

ELSA

in Transport

**European Large Scale bridging Action
(ELSA)**

**Report of the Thematic Working Group
"Transport" for the Visby Conference,
10-11 November 2009**



This report is the result of three stakeholder meetings (industry, public sector and eSafety Forum observers) that took place during September 2009 organised by the European Commission (DG INFISO/G4). It represents the discussions that took place during these meetings and subsequent consultations, but is clearly 'work in progress'.

1. Introduction

Transport represents one of the **most serious socioeconomic challenges** we face in Europe today. While a lot of progress has been achieved in the European transport sector over the last ten years since the launch of the 2001 White Paper on European Transport Policy¹, we still need to work over the next decade on the main policy goals, namely in achieving **a low-carbon economy, a sustainable transportation system and improving drastically safety and security**, in particular road transport safety.

Regarding the environment, while progress has been achieved in reducing air pollution and improving air quality, advancement in reducing emissions of Green House Gases, most notably CO₂, has been disappointingly slow, with about 12% of the overall EU CO₂ emissions coming from passenger cars' consumed fuel.

The review of the EU Sustainable Development Strategy² stressed the fact that while availability of affordable transport has benefited us all, we suffer from downsides such as congestion, health impacts and environmental degradation. The transport sector is also the only sector where the CO₂ emissions are still on the increase: as the economy grows, so grows transport demand, and despite significant improvements in vehicle and engine performance, negative impacts are rising and the current trends are unsustainable. **It is clear that further measures are necessary to reduce the negative environmental impact of transport.**



Regarding safety, we have achieved substantial reduction in the number of fatalities, from 50.000 in EU-27 in 2001 to less than 39.000 today. New technologies, such as Intelligent Vehicle Safety Systems and Intelligent Transport Systems (ITS) play an increasingly important role. This was recognised by the mid-term review of the 2001 White Paper³ which stressed the key role of innovation in ensuring

sustainable, efficient and competitive mobility in Europe. However, we know that the objective to reduce casualties by half in road accidents by 2010 introduced in the White Paper will not be achieved **and further measures are urgently needed in road safety as well.**

The EU has recently set very ambitious targets to its transport sector, and responding to these, the European Commission has initiated a number of actions which address them.

¹ COM(2001) 370 - White Paper European Transport Policy for 2010

² COM(2005) 658 - On the review of the Sustainable Development Strategy - A platform for action

³ COM(2006) 314 - Mid-term review of the European Commission's 2001 Transport White Paper

At the Spring Council 2007, the EU Heads of State and Governments committed to **increase energy efficiency in the EU in order to save 20%** of the EU's energy consumption compared to projections for 2020. This commitment is guiding the Commission's actions both on short term and long term.

On short term, **the ITS Action Plan**⁴ introduced a number of measures for promoting safer and more sustainable transport in Europe by the wide-scale deployment of Intelligent Transport Systems in Europe. This joint programme of five Commission services, including DG INFSO, is currently under implementation.

On longer term, the Commission has started the debate on the European Transport Policy for 2020. As a reaction to EU's policy goals, **decarbonisation of transport** will be a goal of this transport policy, on equal footing with safety. The recent Communication on sustainable transport⁵ launched a process which will lead in 2010 to a new White Paper. It emphasises the role of new technologies and especially Information and Communications Technologies (ICTs) in solving the abovementioned European transport problems.

The benefits of mobility can be provided with lower economic, social and environmental impacts by reducing the need for transport, by making better use of infrastructure and of vehicles, by changing modes of transport, by using cleaner vehicles, by developing alternatives to oil, especially with new technologies. **Technological innovation will be a major contributor to the solutions needed to address Europe's transport challenges.** New technologies will provide new and more comfortable services to passengers, increase safety and security and reduce the environmental impacts.

It is imperative to address during the next decade these major socio-economic challenges, namely environment and safety, while other related societal trends such as ageing and urbanisation require attention as well. Europe's transport system must be capable of playing its full role in satisfying the mobility needs of the European economy and society. This transition to sustainable mobility and low carbon society is possible with the right technology approach. Consequently, we should consider **European Large Scale bridging Actions (ELSA)** in the area of Transport, with the goal of providing **Innovative ICT solutions for Carbon and Accident Free Transport.**

2. ELSA: European-scale projects spanning from RTD to deployment

With the recognition that the public sector can play an important role in driving research and innovation and opening up new markets for innovative products and services, and to speed up **the achievement of specific societal goals**, the EC is considering how to support a set of **focused projects of significant scale and duration** that cut across the innovation cycle to develop modern pan-European service infrastructures. These initiatives, tentatively called European Large Scale bridging Actions (ELSAs) will mobilise a critical mass of resources, including grants for R&D, pre-commercial procurement and support for innovation and deployment. In the area of ICTs, the

⁴ COM(2008) 886 - Action Plan for the Deployment of Intelligent Transport Systems in Europe

⁵ COM(2009) 279 - A sustainable future for transport: Towards an integrated, technology-led and user friendly system

proposal for ELSAs is contained in the 2009 Commission Communication "A Strategy for ICT R&D and Innovation in Europe: Raising the Game"⁶.

In all, four ELSAs in different domains are being discussed. Each ELSA will:

- address societal challenges by modernising public services
- defragment European markets for ICT innovation
- speed-up time-to-market/return-on-investment for innovative ICT-based solutions
- increase private and public investments in research and innovation
- accelerate uptake of ICT innovations in public services

The expected **impacts** of ELSAs are:

- less fragmentation on both demand and supply side, e.g. via common technical specifications
- less likelihood for lock-in
- faster innovation cycles, leading to expanded private and public investments
- higher quality, more effective and efficient public and private services
- cost and risk reduction by working together
- cost reduction by innovative solutions

3. The Objectives of ELSA in Transport

In 20-30 years time-frame, we should be achieving a transport system which is carbon-neutral or carbon-positive, and virtually accident free. Achieving this goal needs all stakeholders in Europe to be mobilised, innovative leadership, innovative solutions and using effectively the whole R&D and innovation chain, including demand-side measures in an operational environment of informed system users/consumers.

The focus of ELSA in Transport will be in road transport as this sector presents the largest challenges; however it will address all modes of transport and interfaces between them, following Europe's Transport Policy principle of co-modality, especially on transport network nodes where modal transactions are taking place.

The work will be based around three axes, namely Research Challenges, European-Wide Service Platform and Large-Scale Test Beds. Carbon-free and accident-free transport stands as highly challenging technical and economical objective with a potentially profound impact on a sector where policy matters and decisions are often split between EU, national, regional and local administrations. However, as energy efficiency and environmental sustainability and road safety are on every government's agenda, it will be imperative to align pertinent national and regional initiatives with ELSA. Due to the considerable complexity of any transport system entails, this alignment may well be achieved by setting-up **ELSA Large-Scale Test-Beds**, aiming at modelling concepts and thus paving the way for full deployment at European scale.

⁶ COM(2009) 116 - A Strategy for ICT R&D and Innovation in Europe: Raising the Game

4. ELSA in Transport: the research challenges

4.1 Building on ongoing actions

This work will build on research in the ICT for Transport Area in FP5, FP6 and FP7, which has currently a project portfolio of about 250 M€ of Integrated Projects and Strategic Projects addressing safety and increasingly energy efficiency, including technologies for Fully Electric Vehicles.

It also builds on the work of the Joint Technology Initiatives ARTEMIS and ENIAC which have a range of projects addressing the automotive sector, and European Technology Platforms, in particular EPoSS and ERTRAC, as well as the Intelligent Car Initiative, the eSafety Forum and its R&D Working Group. The European Green Cars Initiative is also an important precursor for ELSA in Transport. In this Public-Private Partnership, DG INFSO contributes with technologies for Fully Electric Vehicles. The work will draw conclusions and use best practices from a variety of instruments, models and tools like R&D, Public Private Partnerships and **Pre-commercial Procurement**⁷.

ARTEMIS (Advanced Research & Technology for Embedded Intelligence and Systems)

The ARTEMIS Joint Undertaking, established in February 2008, is a public-private partnership between the European Commission, Member States and ARTEMISIA, a non-profit Industrial Association which represents the research community. ARTEMIS aims to tackle the research and structural challenges faced by the industrial sector. The ARTEMIS JU manages and co-ordinates research activities through open calls for proposals within a 7-year €2.4 billion research programme on Embedded Computing Systems.

ENIAC (European Nanoelectronics Initiative Advisory Council)

ENIAC Joint Undertaking (JU) is an innovative public-private partnership aimed at leveraging private and public investment in the sector of nanoelectronics in Europe. It fosters R&D collaboration between all stakeholders such as industry, European Commission and national authorities, academic and research centres, pulling together and focusing the research effort. The ENIAC Joint Undertaking is set up for a period up to 31 December 2017. The total volume of research activities of the JU will be in the order of € 2.4 billion.

EPoSS (European Technology Platform on Smart Systems Integration)

EPoSS is an industry-driven policy initiative, defining R&D and innovation needs as well as policy requirements related to Smart Systems Integration and integrated Micro- and Nanosystems. The EPoSS Members are major industrial companies and research organizations from more than 20 European Member States, who co-ordinate activities in Smart Systems Integration.

ERTRAC (European Road Transport Research Advisory Council)

ERTRAC was launched in 2002 by high level representatives of all the major stakeholder groups in European Road Transport to develop a shared vision, and ensure timely, co-ordinated and efficient application of research resources to meet the continuing challenges of road transport and European competitiveness. ERTRAC members represent consumers, vehicle manufacturers, component suppliers, road infrastructure operators and developers, service providers, energy suppliers, research organisations, cities and regions as well as public authorities at both European Union and national level.

The Intelligent Car Initiative and the eSafety Forum

The eSafety Forum is a joint platform involving all the road safety stakeholders. The general objective of the Forum is to promote and monitor the implementation of the recommendations identified by the eSafety Working Group, and to support the development, deployment and use of intelligent integrated road safety systems. The Forum was established by the Commission in close co-operation with the industry, industrial associations and public sector stakeholders early in 2003. The Forum organisation is managed by the Steering Group, and it organises regular Plenary Meetings. In 2006 the Forum became one of the three pillars of the Intelligent Car Initiative.

⁷ COM(2007) 799 - Pre-commercial Procurement: Driving innovation to ensure sustainable high quality public services in Europe

The European Green Cars Initiative

The European Green Cars initiative is a dedicated public-private research programme announced in the European Economic Recovery Plan. In order to ensure the rapidity of the response, existing mechanisms to fund research under FP7 will be used for the first wave of projects. Four first calls have been published in 2009 that will focus on electrification of the road transport and research into hybrid technologies. More specifically, the three major research and development avenues are contained within the RTD pillar: Research on electric and hybrid vehicles, Research for heavy duty vehicles based on internal combustion engines (ICE) and research on logistics and co-modality combined with intelligent transport system technologies. The total value of research partnership between public and private sector will be €1 bn (for the period 2009-2013), of which €0.5 billion will be Community funds. DG INFSO research focuses on technologies for Fully Electric Vehicles, with funding of 120 M€

4.2 The Changing Paradigm

There are already considerable efforts made in Europe to develop new ICT based solutions for addressing the efficiency and safety of transport, most notably in Co-operative Systems which are moving to Field Operational Tests, in automated driving, in in-vehicle safety systems and many technologies and systems for improving efficiency of transport, both on-board and traffic management.

However, at the moment we are on the verge of a **major paradigm shift** which is enabled by the future Internet technologies, wireless broadband connectivity, Cloud Computing and new Internet business models.

Future internet technologies **may completely change the connected car paradigm**, if the relevant enabling technologies including mobile broadband access, communication protocols (including IPv6) and trust and security are mature enough to support the introduction of this advanced new concept, and if the relevant enabling framework exists. Wide-scale take-up needs also interoperability which can be brought up only by standardization, preferably global.

In this future scenario, personal information is available anywhere at any time. We see elements of this already, in the form of 3G phones, in-vehicle telematics terminals, WiFi hotspots etc, but in the new scenario access is completely seamless and there is no loss of connectivity. All environments, **home, office, car and leisure, as well as road infrastructure**, are context-aware: systems and devices are able to sense how, where and why information and content are being accessed and respond accordingly. A key building block of this future scenario is the European-Wide Service Platform.

4.3 The European Wide Service Platform

Global and local access to the wealth of mobility applications and services needs the development of a **European-Wide Service Platform**, as the enabler of the mobility of the future

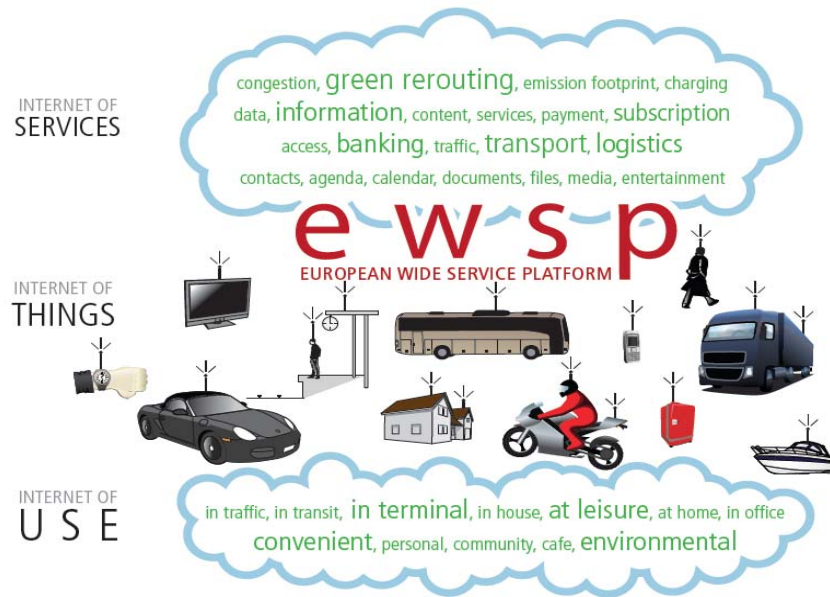


Figure: Industry's view on EWSP

The European-wide Service Platform (EWSP) will potentially fulfil the expectations and needs of all travellers in Europe, wherever they are geographically, whatever access terminal they are using, and whatever the transport mode. The service deployment of the EWSP consists of subsystems like service development, service offerings, service discovery and operations as well as of authorisation/authentication, subscriptions/identification, payment/billing/charging and CRM in order to have full independence from existing service concepts of today.

The most critical issue related to the EWSP is the business model. It is clear that the business model is a web-based service model. Examples of such service platform already exist, like the FP7 Integrated Project EURIDICE. The basic concept of EURIDICE is to build an information services platform centred on the individual cargo item and on its interaction with the surrounding environment and the user. Integrated project CVIS is developing the same concept for a variety of mobility services.

Regarding the business model, there are a number of issues to be solved. Who owns the wealth of data flowing in from millions of cars and users? How to leverage on this data, and turn this to cash flow? How to solve trust, security, liability and privacy issues? It is clear that a number of socio-economic studies are needed to clarify the concept of EWSP. It will be essential to be able to reply to the question: “why should stakeholders invest on new transport technologies?” All stakeholders have to plan new investments with clear perspectives in terms of benefits. New transport systems need to be affordable for all actors in the value chain, while public bodies should find solutions to their policies in the implementation of the new transport systems. Quantitative and qualitative market analyses will be essential to create and evaluate specific marketing plans, to define the different market segments and their specific requirements and to define appropriate communication strategies to bridge the technology with the public.

Regarding services, EWSP has to support various services for various user groups, like on-board users, public sector interest users, automotive manufacturers, road infrastructure managers and external 3rd party users. They all have certain specific interests, making full interoperability and openness of EWSP difficult. The EWSP design

has to allow for the different viewpoints of these user groups: The Community viewpoint with emphasis on mobility, safety and environmentally sustainable aspects, service market viewpoint moving towards open service delivery of value added services, and viewpoints of automotive industry (OEMs), component supplier and after market service providers.

4.4 Research Challenge: ICTs for Carbon-Free Transport

Fully Electric Vehicles are currently considered the cleanest option due to zero local emissions and potentially low total greenhouse gas emissions (depending on how the energy is produced). As 73% of all oil in Europe is consumed by transport, the introduction of FEVs should be a first priority for savings of and independency on the most critical source of primary energy. Ultimately the energy can be produced by renewable energy sources, bringing the total emissions to a very low level. Beside the environmental impact, also energy efficiency will increase by mobility based on electric vehicles.

However, future transport is expected to be based on **multiple vehicle types** starting from vehicles with efficient combustion engines, including many different vehicle types with hybrid powertrains and range extenders, Fuel Cell and the Fully Electric Vehicles. The current estimate is that in 2020 10% of vehicles will be electric. Therefore research has to address all the technologies for low carbon transport, including the necessary interfaces to intelligent infrastructures. In particular research and development has to cover the interaction among the vehicles and the road infrastructures for recharging of the electrical vehicles.

The research in ICT for Carbon-Free Transport will cover freight and logistics, technologies for clean and efficient mobility and fully electric vehicles and their integration with transport, and energy and communications infrastructures. These three research areas have the potential to significantly lower transport-generated carbon emissions. The research in Fully Electric Vehicles contributes to Europe's Green Cars Initiative (EGCI). This initiative is one of the three PPPs included in the Commission's recovery package. The envelope for this initiative is foreseen at €5 billion to boost to the automotive industry in a time of economic hardship, and support the development of new, sustainable forms of road transport. As for other PPPs the Green Car PPP is led by the Commission in consultation with MS and key industrial stakeholders. This initiative can be seen as a pre-cursor for ELSA.

- **Research in freight transport** will benefit⁸ from new ICT services based on ICT-equipped freight objects (such as vehicles, containers and shipments) which know their present location and are autonomous, self-aware and capable to communicate with their environment. Research will focus on the full integration of such Intelligent Cargo items into the transport infrastructure for efficient and clean freight transportation. Research will also address safety and security (at parking areas and on the move) that are critical in the transportation of precious and dangerous goods.

Research will allow efficiency of processes to be improved and enables new value adding features. Warehouses will become completely automatic with items being checked in and out and orders automatically passed to the suppliers. Goods may be transported without human intervention from producer to consumer and the manufacturers will have a direct feedback on the market' needs. The production and

⁸ COM(2007) 607 - Freight Transport Logistics Action Plan

transportation can be adapted dynamically saving time, energy and the environment. Executable code in the tags enable the object in transit to make intelligent decisions on its routing based on information received via readers or positioning systems, helping to optimise the forwarding of the item and delegate routing authority from the transporter to the manufacturer or the customer.

- **Research in ICT for clean and efficient mobility** will focus on developing more efficient applications for energy efficiency in the following key technology areas: Eco-Traffic Management and Control Systems, Eco-Demand and Access Management Systems, Eco-Navigation and Travel Information Systems, Eco Driving and Driver Behaviour Change via the novel concept of driver training on the move, at the same time rewarding mechanisms will also be analysed.
- **Research in ICT for Fully Electric Vehicles** will contribute to the significant improvements in performance, efficiency, complexity management, system integration, safety and cost reduction of FEVs. Research will focus on architectures, (power)electronics and smart systems for energy storage (including energy management), drive train (drive-power electronics-active and adaptive control), energy recovery optimization through braking system and vehicle integration, grid integration and interfaces, all requiring thorough modelling, simulation, implementation and testing of overall systems and subcomponents. Furthermore it will address on-board systems, safety aspects of new vehicle concepts, passive, preventive safety and crash mitigation, safety of high-voltage systems), vehicle-infrastructure aspects (information systems, energy measuring systems, vehicle-charging system interoperability) and electric vehicle in transportation system (traffic and network management for electric vehicles).

4.5 Research challenge: ICTs for Accident-Free Transport

Accident-free transport is an extremely ambitious but worthy objective, a real European challenge. Introduction of electronic components is the key to improve the safety of the drivers and the environment. Vehicles and road infrastructure will be able to communicate and autonomously gather ambient information. Vehicles will help the driver to keep safe distance to the vehicles in front and will support the prevention of dangerous actions like speeding in bad weather conditions etc.

The research will build on the ongoing research on Cooperative Systems, and will involve future research in automated driving:

- **Co-operative systems** are based on advances in mobile communications and on-board processing and sensor performance, the availability of broadband wireless communications infrastructure, the availability of geographic information and enhanced digital maps, together with the planned deployment of the European satellite navigation infrastructures, EGNOS and GALILEO. Co-operative systems will enhance the support to all transport and road users, enhancing traffic efficiency as well as road safety and security by enlarging the perceivable horizon and offering relief in case of emergencies. Furthermore, co-operative systems offer to the public sector the necessary tools for better managing the transport networks, increasing safety and efficiency and managing congested driving scenarios to reduce CO2 emissions. R&D will focus on the integration of different communication bearers (including IPv6) into interoperable platforms, on the development of enabling technologies like the precise and low cost relative localisation of vehicles, on the new generation of integrated seamless services that will become accessible via different

means, on the accessibility and usability of new functions in different transport means (private and public).

A sustainable deployment strategy should be implemented starting from the implementation of cooperative systems in vehicles fleets and from the upgrade of existing road infrastructure.

- **Assisted and automated driving** is seen as the only way to further reduce accidents and fatalities in Europe, eventually arriving to accident-free transport (the so called vision of zero). Furthermore, automation helps also in reducing CO₂ emissions in transport and thus achieving the environmental goals. Research in this area will build on the work on cooperative systems, and has very strong international links. Technologies for single-vehicle automated driving and platooning will be addressed e.g. in specific context highway sections with high congestions to reduce accidents and emission of pollutants. Technologies for driver monitoring will evolve to trigger, in case of driver negligence or illness, temporary autonomous driving towards vehicle safety conditions. Assistance systems will move towards an integrated platform which is able to support the driver in all possible manoeuvres and to give to the driver only appropriate warnings in simple and understandable way.

To comply with road safety requirements, the level of reliability, robustness and performance of the systems for automated driving must be significantly improved, and validation and certification methodologies need to be developed. Liability framework for automated driving is currently incomplete, and needs to be developed. Additional research efforts are needed to make today's components and systems more reliable and fail-safe, including reliable fail-safe sensors and sensor networks and fail-safe software architectures and communications systems. Field Operational Tests will be used for testing the developed vehicle concepts.

Advanced Transport Systems Ltd introduced the Personal Rapid Transit system (PRT), an innovative fully automated transport system designed to meet the need for congestion free, multi origin, multi destination public transport. The first reference project at Heathrow Airport is entering passenger service in 2009.

4.6 Research Challenge: The Connected Car and future technologies for Internet

The future internet technologies will change the connected car paradigm, when relevant technologies (broadband wireless access, trust and security framework) are mature enough to support introduction of advanced service concepts. Building on the research on Co-operative Systems, the Connected Car of tomorrow has an important role as a communication and access platform for a huge variety of European wide services and applications. These services not only cover the traffic and transport context, but serve for wider personal needs.

In order to facilitate the above, we need a **European-wide Service Platform (EWSP)** to fulfil the expectations and needs of the people enjoying the wireless mobility.

The EWSP would cover the various roadmap developments envisaged from various viewpoints. The Community viewpoints have put emphasis on **mobility, safety and environmental sustainability** while the service market viewpoint which has been in favour of proprietary and fragmented approaches is now moving towards **open service delivery**. The integrated and co-operative market viewpoint is driving for open service platforms that would comply with the automotive industry, component supplier and after market viewpoints.

In a few years, the after market viewpoint will have to work in collaboration with automotive industry **interoperable service platform and on-board devices** that will connect seamlessly and effortlessly with the EWSP. When fully developed, EWSP could offers services like *My Preferred Services* (like Calendar & Contact management, Communities & Blogging, Contents & Media, Traffic & Driving preferences), *My Safety Services* (like eCall, Pedestrian, Road departure, Accident & Collision warning, Parking & Merge assistance, Pre-crash sensing), *My Car manufacturer's Services* (like Remote & Maintenance diagnosis, Theft immobiliser, Service & Repair invitations), *My Commercial Services* (like Weather & Road condition, News & Popular media, Secure payment) and *My Eco Services* (like green routing).

The full scope of the Connected Car will be achieved in a sustainable, viable and beneficial manner supporting the rapid European-wide deployment and uptake of Co-operative Systems. The research in Connected Car and Future Internet will address:

- **For the in-vehicle part**, communication capabilities for embedded solutions including high-performance robust hardware and software components (e.g. routers, servers, hosts, gateways, firewalls). The connected **vehicle** will support various connectivity media and protocols for short, medium and long range wireless communications with various bandwidths, including ultra high bandwidth.
- **The service deployment** for the EWSP consisting of subsystems like service development, offerings, discovery and operations as well as of authorisation/ authentication, subscriptions/ identification, payment/ billing/ charging and Customer Relations Management (CRM) in order to have full independence from existing service concepts of today.
- **Innovative services** for the EWSP, in the ultimate connectivity environment, covering the needs of different parties, like on-board users, automotive manufacturers and external 3rd party interests.

5. The Large-Scale Test Bed

Large-Scale Test Bed is considered to be essential for the take-up of innovative new ICT technologies in transport, and they build the bridge between research and full-scale deployment. For the Test Bed, we need to identify networks of **appropriate test areas** among and within the candidate cities and/or transport corridors, fulfilling the criteria on the side of economic activities (e.g. manufacturing, service, recreational, industrial districts/sectors), co-modal connectivity (e.g. linking motorways/railways/waterways with city transport networks), urban mobility attributes, infrastructure characteristics and development capabilities. Test areas with cross border corridors and country-through traffic are preferred.

This network of **connected ELSA test areas will form the Large-Scale Test-Bed** of the programme and will eventually become a European show-case on how ELSA can cut across the innovation cycle to develop a modern pan-European transport service infrastructure, achieving the required paradigm shift and eventually boosting the European economy.

5.1 Objectives for the Large-Scale Tests

The aim of the test bed approach described above is to conduct a comprehensive socio-economic evaluation of the systems and services developed under the research activities of ELSA.

5.2 Test beds as drivers for economy

Research and innovation are important economic drivers for regions and cities which face future challenges, enabling them to convert them to opportunities and to catalyse new economic growth. In the ELSA concept, innovative technical solutions are developed through the co-operation of regions, research institutions, private companies and industry, and through local and regional cooperation enabled by test beds and alter large-scale take-up turned into sustainable economic growth in the regions.

The test-beds will include both deployment of mature technologies and Field Operational Tests and pilots for new research results in a holistic approach. Test beds will enable efficient and fast transfer of knowledge and technology from research institutions to public authorities for all services and products that are deployed. It is expected that the test beds will be based on the on-going research on **Cooperative systems** and will involve future research and deployment in **automated driving**.

Public Authorities as well as Fleet Operators (taxi, bus, delivery, car rental etc) will play a leading role as the target customers for the test beds.

5.3 Building blocks for the Test Bed

The ELSA test bed will require update of the existing **communications infrastructure**, targeting the incorporation of the results of ongoing research in the V2V and V2I communication, including traffic management systems. The initial service platform will be identified and elaborated during the initial design stage, being envisaged as a heuristic solution in the expectation of a future **fully operational EWSP**. Evidently, **interoperability** and **standardisation** will be one of the most important outcomes of this initiative, elements which are essential to foster innovation uptake on a large scale within the EU.

Another major component of the ELSA test bed are the test fleets, most importantly of Fully Electric Vehicles (and their accompanying infrastructure) for public and freight-utility transport as well as for private transportation. The envisaged procurement will draw from best practices and tools in the **Joint Technology Initiatives and the Guidelines for Pre-commercial Procurement**. The former is a novel element of 7th FP for Research, Technological Development and Demonstration Activities. JTIs support large-scale multinational research activities in a context of public-private partnerships to define common objectives of wide societal relevance. For the latter, the Communication on "A broad-based innovation strategy for the EU"⁹ highlighted the importance of public procurement in reinforcing the innovation capabilities of the Union whilst improving the quality and efficiency of public services.

The Communication on pre-commercial procurement¹⁰ further addresses this concept, describing a generic approach to procuring R&D services other than those where the benefits accrue exclusively to the contracting authority for its use in the conduct of its

⁹ COM(2006) 502 - Putting knowledge into practice - A broad-based innovation strategy for the EU

¹⁰ COM(2007) 799 - Pre-commercial Procurement: Driving innovation to ensure sustainable high quality public services in Europe

own affairs, on condition that the service provided is wholly remunerated by the contracting authority, and that does not constitute State aid.

Specifically in the transport domain, the iCARS network¹¹ is addressing the issue of pre-commercial procurement, and has established a Thematic Group in this area. The aim is to contribute to the acceleration of the deployment and market take-up of ICT for mobility solutions and thus to the innovation and competitiveness of the European road transport industry by the analysis of good practices, the development of potential business cases that match recent research developments to user needs, the development of a roadmap for pre-commercial procurement and the creation of a framework for the formation of public procurement groups.

6. Barriers for Deployment

6.1 Liability

A number of Directives have been enacted in order to harmonise the liability legislation in the EU's Internal Market, assuring citizens of the safety of products and the possibility to claim compensation in case of damages caused by defective products. Product liability is regulated in the Directive 1985/374/EEC, amended by Directive 1999/34/EC, and product safety in Directive 1992/59/EEC, amended by Directive 2001/92/EC.

These Directives cover a wide range of products and thus provide a rather generic framework for the safety of products. Despite the fact that the Member States have implemented the requirements set out in the Directives in their national legislation, the laws are often complex and open to interpretation, and also in certain aspects different between the Member States.

Another group of relevant laws are the EU safety standards for vehicles and the vehicle type approval directives. Traffic rules and traffic liability however are a full competence of Member States and thus not harmonised within EU.

The RESPONSE 3¹² project developed the Code of Practise mainly for the development of autonomous in-vehicle systems, addressing liability and product safety among other issues. The further challenge with cooperative systems is that there are more different parties involved, each responsible for a component or a function, which is dependent on other components of a complex system. The complexity and interdependencies - not only between the system's components, but also between vehicles and the infrastructure – can make it very difficult to find the liable party in case the system fails. Further work is needed in identifying the legal consequences of the proposed technical solutions, which can have a direct impact on development and design process.

One major element of legislation which currently restricts the functionality of Intelligent Vehicle Systems is the UNECE Convention on Road Traffic ('the Vienna Convention'), signed in November 1968, stipulating that the driver must control his/her vehicle at all times. However major developments in technologies used in vehicles and infrastructure

¹¹ http://www.icarsnetwork.eu/en/thematic_groups/tg1_-_pre-commercial_public_procurement/

¹² http://www.prevent-ip.org/en/prevent_subprojects/horizontal_activities/response_3/

make today's cars and driving environment totally different from those of 1968. Moreover, the traffic has become more and more complex, making the driver's task increasingly difficult. Current technologies could be much more efficiently used in supporting the driver, if vehicle systems would be allowed to intervene in controlling the vehicle. Many systems currently on the market are also bordering a "grey zone", where the way the driver controls the vehicle is fundamentally different from earlier systems, and open to different interpretations. Revising the Vienna Convention in this respect should be considered in the near future; otherwise the safety potential of many current and emerging technologies and applications is lost, and the liability issue remains problematic.

6.2 Security

Cooperative systems will exchange information which might be relevant for (automated) decisions upon which the safety of human lives depends. Therefore, it is mandatory to ensure that no malign intervention can threaten the health of road users and other traffic participants. One part of the safeguarding of critical communication might be the introduction of legal measures along the lines of Directive 1999/93/EC of the European Parliament and of the Council of 13 December 1999 on a Community framework for electronic signatures.

Related to the i2010 EU policy framework for the information society and media, the following legal act has to be taken into account: Directive 2002/58/EC of the European Parliament and of the Council of 12 July 2002 concerning the processing of personal data and the protection of privacy in the electronic communications sector (Directive on privacy and electronic communications). According to it, providers of a publicly available electronic communications service are obliged to take appropriate technical and organisational measures to safeguard security of its services.

A Communication from the Commission (COM(2006) 251 final), titled 'A strategy for a Secure Information Society – "Dialogue, partnership and empowerment"', reviews the current state of threats to the security of the Information Society and determines what additional steps should be taken to improve network and information security (NIS). It is based on the Communication from the Commission "Network and Information Security: proposal for a European Policy approach" (COM(2001) 298 final).

6.3 Privacy

The introduction of cooperative systems will imply the creation, storage and exchange over wireless communications links of personal data. In particular, it is expected that cooperative systems will generate a huge amount of location data, which may be considered as personal data, as they can lead to tracking the movements of individuals.

The results of the Eurobarometer survey carried out in 2006 regarding the perception of the use of the intelligent systems in vehicle showed privacy concerns vary. For the eCall, for a great majority, privacy is not a major concern, or it is considered to be only a minor inconvenience as compared with the usefulness of the system. However regarding real time traffic and travel information systems there is still real concern: significantly more respondents considered this system as an intrusion and would not like to have it in their car. This is especially the case for the French (26%) and the German (25%) respondents. The introduction of some innovative insurance schemes which imply tracking of the vehicles and exchange of data between vehicles and infrastructure (such as the Pay as

You Drive systems) have induced a debate in the media, and some national Data Protections Offices have rejected the introduction of these applications and considered them too intrusive regarding citizens' privacy.

The design of cooperative systems has to take into consideration the appropriate measures to ensure protection of the privacy and personal data. Cooperative systems must comply with the European Directives relevant to the protection of privacy and data protection: the Directive 95/46/EC on data protection and the Directive 2002/58/EC on privacy and electronic communications.

The European Commission has organised two workshops on the security and privacy implication of in-vehicle telematics and cooperative systems, bringing together experts from industry, research centres and data protection authorities. The main conclusion of the workshops is that it is necessary to incorporate security and privacy issues from the early stages of the design of cooperative systems, in order to develop the appropriate mechanisms to protect the privacy rights of the users and to generate the necessary trust.

The eSafety Forum (the eSecurity Working Group) is elaborating, in collaboration with experts from the Data Protection Offices of the art. 29 Working Party on Data Protection, a Code of Practice with recommendations on how to deal with privacy and data protection issues in the design of in-vehicle telematics and cooperative systems.

It is also important to consider, when designing the cooperative systems services and applications, the opinion of the art. 29 Working Party on Data Protection regarding the use of location data with a view to providing value-added services (25 November 2005) and the working document on data protection and privacy implications in the eCall initiative, adopted by the art. 29 Working Party on 26 September 2006. These documents contain recommendations applicable also to the cooperative systems.

Some European projects are researching on issues related to privacy protection on the vehicle-to-vehicle and vehicle-to-infrastructure communications environment. FP6 SeVeCom project addresses security of future vehicle communications networks, including both the security and privacy of inter-vehicle and vehicle-infrastructure communication. Its objective is to define the security architecture of such networks, as well as to propose a roadmap for progressive deployment of security functions in these networks. The FP7 project PRECIOSA, is aiming at defining an approach for privacy evaluation of cooperative systems, with a focus on both communication privacy and data storage privacy, for the protection of location oriented information; defining a privacy aware architecture for cooperative systems; defining and validating guidelines for privacy aware cooperative systems around a concrete system and investigating specific challenges for privacy.

7. Implementation and Instruments

7.1 Funding instruments

An ELSA project would run for a number of years and draw on support from R&D programmes for technology and platform development, systems integration and validation, from innovation programmes for field-testing, demonstration and spreading of best practice, and from deployment actions to roll-out final solutions.

EU-level programmes and instruments could include: FP (incl. 171/169-based schemes and new schemes to support Pre-Commercial Procurement), CIP, TEN/"Trans-European-

Services", Structural Funds, as well as Lead Market Initiatives (with stronger coherence and coordination mechanisms), ETPs (addressing also innovation- and deployment-related issues), regulation, standardisation, coordination, benchmarking etc.

National/regional-level programmes and instruments could include: research and innovation programmes, structural funds, public procurements, infrastructures et al.

Possible coupling of instruments: R&D through PPP based on demand-driven roadmap, including use of new features such as support to pre-commercial procurement, joint programming actions, nominated beneficiaries, reserved budgets.

All actions follow an agreed roadmap/agenda, with commitments to deploy upfront. Synchronisation between instruments, e.g. influence on call and budget planning of different instruments is important. Dedicated funding for actions are preferable since it is often difficult to combine money from different sources in a timely way to achieve a common objective. Competition and state aid rules could be a problem when managing a project spanning from R&D to deployment. Each type of financing has special rules e.g. FP, national R&D, structural funds, support to SMEs etc.

7.2 Management

The following three generic options can be considered for management of ELSA in transport:

1. The Commission manages EU-level programmes in support of research and innovation, and gives incentives for deployment and the national/regions manage national/regional-level research and innovation programmes and deployment projects.
2. The Commission manages joint research and innovation programmes based e.g. on Art. 169 in the FP and Pilot A in the CIP, and provides EU-level incentives to deploy/procure, e.g. to innovate in public services (using for example structural funds), or to interconnect services in a subset of MS (using e.g. TEN) and the national/regions manage targeted deployment/procurement programmes.
3. Implementation as a "single heading" project through a dedicated European "agency".

Specifically for ELSA in Transport, **the eSafety Forum** will play an important role in its governance. A Task Force of the Forum will be established by the end of 2009.

8. ELSA in Transport Roadmap and Next Steps

8.1 Road Map

ELSA in Transport is an integrating initiative, building on the former research, the policy frameworks, standardisation, Field Operational Tests and other deployment actions. The following figure summarises the overall timing of ELSA in Transport, and its relation with the other activities:

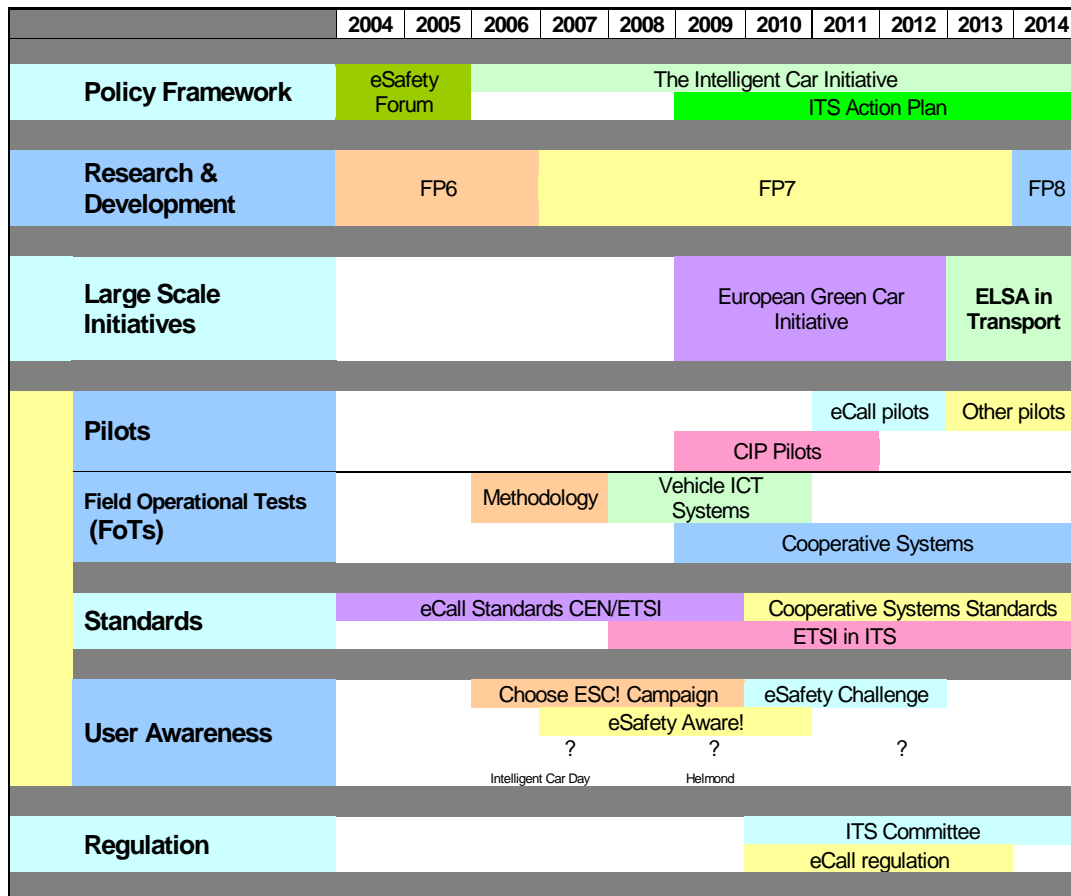


Figure: ELSA in Transport overall Road Map

8.2 Activities in 2009

The ELSA activities in 2009 include initial set of consultations, leading to the establishment of the eSafety Forum Task Force:

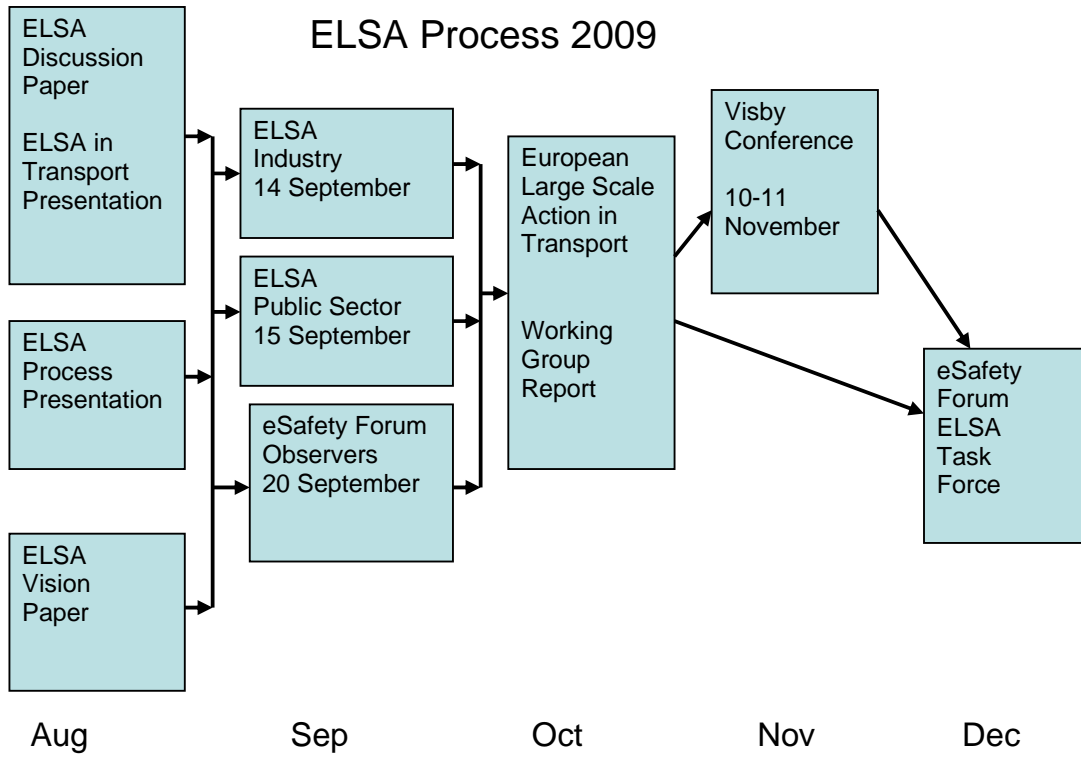


Figure: ELSA in Transport activities in 2009