. His consultancy activities focus on providing advice on policy and interoperability issues to Government, developing research programmes and carrying out specific technical and human factors studies in Intelligent Transportation Systems. In terms of academic activities, he participates in University teaching at MSc level, supervises PhD students and is Editor in Chief of an international peer-review journal of Intelligent Transport Systems.

Full video and slides of the presentation available at <http://decomobil.humanist-vc.eu/Downloads.html>.

Summary:

Nomadic devices can be a blessing or a curse, especially for the drivers. They can support many applications with diversified purposes: route guidance, eco-driving, intelligent speed adaptation, even an application that has been rewarded for safe driving behaviour (IHVD for Insure How You Drive) but also entertainment. The example of the Vinci Autoroute App which allows drivers to get in-vehicle signs, congestion warning, basic ISA, emergency call, etc... and where Human Machine Interaction is acknowledged as being an issue.

The Working Groups from ISO or from other projects covering the issues of in-vehicle systems and ITS standardisation have been presented, in addition to the important work conducted under the DG InfSo management: the European Statement of Principles (ESoP). The development of the ESoP as a design assessment checklist to be easily used on a PC or a tablet has been presented, with communication of the email address where scientists can get free access to this electronic checklist.



Fig.7: Electronic checklist available on tablet.

References have been made to parallel activities in the field in USA (NHTSA reports) and in Japan (JAMA guidelines). Concerning USA, NHTSA has published a new set of HMI Guidelines to update the Alliance Guidelines originally based on the ESoP, with a draft which is controversial and has generated much comment. The guidelines cover original equipment in-vehicle device secondary tasks such as communications, entertainment, information gathering and navigation tasks not required to drive performed by the driver through visuo-manual means. These visuo-manual activities cover the driver looking at the device, manipulating a device-related control with the driver's hand and watching for visual feedback. A suggestion has been to implement a "car mode" on portable devices, similar to "airplane mode", allowing then to disable certain functions when the vehicle is moving. In a close future, NHTSA plan to publish guidelines for portable devices in 2013 and guidelines for vocal interfaces by 2014.

In addition to the setting up of guidelines, and in order to support the process, several scientific solutions need to be investigated: lane change task, occlusion method, peripheral/tactile detection task, eye movement analysis.



Fig 8: Occlusion goggle method

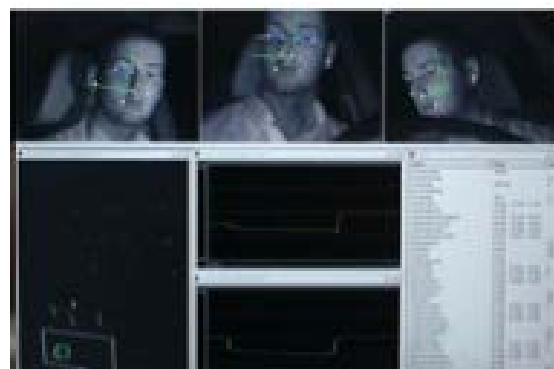
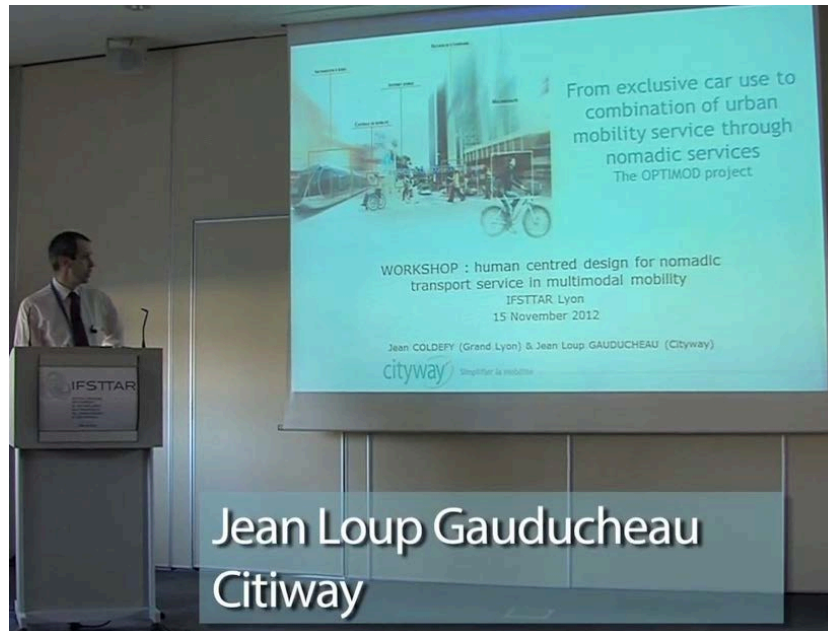


Fig 9: Eye movement analysis

It's an exciting time for Nomadic Devices ...and human factors : Nomadic Devices can deliver many services and the HMI design depends on the service ; however, human factors principles still apply so, there are advice and guidelines available

Legislation is developing mostly related to driver behaviour. Considering lock-outs and limits or general principles, there is the challenge of identifying technology-invariant measurements.

2.6 From exclusive car use to combination of urban service through nomadic services, The Optimod project (Jean-Loup Gauducheau, Cityway)



Full video and slides of the presentation available at <http://decomobil.humanist-vc.eu/Downloads.html>.

Summary:

After a brief presentation of the company Cityway, the main aspects of the project Optimod'Lyon have been described. The OPTIMOD Project aims to develop the infrastructures for three innovative services : improvement of road traffic information by the introduction of predicted traffic in trip calculation, development of an urban navigator on smartphone fed with real time Information of all transport modes and urban freight assistant (operator's journey and real time available delivery) places.

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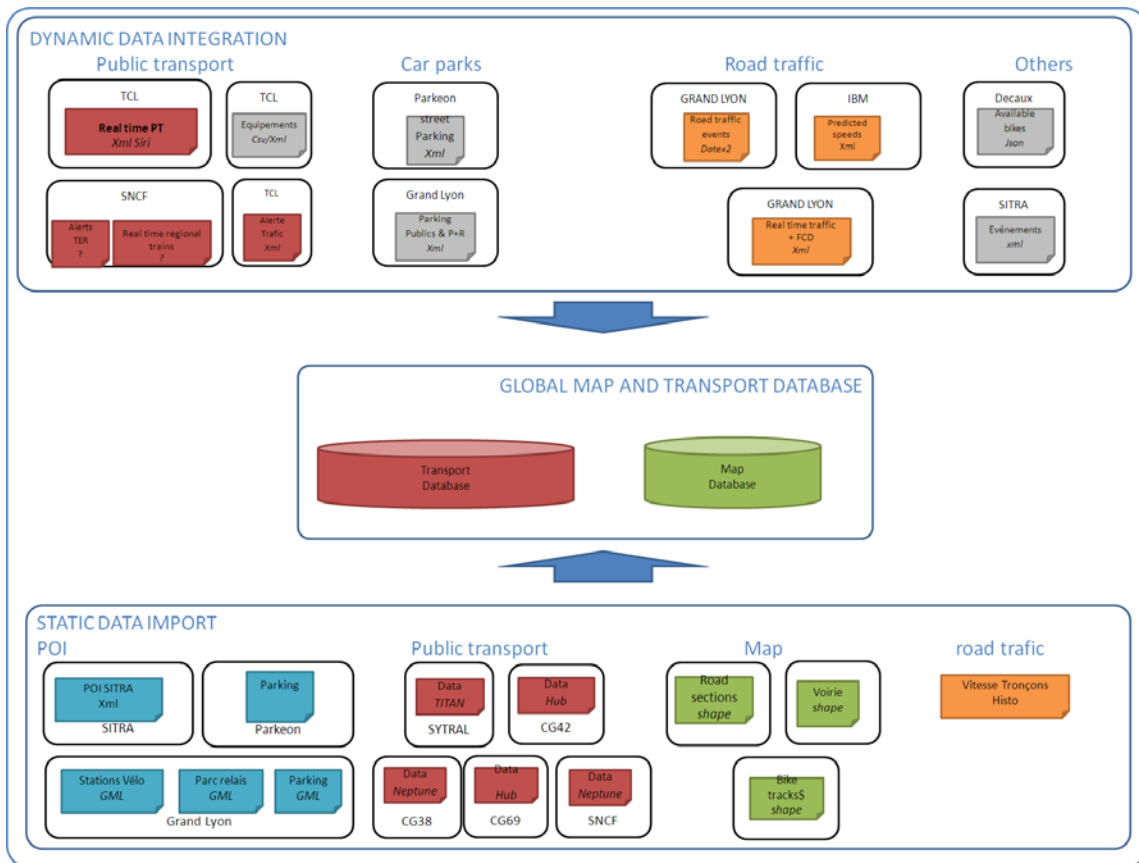


Fig 10: Globam Map and transport database

The personal travel assistant app is a real time planner, with all transport modes (public and private), giving predicted traffic and using satellite navigation for on-trip assistance.

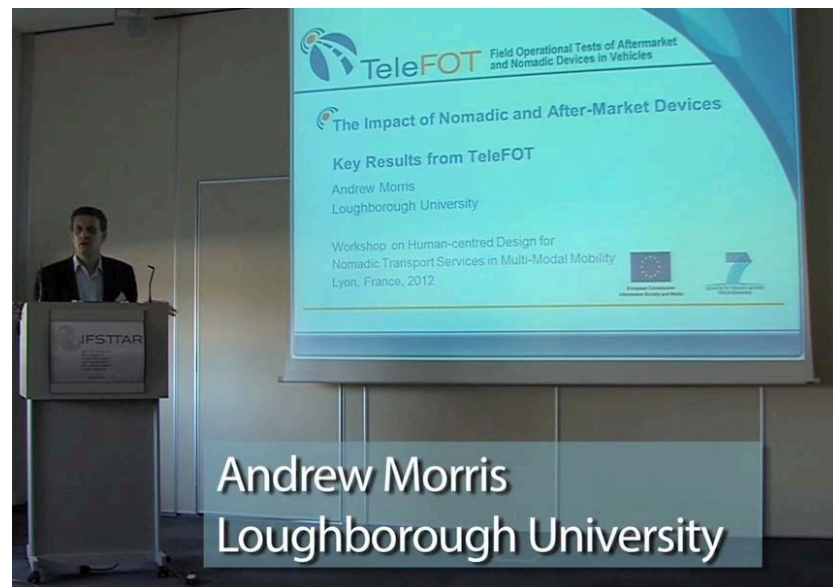


Fig 11: HMI model for the smartphone app.

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In the pre-trip functions, the multimodal journey planner gives information on road traffic, public transport, parking availability, bike sharing, displayed on a global or a detailed route. In the on trip function, the route can be refreshed, giving latest schedules and trip duration from real time information. The route recalculation occurs if the trip becomes impossible (severe delay, bikes or parks not available) and a new route is calculated taking into account the actual situation of the user (position, transport mode, user's settings).

2.7 The impact of nomadic and after-market devices, Key results from TeleFOT (Andrew Morris, Loughborough University)



Andrew Morris originally joined Loughborough University in 1995 but also worked as a Senior Research Fellow at the Monash University Accident Research Centre (MUARC) in Melbourne, Australia between 1997 and 2001. During this time, he worked on the Australian National Crash In-depth Study (ANCIS). Currently he is involved in a large programme of work which is evaluating nomadic driver information systems in real-world driving trials (the TeleFOT project). He is also interested in studying driver behaviour in naturalistic and experimental situations in the PROLOGUE and DaCoTA projects. Andrew also conducts Special Accident Investigations involving road crash and injury outcomes. Andrew's other research interests include vehicle passive safety performance, accident and injury causation and intelligent transport systems. He has published over 100 refereed technical publications, reports and conference papers in the subject of accident research and road crash injury. Andrew was awarded US Government Special Award of Appreciation in recognition of outstanding leadership and special contributions in the field of motor vehicle safety (June 2009).

Full video and slides of the presentation available at <http://decomobil.humanist-vce.eu/Downloads.html>.

Summary:

The key results from the TeleFOT project related to the impact of nomadic and after-market devices have been presented.

Using the Field Operational Test (FOT) Methodology – “Studies undertaken to evaluate a function or functions under normal operating conditions in environments typically encountered by the host vehicle(s) using quasi-experimental methods”- 2800 subjects have been tested in Large Scale FOT and detailed FOT. The TeleFOT impact areas were safety, mobility, efficiency, environment and user up-take (acceptance and adoption).

To cover the research question about distraction using in-vehicle device, hypothesis made was that the duration and/or frequency of glances to defined areas of the visual scenes change with the device.

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Crash-testing of nomadic device fittings have been conducted, in order to evaluate the injury risks in frontal/side/rear impact crashes for various types of low-cost customary fitting products.



Fig 12: Various types of low-cost customary fitting products for nomadic devices have been tested through crashes

The results showed considerable injury risk in rear-end collision with the device being hurled past the passenger’s head implying serious injury potential.

Through this project, there have been use of in-depth data collection procedures to support large-scale data collection.

In terms of safety, objectives were to study positive and negative effects on visual behavior and impact on driver distraction during aftermarket and nomadic device usage in addition to other potential changes such as speed or lateral/longitudinal control.



Fig 13: Illustrations of TeleFOT researches

Evaluation of the efficiency of the TeleFOT systems is considered from the driver’s perspective such as reporting on delays or on encountered traffic jams. A decrease in time spent following too closely the preceding vehicle would have been identified, with positive potential consequences in terms of safety and efficiency.

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Impact of the TeleFOT systems on the environment has been conducted by analyzing their effect on fuel consumptions and emissions (Green Driving Advisor system for car in UK and for bus in Finland).

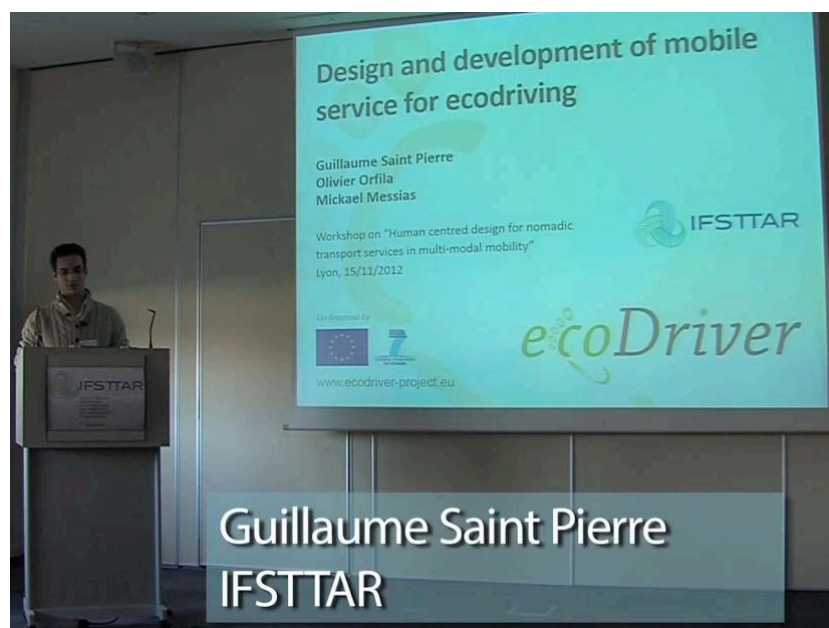
Overall evaluation by drivers indicated that Green Driving and Speed Info/Alert were used more often than Navigation Support and Traffic Information.

Nomadic devices change visual behavior in terms of frequency and duration of glances, with glances duration much less than 2 seconds.

Use of nomadic devices tended to improve car-following behaviour.

Main benefits were seen by drivers to be convenience (easy access to information), comfort (less uncertainty and errors), economic (less cost) and environment (fewer emissions).

2.8 Design and development of mobile service for ecodriving, the ecoDriver project (Guillaume Saint-Pierre, Ifsttar)



Guillaume Saint Pierre, born in 1975, holds a PhD in applied mathematics of the Toulouse III University. He is working at the Vehicle-Infrastructure-Driver interactions research unit (LIVIC) of the French institute of science and technology for transport, spatial planning, development and networks (IFSTTAR) since the beginning of 2007 as a statistician researcher. His work interests there are in understanding driver behaviour with the help of statistical analysis, road risk study, and fuel consumption analysis related to the driver usage of assistance systems. Before joining the LIVIC, he gained experience in statistical methodology as a post-doctoral fellow at INRIA, IRCAM, and INRETS, all French national research institutes. He is currently involved in various national and international research projects related to driving assistances impact assessment: U-Drive, EcoDriver and Volhand. He was recently involved in the first european large scale field operational test EuroFOT (ended in 2012) as the IFSTTAR responsible. He is also member of the European network of excellence HYCON2 (Highly-complex and networked control systems) and an active participant to the FOT-Net Specific Support Action, both EU funded.

Full video and slides of the presentation available at <http://decomobil.humanist-vc.eu/Downloads.html>.

Summary:

Efficient driving is a highly complex task. For pedagogical purposes, eco-driving is often summarized in short and simple advices (tips), but sometimes leading to a misunderstanding of the fuel-efficient driving strategy.

When drivers are asked to drive more efficiently, they generally interpret this as to drive slower, while reducing speed is not the only nor is it the optimal strategy for eco-driving.

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Furthermore, complying the speed limits does not necessary save fuel (ISA studies). In fact, there are several factors other than speed, which can influence both fuel consumption and emissions.

Eco-driving should be distinguished from hypermiling: hypermiling trades off safety for fuel economy, while there is no tradeoff with eco-driving.

Eco-driving is, at every moment, a multicriteria optimization (energy consumption, safety, travel time, comfort,...) of each driving task.

The goal of ecoDriver is to build a system that help the driver learning and maintain an efficient driving style. Drivers will receive eco-driving recommendations through a multimodal HMI (i.e., a combination of visual, acoustic and haptic messages). The message content and types will be adapted to the driving style and to vehicle characteristics in order to maximize fuel use efficiency and improve traffic flows –but without compromising safety.

One of the project goals is to test and to compare effectiveness of built-in and nomadic navigation systems in encouraging green driving.

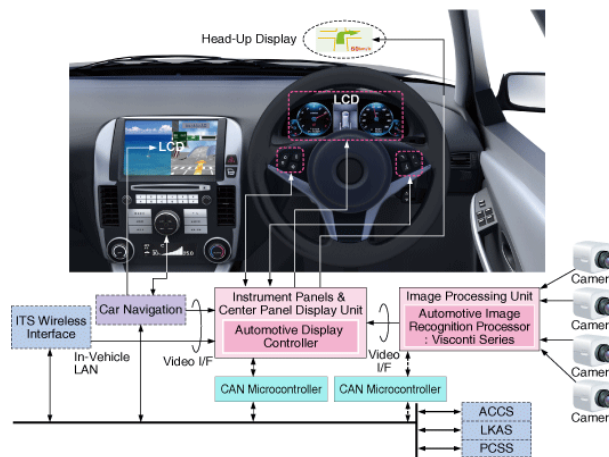


Fig 14: Built-in full ecoDriver system



Fig 15: Nomadic devices

The OEM partners of the project envisioned various options of HMI.

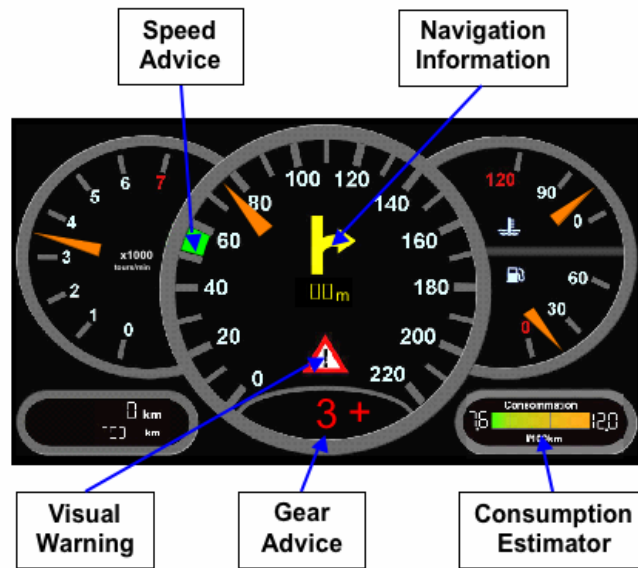


Fig 16: One example of HMI integrated in the dashboard by OEM

Many applications already exist for nomadic devices, presenting different HMI for different purposes and with mainly visual display till now. Few applications are providing different services in the same time.

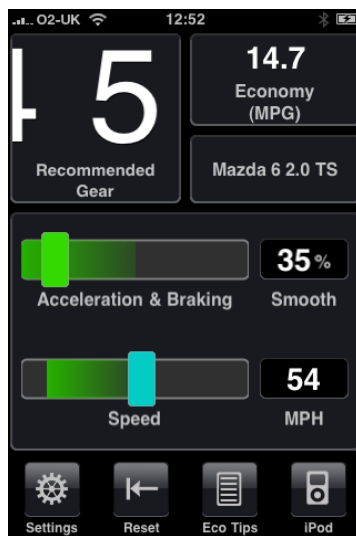


Fig 17: DriveGain



Fig 18: GreenMeter

For the HMI related to fuel efficiency, drivers better perceived instant information than aggregated information. There is little evidence of long term positive effects for instant information about fuel economy. The haptic pedal would work quite well but is not accepted by drivers and auditory feedback is often annoying.

In the project EcoDriver, the smartphone application uses Android and should adapt to these standards: back button always in the same place and use action bar instead of menu buttons.

The drivers' motivation for eco driving differs: time, fuel consumption or environmental factors but there are other factors influencing driving behavior: surrounding traffic, power of the vehicle. So, the system needs to adapt to drivers' skills and instant motivation.

Several questions need to be addressed:

- Nomadic application only for ecoDriving?
- Include a navigation service?
- How to adapt to driver's motivation?
- Is it acceptable to let drivers interact while driving?
- Is it acceptable to use a speedometer?
- How many different information can be provided?
- Interactions with social networks (facebook, google+) to improve attractiveness and competition between drivers?
- Associated website for detailed history consultation?

2.9 EcoMobility and cognitive ergonomics (Patrick Minot, Nomadic Solutions)



Patrick Minot is engineer CESI. He spent several years in Africa as professor in the electronic/automatic domain, then as project manager in the subsidiary firm ETDE of Bouygues. Back to France, he worked at Philips during 16 years, being successively project officer, project director and finally project technical director in the area of communication and safety. Among other projects, he participated to the creation of the sound system of the Disneyland resort in Paris and was in charge of the electronic conference system used nowadays by the European parliament of Strasbourg. Then, he created in 2003 in partnership with Philippe Orvain the society Nomadic Solutions in the area of on-board computer technology.

Full video and slides of the presentation available at <http://decomobil.humanist-vce.eu/Downloads.html>.

Summary:

The Nomadic Solutions company designs and distributes eco mobility products and has been laureate of several awards.

Eco driving taught and used in a large scale is a smart answer to reduce the mobility carbon footprint and will bring economical benefits.

For the eco driving training, the post training follow up is very important to get real benefits. There is a follow up necessity ; indeed, eco driving behaviour training is a long term process, it is not necessarily a natural way to drive a vehicle (moderate your acceleration but not

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imply, anticipate braking, take advantage of vehicle inertia,...these attitudes are not really natural).

This is what is proposed by the EcoGyzer system that reconstructs fuel consumption and CO2 impact upon driver attitude without can bus connection. This system allows following training benefits up with or without location data.

In automotive domain, the main issue for cognitive ergonomics is to identify driver needs in real time driving, keeping the absolute necessity of driver's safety.

Map display on GPS navigator is very efficient especially when the screen is well placed and no handling needed during the drive. By contrast, for an eco driving helping tool, the only efficient real time information is an on board alert when the driver exceeds threshold (turn, braking,...).

There are two types of drivers: private individual in personal mobility situation and professional drivers.

- For private drivers, the EcoGyzer version brings to consumer eco driving in general use. When driving, a single screen is displayed and a text2speech advises when exceeding the threshold. The post analysis is conducted with screen status and global note.



Fig 19: EcoGyzer illustration

- For professional drivers, there is a module version with or without a buzzer, which allows analysing, comparing, storing, collecting and sending data to a remote server with award of virtuous attitudes a posteriori.

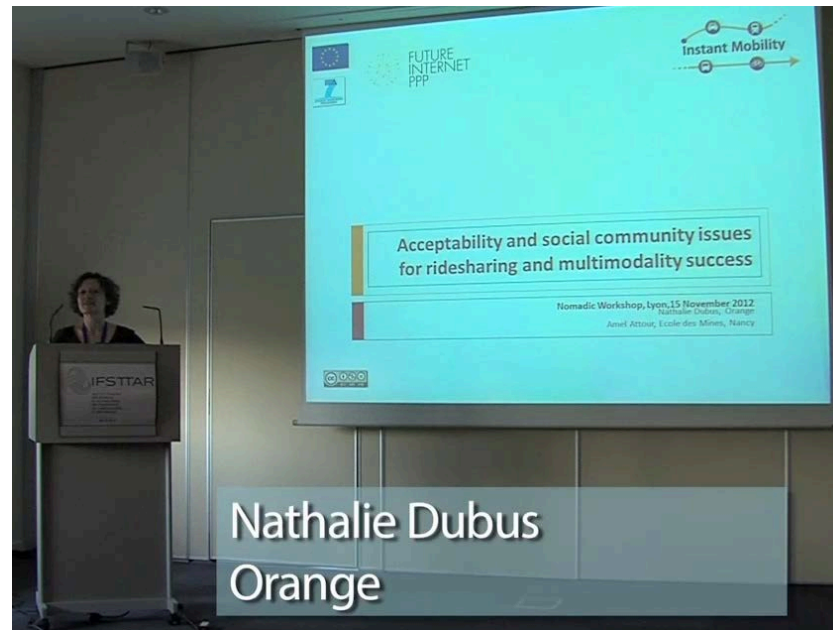


Fig 20: EcoGyzer professional version

- For eco driving purpose, performances real time display are not essential.

- Real time embedded alert (buzzer, light, text to speech) is sufficient to advise the driver.
- Scoring, ranking is a good emulation for driver but in batch mode.
- Follow up of eco driving behaviour by a big number of persons is vital to get sustainable result.

2.10 Acceptability and social community issues for ridesharing and multimodality success (Nathalie Dubus, Orange)



Nathalie Dubus is graduated from Sciences Po in Aix-en-Provence, has a Master degree in Information Management (Sciences Po Paris) and a Master degree in Public Management (Institut d'Administration des Entreprises of Nice). She is working as a project manager (certified Project Manager Professional) for Orange Labs since 1997, after 5 years in Credit Lyonnais also as a project manager. She was responsible for the HMI developments of a SME router for 5 years for Orange, and since mid 2011, she's in charge of the Work Package 6 Societal Issues of Instant Mobility PPP Future of Internet, which includes Acceptability studies, Business Cases and Security and Privacy issues.

Full video and slides of the presentation available at <http://decomobil.humanist-vc.eu/Downloads.html>.

Summary:

Instant Mobility is a European Project bringing together cities (Roma, Istanbul, Nice, Trondheim), solution providers and research institutes with the aim to study and evaluate the opportunities that future internet technology may bring in urban mobility (car, bus, tramway, bike, walk for instance).

The general aims of the project are:

- to resolve the mobility issues by including all the stakeholders : multimodal travellers, car drivers and passengers, public transport operators, carriers and fleet managers, road and traffic managers.
- to provide to travellers and vehicles drivers a mean to plan and adjust their multi modal journey, or better find ride sharing opportunities in a dynamic way, and according to their preferences, location and the real time conditions (traffic, timetables, prices, etc.)

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- to provide to public transport operators and the fleet managers a mean to optimize (for logistics actors: due to the e-commerce growth, a mean to organize load sharing, prevent re-delivery, use dynamic drop points, adapt the delivery to the consignee)
- to provide itineraries adapted and optimized in real time as all the means of transport

Objectives of acceptability studies are to evaluate the acceptability for a generalization of demand-driven multi-modal transportation services bases on real time and anywhere location, and advanced preferences in 4 cities: Nice, Istanbul, Roma and Trondheim.

Evaluation of acceptability is targeted toward present and future users perception, taking into account the fact that there are several factors influencing social acceptability.

As the applications were just conceptual, we decided to test the technological characteristics such as usability, easiness, security, confidentiality and the social factors such as intention of use and behaviour: how to find information to prepare the travel, actual practices (mobile or GPS usage), intention of use, privacy and traceability, positive factors.

Two types of population have been targeted: private users (travelers and drivers) and professional drivers. Several languages versions of the questionnaire were available.

The online survey was available for 4 cities: via institutional web sites (Nice, Istanbul, Roma), local government web sites, transport operators web site and email to transport tickets holders in Trondheim.



Fig 21: Online Instant Mobility survey on the web site of the Istanbul city

Some main results of the online survey:

- A majority of persons uses its own vehicle, with a very low ride-sharing activity
- There is a high demand for information while travelling
- Information is mainly get through web or mobile applications
- There is a large use of smartphones rather than traditional information in stations

Concerning respondents' opinions for real-time location and previous trip recording: more than 90% would accept to transmit their location in real time, more than 84% would accept

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trip recording, and more than 50% require anonymous recording, and good privacy preservation rules.

For respondents' personal preferences recording, more than 50% record them today, more than 90% would record them in the future and more than 70% would require easy management of their data (modify, remove, share, ...).

The customized services that are expected by the users are information while traveling in case of events (accident, road works ...), optimized itinerary matching preferences, duration of the trip, arrival time, mean of transport and, far after, security or price.

In terms of assessment of the service, more than 60% evaluated the service nowadays and more than 85% in the future. Criteria of assessment are punctuality and frequency for public transports (> 85%), punctuality and experience of the drivers for ride sharing (80%). Attractive terms for the service are simple access and easiness of the tool and possibility to evaluate it anonymously.

For the acceptability of location transmission, 26% would accept, 9% would not, and 65% would accept under conditions such as privacy, anonymity, trust, and a combination of these 3 aspects.

For the acceptability of travel recording, 21% would accept, 16% would not, and 63% would accept under conditions such as privacy, anonymity, trust, and a combination of these 3 aspects.

For the acceptability of personal preferences register, 23,5% would accept, 12% would not, and 64,5% would accept under conditions such as privacy, anonymity, trust, and a combination of these 3 aspects.

And, finally, regarding the evaluation of the Instant Mobility services, 80,6% accepted to do it readily while 19,4% did not for various reasons such as too long and too complicated, not interested, judgment of a person and additional other reasons.

To conclude, main results from the acceptability survey are:

A confirmed users' need for daily or regular information linked to transport commuting context

Importance of mobile use today for transport information purpose

Good acceptability of the future services, tailored to their preferences and with better quality, especially punctuality and frequency rather than comfort and security

Good acceptability from users for transmitting location information on real time as well as storage and personal preferences with conditions of anonymity, easiness and possibility to manage their own data.

The ride sharing factors of success have been identified:

- a critical mass of drivers and passengers has to be achieved quickly to develop a sustainable market
- incentive criteria:
 - o a community to build the trust
 - o alternative vehicles or car pooling for emergency or availability issues

- efficiency, relevance and punctuality of the users
- subsidies
- capacities: car pool lanes, parking facilities at the meeting points (cities, employers)
- levers
 - adaptation to users 'personal needs to give a sense of freedom
 - gamification and nudge
 - social networks to better manage information, communication, exchanges and pedagogy

There are several examples of ride sharing smartphone applications in US. Their factors of success are linked to the fun of use, the easiness and quickness of responses, the community driven. The trust is built on driving test, in-person interview and inspection of the vehicle in addition to ranking system of the drivers.

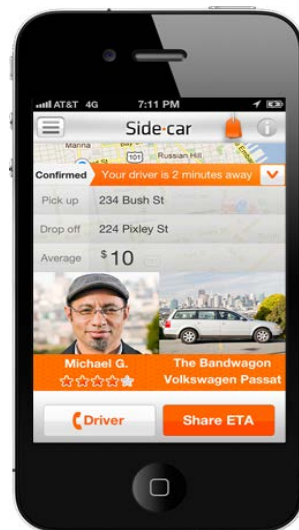


Fig 22: Ride sharing application on smartphone

The use of social network generate participation by creating interactive communities of citizens in addition to policy makers and service providers sharing the same interest in order to develop a new, ecological and collaborative way of travelling.

In terms of trust, using crowdsourcing data to better chose and social networking to make anonymous user location.

Furthermore, use of smartphones and Twitter automatic data collection in addition to human data collection via "driver generated content" allows to develop reality mining, combining "big data" sources to influence local authorities to encourage innovative use networks and modes of transport and to enhance multimodal community.

3. Discussion and conclusion

Several issues have been raised during the event through exchanges between speakers and participants.

Some general conclusions on the nomadic design issues in relation to users' acceptability and road safety are presented in the following paragraph.

- Even if technical solutions exist in order for the information on nomadic devices to be accessed easily, the type of information relevant to be delivered in relation to the localization of the travelers/drivers, and the way to display it, still needs to be investigated, especially according to the context (urban, peri-urban, interurban) and the type of user (novice, professional drivers, elderly or impaired traveler).
- Usability and legibility of information on nomadic devices is a challenge in terms of human centred design, due to the size of the screen and the mode of dialogue (tactile screen, small keyboard,...).
- Needs and requirements specific to elderly travelers in terms of trips typicality and motivation, in addition to characteristics of their perceptive, cognitive and motor abilities have to be integrated in the design of multimodal transport services on nomadic devices, as this population will increase in the coming decades and as mobility of this population is an important issue for the society, previous studies showing that it impacts on the level of senior good health.
- Success in being able to attract drivers out of their vehicles in urban area by offering high quality information on other modes of transport (public transport real time schedule and guidance to location of stops and stations, availability and location of parking, availability and location of self service bicycle stations) is closely linked to a better understanding of drivers' needs and requirements, in addition to habits of use in order to support nomadic applications development.

4. Future priorities

Following the workshop, a short questionnaire has been sent to all the participants to get feedback about their opinion and their view in terms of future research perspectives based upon their expertise and the discussion run during the workshop (instructions and full questionnaire in annex 2).

The main answers received following this survey are summarized in the following paragraph:

1- Nomadic Research issues related to safety (*priorities, bottlenecks, lacks, future focus in development, positive and negative impact, integration with other systems,...*)

Priority of research:

- driver's safe use of Nomadic Devices during driving (functions, type of interaction): this research is a priority due to the widespread of these mobile devices and the increase number of available functionalities.
- rider's safe use of Nomadic Devices during riding (functions, type of interaction): this research is a priority has the riding task is very different from driver task, and

almost no knowledge available about the specific context of PTW and the riders' behavior.

Lack of research

- Nomadic researches still need to be conducted on the consequence of the use of such systems on attentional focus and resources. For instance, it would be interesting to complete the study driven by M. Quaresma on visual interruptions while using nomadic system by a measure of the orientation of attentional focus. Indeed, as previously demonstrated by Posner (1980) the visual focus does not strictly correspond to the attentional one.
- Future focus on research understanding complex relationships between driver's attention (level of fatigue, experience in driving,) and nomadic system use (purpose of application, mode of dialogue...) could be useful to (1) improve driver security while using (reading, tapping, talking with, hearing, etc..) this kind of system; (2) improve the recommendations to drivers when they have to use them.
- Related to vehicles, the integration of different nomadic devices and the combined usage of IVIS and ADAS is an interesting issue for the forthcoming years (especially, for the evaluation of workload and, more in general, possible negative outcomes on road safety).
- The positive impact of the systems on some categories of drivers (elderly and novice but not only) should be evaluated through long-term research, which appropriately takes into account the possibility of behavioural adaptations to occur.
- Lack of research on impacts of attention and distraction for the drivers using nomadic devices, needs to set up adequate measures for drivers' workload adapted to this context
- International discussion and agreement by ad'hoc organisations such as IHRA-ITS or ISO have to be conducted to have an international consensus about criteria to take into consideration in order to define overload and distraction unsafe level for the driver using ND.
- Lack of knowledge on the mobile transport applications users' trust regarding information transmitted via social network supporting ridesharing. Travelers and drivers privacy due to personal information sharing has to be investigated in order to allow ridesharing to be fully efficient in urban and inter-urban trips. A better understanding of social acceptability would have a positive impact on reducing the number of vehicles on the road, for the benefit for ecomobility and the reduction of traffic congestion.
- Relevant metrics related to, for example, user engagement and travel choice influence, have to be defined in order to better understand the impacts of social media access on mobile devices.
- Good comprehension is needed about which services are currently used in car, their frequency and motivation of use in relation to targeted population such as novice and experience drivers, professional drivers, elderly, commuters, tourists and in relation to the context such as urban, peri-urban, motorway, countryside.

- The concrete modalities of integration of nomadic devices in a global cooperative information and communication system should be identified for sustainable transport in a perspective of implementation.
- Methodologies to assess safety use of smartphone applications while driving need to be developed and validated in order to be easily applied with low cost by developers for testing their services.
- Concrete specifications for hierarchy and logic of displays for several functionalities/applications simultaneously used in the same device have to be developed, based upon criticality and comfort in relation to transport context and type of user, in order for the mobile services to be used safely while driving and/or traveling.

Bottleneck:

- NDs will be used by different user groups inside the vehicle (driver; passengers).
 - needs and requirements towards safety are different for these user groups (i.e. safety requirements from a driver's perspective are different to those from a passenger' perspective)
 - the owner of a ND will often switch between the different user groups (i.e. the owner may be a driver for a certain time, then change to the role of a passenger, then back a driver again, and so on),
 - the ND has to meet different safety requirements and should be able to adapt to the different safety strategies needed for the different user groups. The "car mode" principle seems to be not sufficient, if the different user groups inside the vehicle are not taken into account.

2- Nomadic Research issues related to maturity of technology (*priorities, bottlenecks, lacks, future focus in development, positive and negative impact, integration with other systems...*)

Priority of research:

- Development on technical solutions to display the ND content on integrated screen of the vehicle (e.g.: mirror link technology) will allow:
 - a better legibility as, usually, in-vehicle screen have visor to protect against reflection and high ambience lighting,
 - an improved environment in case of crash for driver and passenger safety as, nowadays, the ND fixing support is not efficient in this type of critical context
 - a control of the display location as, for the moment, the ND can be fixed anywhere by the driver with sometimes very bad choices of location.
- Due to their spread out among population and the high number of available applications, ND are increasing safety risks for the driver unless integrated in the vehicle. Technical solutions to have an automatic link between the two systems (connection between the smartphone in the driver's pocket with the in-vehicle screen as soon as the driver sit into his/her vehicle) have to be fully operational, not costly and implemented in all the future vehicles.

- Robustness of ND vocal recognition capacities needs to be improved as it is a good mode of interaction between driver and system, allowing to keep the eyes on the road.

Lack of research

- Future technologies linked to Mobility issues such as Big data, contextualized data, NFC (Near Field Communication), Geolocation, Crowdsourcing and Machine To Machine need to be investigated for beneficial implementation in the specific area of transport mobile services.
- Standardization activities and commercial business models need to be developed in the area of communication between nomadic devices and the vehicle.
- Research should be conducted on the development of adaptive interface for nomadic device, taking into account the wide heterogeneity of users, and more specifically drivers, in terms of functional abilities, cultural background and experience.
- Creation of technological solutions that would allow avoiding driver mental overloading: modalities of optimization of the design and the features of the HMI taking into account the quickly evolving maturity of the nomadic technology.
- Modalities of integration of the nomadic functionalities with the other functionalities available in the vehicle.
- Research to develop a “supra-system”, or « intelligent manager system » like the “K2000 voice”, which would manage all the services used by the driver during his trip, including nomadic device functionalities, and delivers the information regarding to driver availability. Some prototypes related to this concept have been already developed, showing that the principle is relevant and efficient; additional development would deserve to be conducted taking into account maturity of the technology in this promising direction.

Bottleneck:

- Exchange of safety related data with vehicle-based systems.
- Development of nomadic device safe fixing in the car, able to resist to crash kinetic.

3- Nomadic Research issues related to guidelines and design recommendations (*priorities, bottlenecks, lacks, future focus in development, positive and negative impact, integration with other systems,...*)

Priority of research:

- Development of verification procedures and criteria for NDs related to the ESOP recommendations.
- Structuring recommendations and guidelines useful for designers, industrials and European working groups in order to improve next generation of mobile services, especially the one used in driving context.

Lack of research

- Educational programs about the use of nomadic systems while driving need to be developed taking into account the fact that more and more functionalities are going to be available through ND, with some of them supporting the driving task or at least relevant in this context (ecodriving, ridesharing, alert information, navigation, traffic information, parking location,...).
- Identification and adaptation of relevant guidelines and standards available for in-vehicle systems to be applied to mobile services used while driving.
- Providing recommendations including ethical and personal security guidelines for the design and the operation of social media sites to support transport applications such as ridesharing or “driver or traveler generated content” for alert messages, for example. This can encompass delivery channels and multiple hardware platforms.
- Setting up design criteria and recommendations build up following human centred design process, considering heterogeneity of drivers population, including novice and elderly, to be used by designers/developers of nomadic devices, in order to prevent misconception, and with the objective of a safe use of nomadic devices into the vehicle.
- Developing guidelines on appropriate affective, that is to say attractive, and persuasive HMI principles for eco-driving support design, with the objective to encourage the driver to maintain his/her eco-driving behavior at middle and long term perspective.
- Covering issues of short versus long- term behavioral adaptation effects of different eco-driving schemes and HMI’s, as well as propose certification methods for eco-driving schemes assessment.
- Investigating legal issues and need for standardisation for mobile services and nomadic devices.
- Developing guidelines for ND design in relation to ESoP as a good basis for mobile functionalities but taking care of not being too quantitative and prescriptive with the potential consequences of reducing scope for innovation and progress, especially in this area where technical features are rapidly evolving.
- International agreement on regulations about in-vehicle usage of non-integrated nomadic devices, as nomadic devices can be a source of danger for the driver and the passengers seating in the car (for instance, in the event of a crash in relation to a poor fixing ND support).

Bottleneck:

- Agreements between ND manufacturers to respect the ESoP or any recommendations about ND design and fixation in the car that would be relevant for road safety.

4- Nomadic Research issues related to ecomobility (*priorities, bottlenecks, lacks, future focus in development, positive and negative impact integration with other systems,...*)

Priority of research:

- Investigation about impact on public transport and self-service bicycle use through development and widespread of nomadic multimodal transport service.
- Modalities of integration in the same user friendly interface of the several ecomobile functionalities available on ND: updated information to the driver about alternative routes with the subsequent advantage of reducing fuel consumption and decrease congestion, information about driving style in terms of fuel consumption and emissions, and suggestions to change towards a more eco-friendly driving one, driver information about alternative transport means to reach final destination (for example, metro, bus, walking) and about the respective environmental impact associated to each of those transport mean. Objective is a single device for different information in different contexts and different modes of transport.

Lack of research:

- Assessment of usability and usefulness of transport services (all kinds, all modes) available on mobile phone.
- Development of multi-modal and eco mobility functionalities for nomadic service that would be user friendly and easy to access through, for example, development of ergonomic mock-ups (to support designers and developers processes).
- Definition of information content being communicated any time any where for an optimized use according to sub-group of the population: drivers, pedestrians, passengers of public transport, young or old travelers...
- Identification of needs of information for diversified population of travelers in the context of multimodal transport (pre-trip, on-trip) when considering multi-modal transport (public transport, self-service bicycles, car-sharing,...).
- Gathering knowledge on social media linked to transport and its potential for influence of sustainable travel choices and ecodriving practices.
- Investigation of long term learning effects of an eco-driving system presenting affective and persuasive HMI characteristics and their potential impacts on decrease of CO2 production and fuel consumption.
- Setting up design recommendations for mobile services beneficial for ecomobility that would allow supporting Small and Medium Enterprises and companies designing and developing mobile services and ICT solutions for sustainable transport, making them more efficient in developing accepted services then more competitive in an international market.
- Experimentation of ecomobility services usage cases in cities (e.g. FOT focusing on ridesharing, ecodriving functionalities on ND).

Bottleneck:

- Adaptability and usability of ND functions, especially for elderly users, so there is no category of population excluded from using ecomobility ND services for an optimized global impact in addition to ethical aspects fulfillment.
- Transfer of favorite settings (functions, links, display settings etc.) to a new device generation, in order to get the new device quickly adapted to personal requirements and reduce time for learning the new system.

ANNEX 1

List of participants

Support action to contribute to the preparation of future Community research programme in user centred Design for ECO-multimodal MOBILity - DECOMOBIL

first name	last name	company
Anabela	Simoies	ADI/CIGEST
Roland	Schindhelm	BASt
Marie-France	Dessaigne	Cabinet ERGONOMOS
Emil	Drapela	CDV
Stella	Nikolaou	CERTH-HIT
Jean-Loup	Gauducheau	CityWay
Amel	Attour	Ecole des Mines de Nancy
Elodie	Chateauroux	ERGOPTIM
Céline	Grange-Faivre	ERGOPTIM
Juliane	Haupt	FACTUM OG
Jessica	Conradi	FRAUNHOFER
Jean	Coldefy	Grand Lyon
Jean-Pierre	Médevielle	HUMANIST
Lucile	Mendoza	HUMANIST
Corinne	Brusque	IFSTTAR
Hélène	Tattegrain	IFSTTAR
Guillaume	Saint Pierre	IFSTTAR
Annie	Pauzié	IFSTTAR
Christophe	Jallais	IFSTTAR
Valérie	Lancelle	IFSTTAR
Nathalie	Dubus	Orange
Matus	Sucha	Palacky University
Manuela	Quaresma	PUC-Rio University / LEUI
Lena	Fredriksson	TRIVECTOR
Alan	Stevens	TRL
Raymond	Hoogendoorn	TU Delft
Josef	Krems	TUC
Marta	Pereira	TUC
Giulio Francesco	Bianchi Piccinini	UNIVERSITAS
Anita	Tontsch	Universitat de Valencia
Roberto	Pangallo	Universitat Politecnica de Catalunya
Céline	Lemerrier	Université de Toulouse
Andrew	Morris	University of Loughborough
Nuria	Sanchez	UPM
Björn	Peters	VTI
Virpi	Britschgi	VTT
Marcus	Schmitz	Würzburg University
Moahammad	Nozari	

List of participants attending the meeting

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Number of DECOMOBIL web visitors: 51 visits on the page allowing downloading the slides and the videos, representing 15.89% of total visits on the project website.

Number of YouTube visitors: 56 visits for videos displays

ANNEX 2
Questionnaire sent after the workshop
to the participants



WORKSHOP

HUMAN CENTRED DESIGN FOR NOMADIC TRANSPORT SERVICES IN MULTI-MODAL MOBILITY

Your comments

Following your participation to the Nomadic Workshop, we would be interested to have your comments and opinions about research issues related to nomadic design in transport.

Thank you to fill in this document, your feedback will be included in a report produced in the framework of the European Decomobil project.

1- Nomadic Research issues related to safety (*priorities, bottlenecks, lacks, future focus in development, positive and negative impact, integration with other systems,...*)

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2- Nomadic Research issues related to maturity of technology (*priorities, bottlenecks, lacks, future focus in development, positive and negative impact, integration with other systems...*)

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3- Nomadic Research issues related to guidelines and design recommendations (*priorities, bottlenecks, lacks, future focus in development, positive and negative impact, integration with other systems,...*)

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4- Nomadic Research issues related to ecomobility (*priorities, bottlenecks, lacks, future focus in development, positive and negative impact integration with other systems,...*)

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ANNEX 3

Presentations