> Foreword

Mobility is essential for Europe's prosperity. As well as underpinning the competitiveness of European industries, mobility is also an essential right of our citizens. Yet our insatiable demand for mobility also has its negative aspects, in terms of energy use and environmental quality, which must be reduced. Information and communication technologies (ICT) play a key role in keeping Europe on the move.

In its recent transport policy guidelines – *Keep Europe Moving: Sustainable mobility for our continent* – the Commission responded to these challenges and proposed actions to improve the efficiency of existing transport networks, protect the environment, stimulate innovation in transport technologies, and strengthen the international dimension in the EU's transport policy, in short, to meet the mobility needs of the 21st century. At the heart of this approach we find the concept of "intelligent mobility". We intend to bring inte lligent road transport systems to the market and to prepare infrastructure for co-operative systems which over the longer term will bring further improvements both in safety and energy efficiency.

Many of the actions prioritised in the transport policy review draw on research and pilot actions undertaken in European ICT research and deployment programmes. The past years have seen a rapid development in intelligent transport systems both inside vehicles and on the infrastructure side. Results from European ICT research are already being deployed by the European automotive industry, leading to safer vehicles, while further support for intelligent transport systems, both research and deployment, is foreseen under the 7th Framework Programme, the i2010 initiative on the Intelligent Car and the Multiannual Indicative Programme related to the Trans-European Transport Network for all modes.

Furthermore, the application of information technologies will provide a range of options to improve the management of traffic and logistics. New technologies coming to market in the near future will gradually provide new mobility related applications and services for businesses and citizens. These innovative projects, such as GALILEO, Europe's satellite navigation system, will provide new opportunities to develop systems that contribute to the more efficient use of existing infrastructure, reduce congestion and thereby limit pollution.

This brochure presents the most recent and relevant innovations emerging from EU supported research and illustrates how innovation in ICT is contributing to a European policy for sustainable mobility.

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> Challenges for Transport

Effective transportation systems are essential to Europe's prosperity: not only do they enable the mobility of citizens and goods, they also have significant impacts on economic growth, social development and the environment. Transport is also an important industry in its own right, accounting for about 7% of European GDP and for around 5% of employment in the EU. Yet mobility isn't simply a component of the competitiveness of European industries and services; it is also a basic citizen right.

While the goals have remained stable, the transport context has changed significantly over recent years. Enlargement has provided the EU with a continental dimension and the Union of 25 (soon to be 27) is more diverse. Whereas pollution, land use and congestion are the major concerns in the densely populated and industrialised "mid-west", accessibility remains a key concern in other regions. Consequently, certain policy areas require more differentiated solutions, leaving room for national, regional or local answers while ensuring a Europe-wide transport market.

The transport industry itself is evolving, too. Consolidation is taking place at European level, especially in aviation and maritime transport. The internal market has contributed to creating competitive international road haulage and rail operations. The last five years have seen the effects of globalisation leading to the creation of large logistics companies with worldwide operations. Transport is fast becoming a high-technology industry, making research and innovation crucial to its further development.

The negative impact of mobility in terms of energy use and environmental quality must be reduced. Transport now accounts for 30% of the total energy consumption of the EU. With 98% dependency on oil, the transport industry not only has a big impact on air quality and greenhouse gas emissions, but high oil prices also have a significant influence on the transport sector and the economy as a whole. International environmental commitments, including those under the Kyoto protocol, must be integrated into transport policy, in line with the EU sustainable development strategy.

Road safety remains a major concern. Each year in the EU around 40000 people are killed and more than 1.2 million injured in road accidents. Much more needs to be done to increase road safety and reduce the number of accidents on Europe's roads. Technology, in particular, has a big part to play.

Finally, the international context has changed in other ways as well: the sustained threat from terrorism has impacted transport more than any other sector, while economic globalisation has affected trade flows and increased demand for international transport services to and from the emerging economies. European governance is evolving as well, as the basic internal market legal framework is now largely in place. From hereon much depends on its effective implementation in reality across Europe.

> Transport Policy

The European Union's transport policy has developed rapidly over the past 15 years. Current policy is framed largely by the White Paper of 2001 and its mid-term review and update, entitled *Keep Europe Moving - Sustainable mobility for our continent* (COM(2006) 314), published in June 2006. The key policy objectives are built around four main pillars:

- A high level of mobility - efficient and well integrated transport networks that offer seamless operation between the different transport modes (road, rail, air, waterborne).
- Protection of the environment – ensuring that transport systems have minimal environmental impact, provide safety, security and comfort for passengers and citizens, and good working conditions for employees.
- Innovation in support of the first two aims by supporting new technologies and promoting the efficiency and sustainability of the growing transport sector.
- International connections - projecting the Union's policies to reinforce sustainable mobility, protection and innovation in Europe and globally.

Orientations to achieve these objectives are numerous. They include actions to create a competitive European railway network through liberalisation, technological innovation and interoperability of equipment, investment in infrastructure, and better market monitoring with a new scoreboard from 2007 onwards. 'Motorways of the sea' and short sea shipping will be developed with an increased emphasis on landward connections. The European ports policy, to be launched in 2007, will have as one of its goals increased investment within ports and towards the hinterland.

Measures to improve safety and security will be stepped up so as to realise the 2010 target for halving the number of people killed on the EU's roads. In February 2006, the Commission Communication on the Intelligent Car Initiative has been adopted and is now being implemented.

In addition, from 2007 a European road safety day will be organised to raise awareness, and road safety will continue to be promoted through an integrated approach that targets intelligent vehicle safety systems, vehicle design, transport infrastructure and driver behaviour.

The review identifies that additional instruments will also be needed. A freight logistics action plan will help create better synergies between road, sea, rail and river, and integrate various transport modes in real logistics chains. A major programme to bring intelligent transport systems to market is planned, including use of smart infrastructure charging, together with a debate on how to influence modal choice of people in urban areas. Other measures proposed include an action plan to boost inland waterways, and an ambitious programme for greener power in trucks and cars.

Further aspects of the EU's transport policy include: the Single European Sky policy for air traffic management; the Galileo satellite navigation system; coordination of policy on security of transport networks; the Trans European Road Network (TERN); and the Marco Polo support programme for intermodal freight transport.

> Where the Information Society meets Transport

Information and communication technologies (ICT) are essential to the future of Europe's transport sector. Engine management and control systems enable vehicles to be more efficient, reducing fuel consumption and making a reality of hybrid vehicles. Driver assistance and support systems improve safety and comfort, while real time traveller and traffic information (RTTI) systems offer smart scheduling and routing, allowing the capacity of the available infrastructure to be used better. And ICT are key to the security of critical infrastructure such as air traffic control and public transport networks.

The potential of intelligent transport systems is a key focus of the 2006 policy review. There is no reason why ships, trucks, cars and trains should not have – related to their level of transport system complexity – communication and navigation tools comparable to those of aircrafts. These would provide the basis for smart charging systems that can contribute to a more rational use of infrastructure. In addition, real-time management of traffic flows and capacity use, as well as cargo tracking systems and services will cut costs, improve environmental quality and improve security.

Galileo will play a major role in providing the necessary infrastructure. A joint initiative of the European Union and the European Space Agency, it will give Europe a world-leading satellite radio navigation system that will be a key enabler for a wide range of location- and navigation-based services in the transport sector and beyond.

Information Society Activities

Research and Development

Research in **ICT for Transport** within DG Information Society & Media supports the development and deployment of new products and services as drivers for innovative solutions which meet the needs of a safe, efficient and environmentally acceptable transportation system.

Under the Sixth Framework Programme (FP6) these activities have focused on road traffic and airport safety, and value added services. The underlying systems often address in an integrated way interactions between the person in control, the vehicle and its environment. As an extension to autonomous or stand-alone systems, these safety and traffic management applications include co-operative systems, through which vehicles communicate with each other and with the infrastructure.

In FPs 5[1] and 6, transport-related research was also addressed in the context of ICT research for:

- Communications networks, including significant contributions to the Galileo platform.
- Embedded systems, used in avionics, cars and other transportation control systems.
- Advanced driver assistance systems (ADAS) for improved road safety.
- Information and location-based systems for the mobile user.
- Safety systems for aviation.
- Intelligent Infrastructure.
- Critical infrastructure protection and dependability of networks.
- Socio-economic research into eWork, mobility, sustainability and 'transport avoidance'.

[1]For more information, please consult the brochure "Information Society Technologies for Transport and Mobility. Achievements and ongoing projects from the Fifth Framework Programme". The brochure is downloadable from the following site: http://cordis.europa.eu/ist/transport/publications.htm

For the Seventh Framework Programme, research efforts will be guided by the Intelligent Car Initiative as part of the i2010 strategy for Europe's Information Society. The Initiative aims to help Europe develop a smarter, safer and greener road transportation system. Building on results from previous Programmes, the Initiative will foster co-operative research in intelligent vehicle systems (IVS) and help facilitate the take-up of research results. Specifically, this will include:

- The next generation of driver assistance systems, aiming among other things at enhanced performance, greater reliability and higher security.
- Co-operative systems based on vehicle-to-vehicle and vehicle-to-infrastructure communication to move from basic conceptual models towards integrated systems and applications.
- Real time traveller and traffic information (RTTI) and intermodal transport's needs
- A comprehensive technical and socio-economic programme to assess, based on field operational tests, the impact of intelligent vehicle systems on driver behaviour and driving dynamics.

Other Activities

Under the umbrella of the Intelligent Car Initiative, actions are being taken to coordinate Europe's road transport stakeholders (car manufacturers, road operators, telecom companies, transport service providers, etc.), building primarily on the eSafety Forum. To stimulate user demand, increased efforts will also be made to create awareness of ICT-based solutions for a smarter, safer and cleaner road transportation system.

Transport and mobility is also a priority area under the eTEN Programme, which was concerned with the large-scale roll-out of eServices in support of the eEurope Action Plan and subsequentely the i2010 initiative. In this context, eTEN projects address the deployment of transport and mobility applications and services as one of several areas of common interest for online public services.

eContent*plus* (2005-2008) supports the development of multilingual content for innovative, online services across the EU. One action line specifically addresses geographic content as a key constituent of public sector content.

Projects integrate satellite-based solutions where appropriate and exploit synergies with the European spatial information infrastructure (INSPIRE and GMES).
As of 2007, eTEN and eContentplus will be integrated into the new Competitiveness and Innovation Framework Programme (CIP).

> Towards the Intelligent Car

Research in ICT-based safety systems is a key pillar in European efforts to build Intelligent Cars that improve safety and efficiency on Europe's roads.

Policy Context

Of all transport problems, safety can be the one with the most serious impact on the daily lives of citizens. It also has a high impact on most socio-economic factors. With its "White Paper" of September 2001, the European Commission set the target to halve the number of yearly road fatalities from 50,000 to 25,000 by 2010. In the EU-25, however, more than 40,000 people still die every year through road accidents and many more are injured. In total, there are approximately 1.7 million accidents on European roads annually, entailing a €200 billion cost to the EU, equivalent to 2% of its GDP.

The Commission's recommendations to speed up the development and deployment of ICT in road safety were presented in the 1st eSafety Communication in September 2003. It focused, in particular, on the wider, accelerated use of active safety systems, so-called Intelligent Vehicle Safety Systems (IVSS).

The Communication and a related eSafety Action Plan were followed in September 2005 by a 2nd eSafety Communication, dubbed the "eCall Communication". This proposes a roadmap for a full-scale roll-out of eCall, the pan-European in-vehicle emergency call service, by 2009.

The 2003 1st eSafety Communication led to the setting up of the eSafety Forum as a platform to bring together all road safety stakeholders. The Forum promotes consensus on the implementation of new ICT-based safety technologies and coordinates the work on the development, deployment and use of intelligent vehicle safety systems. Several industry-led Working Groups have been created, each of which focuses on a priority topic within the Commission Communication.

The "eSafety Communications" were followed in February 2006 by the new initiative on the Intelligent Car. It proposes a major European initiative on smarter, safer and cleaner vehicles as part of the i2010 strategy for boosting the European digital economy. It provides a policy framework for the efforts of stakeholders – European Commission, national authorities, car manufacturers, telecom companies, transport service providers and others – in their drive to speed up the deployment of intelligent vehicle systems on European and international markets. A series of actions are proposed encompassing policy, research and communications.

Contribution of ICT

Information and communication technologies (ICT) can contribute significantly to improving road safety, enabling the development of sophisticated safety systems that improve road users' chances of avoiding and surviving accidentsICT also provide new systems for enhanced traffic management.

Certain of these systems are already in use in vehicles, including anti-lock braking systems (ABS), and electronic stability programme (ESP) systems which help the driver keep control of the vehicle in critical situations. Other advanced driver assistance systems (ADAS) are under development or being introduced into the market in small scale. These support drivers in a number of ways, such as to maintain a safe speed and distance; drive within the lane; avoid overtaking in critical situations; avoid collisions including crashes with vulnerable road users; and, as a last resort, mitigate the severity of an accident if it still occurs.

Optimising the Driver-Vehicle Interface

One of the key issues for research is how to integrate all these new systems into the driver's environment safely, so that they do not pose a safety risk themselves. **AIDE** is a major research project under FP6, involving all EU car manufacturers, that is looking at how to integrate such systems into the so-called human-machine interface.

Specifically, it aims to design, develop and validate a new driver-vehicle interface that: maximises the efficiency of individual and combined ADAS; reduces the level of workload and distraction of the driver when interacting with in-vehicle systems; and realises the potential benefits of such systems in terms of mobility and comfort, without compromising safety. AIDE partly builds on the work of FP5 project COMUNICAR.

Research for eSafety

Under the Information Society Technologies (IST) Programme over €400M has been invested in intelligent car related research over the last eight years. For instance, **AWAKE** developed a system to detect and alert sleepy drivers. A variety of sensors (e.g. an eyelid camera and a steering wheel grip sensor) on-board the vehicle monitor the driver's state and detect possible drowsiness. The driver is then alerted through a series of visual and acoustic warnings.

Another system has learnt to watch for pedestrians moving in front of or around the vehicle. If it detects a risk of collision, the driver is alerted through an acoustic alarm, possibly followed by automatic vehicle braking. Development has been pursued under a series of European projects and is being continued under PReVENT's sub-project **WATCHOVER**.

Over recent years the emphasis in intelligent vehicle research, as an extension of autonomous or stand-alone systems, has turned to co-operative systems in which the vehicles will communicate with each other and/or with the infrastructure. Such co-operative systems have the potential to greatly increase the quality and reliability of information available about the vehicles, their location and the road environment, thus enabling improved and new services for road users. A series of research projects has been launched as part of the current portfolio in the Commission's "ICT for Transport" unit, including **PReVENT** and its subprojects (see box).

Other projects cover priorities such as accident causation analysis (**TRACE**) or the economic benefits society might gain from the take-up of intelligent road traffic safety systems (**eIMPACT**).

Mobilising European Efforts for Preventive Safety

PReVENT is a European integrated research project, co-funded by the European Commission, to contribute to road safety by developing and demonstrating preventive safety applications and technologies. PReVENT has over 50 partners, including industry (12 car manufacturers and 16 parts suppliers), public authorities, research institutes, universities and other public and private bodies. Its total budget is €55 million, of which the Commission is contributing €29.8 million.

PReVENT partners are working together to develop, demonstrate, test and evaluate a wide range of preventive safety applications and systems. A number of sub-projects have been launched to undertake research into: safe speed and safe following; lateral support; intersection safety, and collision mitigation. In addition, a series of horizontal activities are looking at how to remove barriers to market introduction.

PReVENT will enable European industry to further strengthen its competitive position by introducing leading-edge technologies that will help reduce the number of road accidents.

The scientific competence regarding the human factor in road transport exists in Europe, but is scattered across various countries, research institutes and universities. To obtain effective and quick results in the domain of human machine interaction, it is therefore necessary to integrate research capacities in Europe. In order to do so, 24 research institutes joined together to constitute the Network of Excellence **HUMANIST.** It aims at pooling research in the domain of user/system interaction and its applications in in-vehicle information systems and advanced driver assistance systems. In the long run, it also aims at creating a European Virtual Centre of Excellence in these fields.

> PROJECT DETAILS

AIDE - Adaptive Integrated Driver-Vehicle Interface
jan.arfwidsson@volvo.com • www.aide-eu.org

AWAKE - System for Effective Assessment of Driver Vigilance and Warning According to Traffic Risk Estimation
abek@certh.gr • www.awake-eu.org

eIMPACT - Socio-Economic Impact Assessment of Stand-Alone and Co-Operative Intelligent Vehicle Safety Systems (IVSS) in Europe
kerry.malone@tno.nl • www.eimpact.info

HUMANIST - Human centred design for Information Society Technologies
loic.courtot@ert-sis.fr • www.noehumanist.org

PReVENT - Preventive and Active Safety Applications
matthias.m.schulze@daimlerchrysler.com • www.prevent-ip.org

TRACE - Traffic Accident Causation in Europe
yves.page@lab-france.com • www.trace-project.org

WATCHOVER - Vehicle-to-Vulnerable Road User Cooperative Communication and Sensing Technologies to Improve Transport Safety
andrea.guarise@crf.it • www.watchover-eu.org

> On-call to the Emergency Services

European ICT research work has laid the foundations for eCall, an in-vehicle system that uses the European 112 emergency number to alert rescue services in the event of an accident. This major European innovation for eSafety will be rolled out across the EU by 2009.

Policy Context

With European citizens increasingly travelling to other countries for holidays, business or pleasure, there is a need for a single number, identical across the European Union, to call in an emergency. This is especially important in case of a road accident, where the response time is literally a matter of life and death.

Over recent years European countries have worked to implement the single European emergency number 112. Instead of having to remember several different numbers, citizens now need only one, wherever they go in the European Union and some neighbouring countries. People calling 112 are connected to an operator. Depending on the national civil protection organisation, the operator will either deal with the request directly or transfer it to one of the emergency services (ambulance, fire brigade, police, coastguard, etc.). In many cases, operators are able to answer in more than one language. Basic features of the system are already available within all 25 EU Member States.

eCall is a safety system that builds on 112 and its location-enhanced version E112. An eCall transmits a minimum set of data (MSD) to the emergency centre, even if no occupant of the car is able to use the voice connection. Whenever a car senses a major impact, its eCall device automatically calls the nearest emergency centre using the Europe-wide E112 emergency number. If an occupant is able to do so, the call can also be generated manually by pushing a button in the car. The minimum set of data transmitted in either case includes the car's geographic location.

The fact that the rescue services immediately get the accurate location data drastically cuts their response time, allowing them to reach the crash site much quicker.

Studies show that if all vehicles were equipped with eCall, by 2010 fatalities in the EU could be reduced by 5% to 15%. Of course, the severity of injuries would also be lowered by the quicker treatment. In addition to reducing the human toll and/or the accident's consequences for the injured persons' health, such measures would save up to €22 billion in social costs per year. Moreover, eCall could reduce congestion times by 10% to 20% through faster clearance of accident sites, with additional cost savings of between €2 to 4 billion.

With these benefits, eCall is a high priority within European eSafety policy. At a high-level meeting in February 2005, the European Commission, Member States and automotive industry scheduled the full-scale roll-out of eCall for 2009, by which time eCall devices will be fitted into all new cars. However, for eCall to function, emergency centres must be equipped with location-processing capabilities so as to be able to receive E112 calls.

The operation of the emergency centres is in the hands of the Member States, their regional or local authorities or appointed agencies. Some Member States are ahead of others in fully implementing 112 and E112, and some need to speed up their investments in upgrading emergency centres. In the 2nd eSafety Communication – "*Bringing eCall to Citizens*" – adopted by the Commission in September 2005 and strongly supported by the European Parliament in April 2006, the Commission set out a series of actions to be taken by the national authorities to overcome the bottleneck in equipping many emergency centres. As a token of their support for eCall, seven Member States - namely Cyprus, Finland, Greece, Italy, Lithuania, Slovenia and Sweden - plus Switzerland and Norway have already signed a Memorandum of Understanding (MoU) committing them to full implementation of the eCall system. More Member States are expected to sign the MoU in the near future.

Technology Behind eCall

Research under the IST Programme has been pivotal to the evolution of eCall.

Much of the development work was done under the FP5 project **E-MERGE** during 2002–2004. E-MERGE determined the functional architecture for sending information – together with or without the 112 voice call – directly to the emergency services in case of a vehicle incident. This information – the so-called minimum set of data (MSD) – includes details about where and when the accident occurred, vehicle identification, and information about the severity of the crash.

E-MERGE developed prototypes and demonstrated the eCall concept. Using an eCall communication link, test messages were transmitted from Opel, Volvo, Fiat and SEAT test vehicles directly to emergency services in Sweden, Germany, UK, Spain, and Italy.

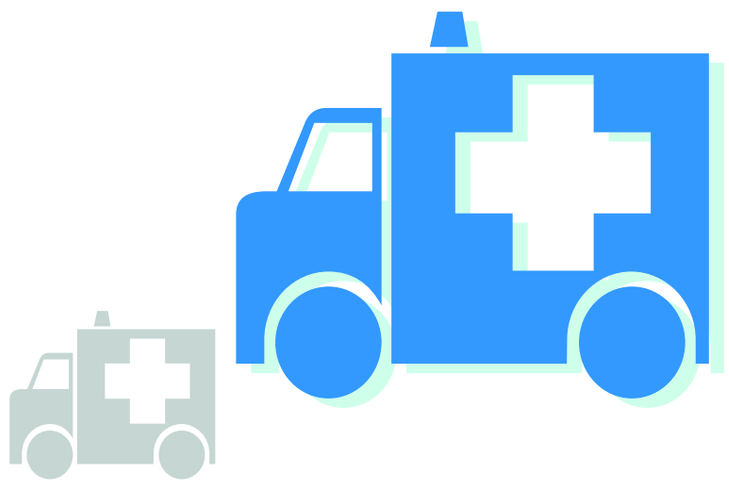
eCall is also a focus under **GST**, an FP6 integrated project dealing with the next generation of telematic support services for road transport. Its sub-project GST RESCUE is looking at how to improve the information flow with and the operation of emergency vehicles (see box). It will accurately assess the type of emergency, and consequently the resources required to provide the appropriate response to a critical incident.

Maximising the Golden Hour in Emergency Rescue

In addition to the knowledge of the exact location of the accident, the ability to assess the type of emergency and the resources required to provide the appropriate response is critical in ensuring that the "Golden Hour" principle – a victim's right to medical help within sixty minutes of an incident – is employed to maximum effect. **GST RESCUE** is investigating a number of systems to improve the flow of information to and around emergency vehicles on their way to and at the scene of the accident.

After the emergency vehicles receive the proper incident information, a hybrid navigation solution together with a "blue corridor" system that notifies road users of the emergency vehicles' approach will ensure that the emergency vehicles reach the scene of the accident as quickly and safely as possible. The safety of the incident scene will be ensured with a "coning" system that propagates a warning to approaching road users through vehicle-to-vehicle communication. After the emergency vehicles leave the scene, remote reporting and transfer of information such as patient data to hospitals will be made possible.

The system is being tested in a real-world deployment with Sussex Police in the UK. The mixture of urban and rural locations, which includes Gatwick airport, allows a thorough testing in a range of scenarios from urban canyons to remote rural areas, as well as tunnels and motorways where weak signals are often encountered.



> PROJECT DETAILS

E-MERGE

m.schettino@mail.ertico.com • www.e-merge.org

GST RESCUE

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> Smart Information for Transport Safety

Location-based and real-time traffic and travel information services can contribute greatly to safety, by warning drivers of accidents, dangerous situations and stress-causing traffic conditions.

Policy Context

Info-mobility, that is traffic-related information, is increasingly important for the smooth running of Europe's transport networks. As transport infrastructures become more congested and environmental constraints come to the fore, we need to look for ways to optimise our use of the existing network capacity. One way of doing this is through real-time and location-based information services. These are key means for increasing network and infrastructure efficiency, and improving user information, comfort and convenience. In addition, the deployment of the European satellite navigation infrastructures, EGNOS and GALILEO, will significantly augment the mass-market demand for these applications.

Facilitating the deployment of real-time traffic and travel information (RTTI) services in Europe was the focus of a Commission Recommendation published in 2001, and more recently of a report by the eSafety Forum's RTTI Working Group. As a key RTTI technology already widely deployed in Europe, the Working Group recommends increased support for traffic message channel (TMC), which gives non-stop additional traffic information via the car radio or to the navigation system. In particular the Group proposes actions to extend TMC's coverage (in terms of countries and national and urban road networks) and to promote its safety-related features.

Location-based services (LBS) are of particular interest in the context of eSafety. The textbook example is eCall, the pan-European emergency notification system, which is able to communicate the exact location of a crashed vehicle to the emergency services.

There is also increasing interest in using location-based and digital map information in combination with advanced driver assistance systems (ADAS).

The aim here is to use an on-board map as a sensor, in much the same way as a radar sensor is used to detect obstacles or other vehicles. Knowing the route the car is on, map-based sensors allow the vehicle's safety systems to look ahead, i.e. to where the car will be in a couple of seconds. The information derived from the map can then be used either directly by the vehicle's ADAS, or in combination with information from other sensors to improve detection or response.

The starting point for the development of map-based safety applications has generally been the maps produced for navigation applications. These navigation maps come close to the requirements of the safety applications under development. However, additional measures are required to fully meet these requirements. Both control and advice applications need additional and higher quality map content than traditional navigation maps, whether used as a primary or secondary sensor. The extra map content required by safety applications is referred to as the "eSafety attributes".

A European approach to map-based ADAS was being led by the eSafety Working Group on Digital Maps. It has been working on three aspects: defining a business model to ensure availability of eSafety attributes in digital maps, defining technical requirements for an eSafety digital map database, and promoting public-private cooperation to collect and maintain the eSafety information.

Maps for eSafety

MAPS&ADAS is developing, testing and validating appropriate methods to gather, certify and maintain safety content to enable the provision of ADAS maps suitable for novel safety applications. It is one of the horizontal subprojects of **PReVENT**. The work involves the development and validation of a standard interface, called ADAS Horizon, between map data sources and ADAS / navigation applications. By allowing ADAS applications to access safety-enhanced digital maps, ADAS Horizon extends the driver's view to at least 500 to 1000 metres ahead. The system is being implemented within the ADAS interface by several PReVENT applications.

Also concerned with smart real-time maps for safety services is **HIGHWAY**. Its 3D maps will provide users with up-to-date information enriched with safety relevant data. For instance, speed limit data will be fed to speed limit units and dynamic data like relevant traffic or weather information will be accessible for the driver and the in-vehicle safety systems. HIGHWAY maps will also help drivers master critical driving situations, for example by delaying incoming phone calls or triggering safety mechanisms based on map information like the radius of the curve ahead or speed limits, or an accident ahead. As well as reducing the risk of accidents, HIGHWAY services will save customers time and money by being better informed.

Building the European Market for Transport Telematics

One of the barriers to the take-up of vehicle telematics in Europe is the lack of common and open solutions for telematics services. **GST** is a major initiative bringing together more than 50 key stakeholders in the European telematics industry. It will deliver the technical building blocks necessary to move from closed to open systems, which is seen as essential in bringing telematics functionalities to all new vehicles and unlocking the market for online services. With an open environment the range of services available to manufacturers and consumers will increase. Drivers and occupants will be able to rely on their on-board telematics system to access online safety-, efficiency- and comfort-enhancing services wherever they drive in Europe. This portfolio of services will be accessible using the same vehicle terminal.

Interoperability is also key to the wider take-up of location-related services, so that consumers can be assured that systems from different manufacturers will work together. The market today is characterised by a strong US technical dominance and the EU industry, though competent, is too fragmented and offers diverse technical solutions.

IST's **ISHTAR** project is looking at how to better match available technologies to users' expectations. It is mapping European expertise in the field of location-based services (LBS) and relevant technologies and identifying gaps in knowledge and expertise, particularly in terms of technological interoperability. It is also producing a five-year roadmap for future R&D activities in the field, and contributing to LBS standardisation efforts.

Mobile Personal Assistant for Travel Information

Aiming to overcome the limited content which holds back existing travel and transport information services, the IM@GINE-IT project has developed software that enhances the usability of mobile devices. Running on any mobile device, be it a mobile phone, laptop, PDA or in-car system, the IM@GINE-IT personal assistant provides location-based transport information, mapping and routing, navigation and other related services anywhere in Europe. Modules are available which combine in-vehicle, pedestrian, public transport and public building route guidance. Transport advice is multi-modal, covering car, bus, train, metro, tram, ship, airplane, airport facilities and even tourist information kiosks. The system has been successfully pilot tested at five European sites.

> PROJECT DETAILS

GST - Global System for Telematics Enabling On-Line Safety Services
p.vanderperre@mail.ertico.com • www.gstforum.org

HIGHWAY - Breakthrough Intelligent Maps & Geographic Tools for the Context Aware Delivery of eSafety & Value-Added Services
claudio.clausi@teleatlas.com • www.ist-highway.org

ISHTAR - Industrial Stimuli for the Harmonisation of European Research in the Area of Location Based Services
ishtar_contact@teletel.gr • www.eu-ishtar.net

IM@GINE-IT - Intelligent Mobility Agents, Advanced Positioning and Mapping Technologies, Integrated Interoperable Multimodal, Location-Based Services
abek@certh.gr • www.imagineit-eu.com

MAPS&ADAS (PReVENT)
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> Optimising Freight Logistics

With logistics increasingly important to industry competitiveness, ICT are helping Europe's logistics sector compete effectively on global markets.

Policy Context

Logistics are indispensable for the competitiveness of Europe's industries and the efficient operation of its consumer markets. On average, logistics, including transportation and warehousing, costs account for 10-15% of the final cost of the finished product. Globally, the logistics industry is worth an estimated €5.4 trillion, or almost 14% of global GDP.
The European logistics sector is highly fragmented, with the top 20 companies having a market share of only 33%.

With globalisation, effective supply chains are becoming increasingly important not only within Europe but also for Europe's international business relations. There are a number of trends emerging. On the one hand, logistics organisation is being centralised in European and regional distribution centres. At the same time, decentralisation is emerging in the light of saturation on European roads, enabling quick response from local warehouses or buffer storages to customer requirements. Outsourcing of logistics activities is also a noticeable trend, while road freight faces competition from other transport modes such as air carriers.

The Commission has already taken a number of initiatives having an influence on freight transport logistics, in the areas of liberalisation, harmonisation, infrastructure, standardisation, promotion and research. Specifically, the 2001 White Paper on transport policy notes that logistics plays a key role in ensuring sustainable mobility and also contributes to meeting other objectives, like a cleaner environment, and security of energy supply.

The latest transport Communication "*Keep Europe Moving*" – published in June 2006 – notes the need to introduce a stronger logistics perspective into transport policy. Logistics considerations should be an underlying factor in decision-making. The approach should be market-oriented, include social and environmental dimensions, and create a win-win situation for all actors. Following consultation with stakeholders, the Commission plans to present an Action Plan for Freight Logistics in 2007. Potential measures include actions in relation to: research and the use of information and communication technologies (ICT), infrastructure planning, service performance, and multimodal supply chains.

Contribution of ICT

Tracking and tracing of cargo in all modes and transport quality control (e.g. the temperature conditions inside a container while in transit) are prerequisites for efficient logistics. The introduction of the satellite navigation system GALILEO will have a substantially positive impact in this respect, as will European systems for managing river, marine and railway freight.

Smart technologies allow delays in the supply chain for security and other reasons to be avoided. One such technology is radio frequency identification (RFID) which is a growing market but requires further development, both in terms of research and the policy framework (see box). Further elements in the equation are common messaging standards (e.g. EDI/EDIFACT) and formats that facilitate better communication of data (e.g. XML).

Companies need easy access to ICT solutions. Closed systems entail start-up costs both in terms of technology and software, which raises the threshold for SMEs to fully participate in the market. Common standards widely accepted by manufacturers and operators, and synergies between different systems are key to making logistics more efficient.

Smoothing the Way for RFID in Logistics

Radio frequency identification (RFID) – an automated data-capture technology – has major implications for the logistics sector, including freight logistics.

Despite Europe's strong position in RFID applications and technologies we still lack a common European approach in formulating and enforcing RFID standards, especially regarding frequencies and data formats. To improve the competitive position of RFID technology in Europe, leading vendors and users are working together under the **CE-RFID** project. They aim to improve coordination in RFID-related research and provide a forum for input to standards bodies and to European policies.

Another project, **BRIDGE**, focuses on the technical, social and educational constraints hindering the implementation of RFID and EPC global standard solutions in Europe. The project will identify the business opportunities and establish the requirements and business case. This will be backed up by research focusing on organisational and policy aspects as well as technical issues. The results will be disseminated on a large scale to the logistics sector across Europe.

Use of RFID touches a wide range of policy issues, including spectrum policy, privacy, food and drug safety, identity cards, biometric passports, e-payments, e-procurement, counterfeiting, homeland security, and environment. The Commission has launched a wide-ranging public consultation on the policy issues and possible concerns raised by the deployment of RFID technology and its applications. This will be followed by a Communication in late 2006.

Keeping It Cool

Maintaining perishable foodstuffs at the correct temperature while in transit in refrigerated trucks is an essential requirement to ensure food safety and quality.

The IST project **COLD-ROAD** developed a system to meet these requirements based on satellite tracking, mobile and internet communications, sensor and computer technologies. The system allows truck operators to give their customers better information about the timing of deliveries, and to verify documentation concerning temperature conditions during transit. It also offers better fleet utilisation and reduces insurance premiums and claims.

The results developed in COLD-ROAD are being progressed further in the eTEN project **COLD-TRACE**, which is looking at the market feasibility of operational services based on the technology.

Safer Transportation of Dangerous Goods

Dangerous goods, such as radioactive materials and hazardous chemicals, are regularly transported on Europe's roads. IST's **MITRA** project developed an operational system for regional civil security centres that helps them monitor dangerous goods in transit. Similar to how air traffic control tracks aircraft, the system could provide civil authorities with real-time information on the location and contents of vehicles carrying dangerous substances.

From the perspective of in-vehicle safety systems, **GOOD ROUTE** is developing a co-operative system for dangerous goods vehicle routing, monitoring and enforcement. It will use vehicle-to-vehicle and vehicle-to-infrastructure communication to improve route guidance and re-routing. For instance, the system will be able to re-route the vehicle in the event of a traffic incident or a change of delivery schedule. It will also be able to communicate with the transport infrastructure to book permission of passage, enforce speed limits and report vehicle movements. This will minimise the societal risks related to road transport of hazardous goods, while still generating a cost-efficient solution for vehicle operators and their customers.

> PROJECT DETAILS

BRIDGE - Building Radio Frequency Identification Solutions for the Global Environment
henri.barthel@gs1.org • www.bridge-project.eu

CE RFID - Coordinating European Efforts for Promoting the European RFID Value Chain
info@rfid-in-action.eu • www.rfid-in-action.eu

COLD-TRACE
yus@inmark.es • www.cold-trace.com

GOOD ROUTE - Dangerous Goods Transportation Routing, Monitoring and Enforcement
tzovaras@iti.gr • www.goodroute-eu.org

MITRA - Monitoring and Intervention for the Transportation of Dangerous Goods
presutto@m3systems.net • www.mitraproject.info

> Flying High for Air Safety

With harmonisation of aviation safety a key policy objective, results under IST projects contribute to common European solutions for air traffic control and management.

Policy Context

As the growth in air traffic accelerates, passengers are demanding a better quality of service, fewer delays and ever decreasing prices, but they also want a guaranteed level of safety. Europe already enjoys a good record since, with a third of global traffic, only a tenth of accidents occur here. This is the result of the combined efforts of the aircraft manufacturers, the airlines and flight crews as well as the national and international authorities charged with the regulation of their activities. Events, however, show regularly that nothing can be taken for granted.

In spite of the harmonisation work led by the national administrations through the Joint Aviation Authorities (JAA), there are still considerable differences between national practices and it is not unusual for a manufacturer to have to produce different versions of the same type of aircraft or of its equipment according to the country where it will be used. Furthermore, the requirements imposed on operators vary from one country to another and sometimes create disparities between airlines that are in competition with one another in the same markets. The European Union has put in place a mechanism permitting standards drawn up by the JAA to be introduced into Community law (Regulation 3922/91), and therefore made obligatory.

The Community and the other entities involved in the sector have sought for a long time to give Europe a single aviation safety authority, like the Federal Aviation Administration (FAA) of the United States. This would be able to draw up common standards to ensure the highest level of safety; oversee their uniform application across Europe, and promote them at world level.

The European Aviation Safety Agency (EASA), created in 2002, put in place a Community system of air safety and environmental regulation. The Agency currently works, amongst other matters, on the certification of the airworthiness and environmental performance of aeronautical products.

In 2005 the Commission announced plans to extend EASA's functions to safety and interoperability of air navigation services, air traffic management and airports. The objective is to have, by 2010, the whole field of aviation safety under the scope of a single European agency.

Another key element in air safety is the Single European Sky policy, which aims to create a seamless European Air Traffic Management (ATM) System. It will restructure European airspace as a function of air traffic flow, rather than according to national borders, create additional capacity and increase the overall efficiency of the ATM system. This is being achieved through a legislative package to enhance cross-border co-ordination and remove administrative and organisational bottlenecks. It is backed up by SESAR, an industry-led programme to modernise the European air traffic control infrastructure.

Contribution of ICT

IST research has been contributing for many years and under several consecutive Framework Programmes to air safety and security through the development of communications, navigation, management and surveillance systems. Currently, close-to-airport traffic safety and airport ground systems safety are in focus.

Three projects on air safety are being supported under the eSafety of Road and Air Transport action line of IST in the Sixth Framework Programme. United by a common aim to increase safety of traffic operations at airports, the three projects AIRNET, ISMAEL and SAFE-AIRPORT have pooled together to share their research and development insights and form an airport safety cluster.

Improved Traffic Flow for European Airports

One of the main airport safety concerns today is the escalating number of accidents and incidents during surface movements. Most major European airports already experience congestion, resulting in significant delays, dangerous situations and waste of fuel, and causing frustration and difficulties for both passengers and aircraft operators. The situation is expected to become more widespread across Europe as air traffic increases. Current technical solutions developed for large airports rely on expensive equipment (ground infrastructure) and specific aeronautical standards.

AIRNET is investigating new communication and surveillance systems to improve traffic movements in airports, for both service vehicles and aircraft. The AIRNET services relate to three aspects: runway safety, covering movements in runways and taxiways areas; congestion control, covering how airport operators plan and manage ground movements and deal with emergencies; and situation awareness, providing critical information to airport users to improve safety and efficiency of the operations.

The AIRNET platform will implement the recommendations of Eurocontrol, the European air traffic control body, for A-SMGCS (Advanced Surface Movement Guidance and Control systems). The work focuses on integrating global positioning with wireless communications to track aircraft and vehicle positions around the airport. The system will be validated at Toulouse and Porto Airports.

Intelligent Surveillance and Management for Airfields

Also concerned with surface movements, the **ISMAEL** project aims to determine whether recent advances in magnetic sensors could provide a better means of ground control at airports. It starts from the physical principle that objects containing ferromagnetic materials, such as aircraft or ground service vehicles, cause slight modifications in the earth's magnetic field. The project is developing a low-cost sensor to detect these mini disturbances and identify the precise location of aircraft and other vehicles as they move around the airport. Particular attention is being paid to the usability of the detection technology and related services.

System tests will be performed in a realistic application environment, thus enabling real-life feedback and validation as well as immediate optimisation inputs. Tests are being undertaken at the small airport of Saarbrücken (Germany), at the mid-sized airport of Thessaloniki (Greece) and at Rhein-Main Flughafen Frankfurt, which is continental Europe's largest airport.

An Ear on the Ground

The third airport safety project, SAFE-AIRPORT, developed an innovative system based on an acoustic sensor capable of discovering and tracking aeroplanes over a distance of at least six nautical miles, both in the air and on the ground. The system integrates into airports' air traffic management procedures and is an effective air control system for ATZ (Aerodrome Traffic Zone). Large airports can integrate it into their standard control systems, while smaller airports are able to use it as an autonomous, stand-alone system.

> PROJECT DETAILS

AIRNET - Airport Network for Mobiles Surveillance and Alerting
presutto@m3systems.net • www.airnet-project.com

ISMAEL - Intelligent Surveillance and Management Functions for Airfield Applications Based on Low Cost Magnetic Field Detectors
u.hartmann@mx.uni-saarland.de • www.ismael-project.net

SAFE-AIRPORT - Development of an Innovative Acoustic System for the Improvement of Co-operative Air Traffic Management
alessandro.ferrando@dappolonia.it • www.airport-safety-cluster.com