European Commission

Thematic Research Summary

Security and safety

COMMUNICATING TRANSPORT RESEARCH AND INNOVATION

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Transport

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Preface

This Thematic Research Summary (TRS) has been produced as a part of the activities of the Transport Research and Innovation Portal (TRIP). TRIP collects, structures, analyses and disseminates the results of EU-supported transport research and research financed nationally in the European Research Area (ERA), and selected global research programmes. The main dissemination tool used by TRIP is the public web portal www.transport-research.info.

The Thematic Research Summaries provide a structured guide to the results of research projects carried out mainly at EU level, either as part of a framework programme or as a study commissioned by the European Commission (EC). These summaries are intended for policy makers at European, national and local levels, stakeholders and researchers.

The Thematic Research Summary on Security and Safety is one of 24 themes, which provides:

- an overview of research activities in a specific aspect of transport focusing on EU-funded projects;
- analysis and compilation of research findings and recommendations.

An overview of the Thematic Research Summaries is presented in Table 1.

Table 1: Transport themes used in TRIP

Domains	TRIP Themes
Sector	Passenger transport
	Freight transport
Mode	Air transport
	Rail transport
	Road transport
	Urban transport
	Water transport (sea and inland)
	Multimodal transport
Policy	Financing, pricing and taxation
	Regulation, competition and public services
	Infrastructure and TEN-T
	Land use and transport planning
	Climate policy and energy efficiency
	Security and safety
	International cooperation and EU Neighbourhood Policy
	Awareness, information and user rights
Technology	Intelligent transport systems
	Innovative technologies
	Transport management
Evaluation	Long-term perspectives
	Assessment and decision support methodologies
	Environmental impacts
	Economic and regional impacts
	Accessibility, social and equity impacts

1. Introduction

The free movement of people and goods are fundamental EU principles – two of the "four freedoms". Demand for these freedoms is likely to increase in the future and cannot be guaranteed without safe and secure transport. Transport safety and security concerns all EU Member States and is a key objective of the EU transport policy.

The increasing number of passengers and freight movements, free access to transport infrastructure in all EU Member States and more complex transport systems make safety and security vital aspects of EU transport policy. Research and development support the identification of appropriate and reliable solutions to meet the increasing complexity and scope of transport systems. The foundation of transport safety and security policy is set in the Treaty on the Functioning of the European Union (EU, 2010). This states that the European Parliament and the Council will lay down "measures to improve transport safety" and all Member States "shall act jointly in a spirit of solidarity if a Member State is the object of a terrorist attack or the victim of a natural or man-made disaster".

Transport safety and security are considered in the context of the sustainable development of transport, and in the establishment of a Single European Transport Area. The Commission Communication "A sustainable future for transport: towards an integrated, technology-led and user friendly system" (EC, 2009) states that the overall quality of transport, including personal security, reduction in accidents and health hazards must remain a high priority in transport policy. The White Paper "Roadmap to a Single European Transport Area" identifies security and safety as key aspects in establishing a Single European Transport Area (EC, 2011a) and states the objective to be a world leader in safety and security in all transport modes. In addition, the Transport White Paper sets out the EU transport research, innovation and deployment strategy. Transport research and innovation should support development and deployment of technologies and solutions for better and effective use of transport networks, and safer and more secure operations through information and communication systems.

Although often considered together, transport security and safety issues differ in nature, characteristics and issues. Transport security is the prevention of unlawful interference with passengers, freight and transport infrastructure. Security must give users confidence to use transport. Transport safety refers to methods and measures to protect people and goods from risks directly related to and arising from transport.

Safety concerns all public and private, motorised and non-motorised, passenger and freight transport modes.

The research projects are presented in two subthemes as follows:

- **Security**: protection of passengers and workers from unlawful interference or attack;
- **Safety**: prevention of accidents and mitigation measures in the event of accident.

2. Sub-Theme: Security

EU policy follows the establishment of baseline standards for security in all Member States. EU-funded research covers the full range of security themes, including the societal dimension of protection of citizens against all types of contamination, and man-made and natural events. Transport security includes actions for infrastructure protection, improvement in crisis management, intelligent maritime and land border surveillance, and interoperability of systems.

Transport security became a top issue especially after the terrorist attack of 11 September 2001. Since then, in conjunction with the International Civil Aviation Organisation (ICAO) and International Maritime Organization (IMO), the Commission has developed measures and regulations to tighten security in aviation and maritime transport in the EU.

In 2011, the Transport White Paper defined the creation of an advisory committee on land transport security as a priority initiative (EC, 2011a). The Expert Group on Land Transport Security was set up in 2012 by Commission Decision (EC, 2012) to assist the Commission in developing policy on security in land transport. Because of its decentralised character, land transport security is handled differently to air and maritime transport. In addition the freedom of access and movement of large volumes of passengers and cargoes, and availability of strategic infrastructure (dedicated routes, tunnels and bridges) require introduction of outstanding measures.

Research projects related to the transport security are presented in two groups:

- **land transport**
- **air and maritime transport.**

Land transport

SECUR-ED (Secured Urban Transport – European Demonstration, FP7 SEC, 2011–2014) is a demonstration project in various cities and involving actors in urban mass transport security (transport operators, police officers, first responders). At workshops, tools packaged as modular solutions and based on the best practices were presented. The tools integrate technologies and processes on security aspects, ranging from risk assessment to complete training packages. Models and simulations of threats and reaction scenarios in security have been validated in demonstrations, and shown to be appropriate for transport systems in medium and large cities in Europe.

PROTECTRAIL (The railway-industry partnership for integrated security of rail transport, FP7 SEC, 2010–2014) is developing a new security system that integrates surveillance systems, such as CCTV, and CBRNE sensors, into internal and external security systems. Using the available security solutions in the rail environment and making them interoperable a modular framework is brought forth. As a result of the project all the necessary and relevant information can reach the control rooms of the infrastructure managers and railway undertakings in an appropriate and standard way. The system is being developed, validated and tested in real environment to provide users with tools to improve the organisation and more effective security and emergency management.

ADABTS (Automatic Detection of Abnormal Behaviour and Threats in crowded Spaces, FP7 SEC, 2009–2013) built a system for automatic detection of the threatening behaviour in large crowds and for alerting security staff to potential threats. The individuals' body position and movement was tracked, monitored and analysed using accurate 3D technologies integrated into the system. Through analysis of mobility, kinetic energy and sound sources, incidents such as gunshot, breaking glass and shouting, can be classified and appropriate alerts raised. The system's capability to support CCTV operators and security staff to identify incidents and to raise timely alert were demonstrated in crowded spaces. The project provided the basis for further investigation by industry and science stakeholders.

SERON (SEcurity of ROad transport Networks, FP7 SEC, 2009–2012) developed an innovative methodology to analyse and assess critical road transport networks or segments. The approach consisted of four steps: road corridor selection and identification of potentially critical infrastructure; calculation of network importance; risk assessment (without protection measures) and measure analysis. The project provided private and public road owners and operators with a methodology to analyse road infrastructure of importance in the European network. A database was developed for use free of charge by operators as a template for collecting infrastructure data and assessing the criticality of infrastructure.

Air and maritime transport

CONSORTIS (Concealed Objects Stand-Off Real-Time Imaging for Security, FP7 SEC, 2014–2017) is developing a screening system with high-throughput, high probability of detection and low false alarm rate. New improved technology, incorporating current millimetre-wave imaging technology coupled with an active 340 GHz 3D imaging radar system, is to be demonstrated in a pilot system at a European airport to evaluate the technology applicability focusing on the ethical issues with regard to the use of stand-off body scanners.

TASS (Total Airport Security System, FP 7 SEC, 2010–2014) is developing a multi-segment and multi-level surveillance and intelligence system for airport security. The main attributes of this system are no intervention with passenger flows, minimal false security alerts, integrated in-place airport security technologies, 3D Visualisation (indoor and outdoor) and state of the art human-machine interface. The first proof-of-concept was carried out at London Heathrow Airport in 2012. Field testing of the TASS prototype has demonstrated the system's ability to deliver real-time data to security authorities, enabling them to quickly identify and assess situations, and to determine the best way to respond.

ATOM (Airport detection and tracking of dangerous materials by passive and active sensors arrays, FP7 AAT, 2009–2012) developed and implemented a prototype of a multi-sensor and non-intrusive system for monitoring an airport terminal area. The system integrated and processed data transmitted by the detecting, tracking and communication modules. In the event of a threat (weapons and sharp objects, explosives, flammable and toxic substances), the system send security agents equipped with mobile devices three alarm levels: green (no alarm); yellow (medium alarm) and red alarm (maximum alarm).

BEMOSA (Behavioural Modelling for Security in Airports, FP7 TPT, 2009–2012) contributed to security improvement by strengthening human resource capabilities. The patterns of security behaviour of personnel, passengers and suppliers in eight European airports were analysed, and comprehensive and practical training guidelines were delivered for airport security stakeholders. The focus of the evidence-based guidelines was on improving airport security by enhancing staff capability to detect and act in the event of a potential risk, and by reducing false alarms and increasing profitability.

AMASS (Autonomous maritime surveillance system, FP7 SEC, 2008–2011) proposed an unmanned coastal surveillance system to give border agencies early and accurate warnings. Using platforms located at a considerable distance from shore and equipped with cutting-edge sensors, data generated are transmitted to a command centre. The system provided a 360-degree view of the area above the water, and was tested in Melanara Bay off the coast of Gran Canaria. Platform functionalities were maintained in all weather conditions.

SECTRONIC (Security System for Maritime Infrastructure, Ports and Coastal Zones, FP7 SEC, 2008–2011) resulted in the development and launch of a Command & Control Security System for maritime and land-based assets protection. The system called NIDAR automatically creates an intuitive situational awareness image for detecting, tracking, classifying and deterring security threats. NIDAR incorporates different modules for processing data received from numerous sensors. The system was demonstrated to operate in extreme environments and security requirements for coastal infrastructure and offshore assets, and wide area land and border protection were met.

3. Sub-Theme: Safety

Safety is at the heart of the EU transport policy and as stated in the Transport White Paper, safety will be of great importance "as long as people are accidentally killed or seriously injured while moving from one place to another". A key goal in EU-funded research is the provision of the highest safety standards in all transport modes in the EU.

Transport safety in the EU has greatly improved in the last decade. The number of people killed in transport accidents in the EU has decreased, but the number of road fatalities – over 26 000 in 2013 (EC, 2014) – is of great concern. The goal set out in the Transport White Paper is "saving thousands of lives" by achieving a "zero vision" on road safety in 2050 (EC, 2011b).

Transport safety and particularly the road safety initiatives envisaged in the Transport White Paper include training and education of all users, establishing common safety standards, deploying and harmonising safety technologies, enhancing the use of safer vehicles and infrastructure to provide movement of "smart vehicles on intelligent roads", and improving emergency and post-injury services, and protecting vulnerable road users.

The basic components in transport safety are users, vehicles and infrastructure, and instruments for the safer transport provision are education, enforcement and engineering (EC, 2010).

EU research projects on safety address the main components of:

- **Human factor**
- **Vehicles**
- **Infrastructure.**

Human factor

SUPRA (Simulation of UPset recovery in aviation, FP7 AAT, 2009–2012) developed and extended dynamic simulation models for teaching pilots to detect and recover from flight upset. The feasibility of exceptional flight conditions simulation was investigated using an advanced aerodynamic model of a generic transport aircraft, unique engineering approach and new motion cueing technologies. Prototype tools for training pilots were developed and tested. Based on the tests, detailed guidelines for effective upset recovery simulations were elaborated.

2-BE-SAFE (2-wheeler behaviour and safety, FP7 SST, 2009–2011) investigated behavioural and ergonomic factors contributing to motorcycle accidents. The experience and knowledge acquired were analysed and summarised in guidelines and policy recommendations for enhancing power two wheelers' rider safety. The guidelines were presented in a handbook for future research programmes. The recommendations included a comprehensive list of currently applied and potential powered two wheeler safety measures with detailed descriptions and indexes on the effectiveness of measures.

PROLOGUE (PROmoting Real Life Observations for Gaining Understanding of Road Behaviour in Europe, FP7 SST, 2009–2011) investigated, improved and tested the methodology for Naturalistic Driving (ND) observation. This project assessed the feasibility of a large-scale European Naturalistic Observation study. Small-scale field trials of naturalistic observations were conducted in five countries using different types of equipment, samples and sampling strategies. The value of the Naturalistic Driving approach for obtaining information on various aspects of road user behaviour and road safety was confirmed. Based on the field trials, the requirements for conducting ND studies were summarised and eleven key recommendations formulated.

INTERACTION (Differences and similarities in driver INTERACTION with in-vehicle technologies, FP7 SST, 2008–2012) analysed driver interactions with available in-vehicle technologies (IVT) and the long-term effects of IVT use on driver behaviour, performance and safety. Technologies available for a wide range of car models were investigated, such as communications and navigation systems, speed control, and distance control systems. Recommendations were made for improving IVT design; preparing training programmes for IVT users; increasing awareness of IVT users, and for consistent use of IVT use by drivers, and for legislation and enforcement of practices.

AZIPILOT (Intuitive Operation and Pilot Training when using Marine Azimuthing Control Devices, FP7 SST, 2008–2011) investigated interconnections between industry sectors, pilots who operate ships fitted with azimuthing control devices (ACDs), and the authorities regulating these devices. The work focused on enhancing the safety of ships during berthing/unberthing operations. Safe operation of vessels equipped with ACDs was shown to require comprehensive knowledge of this type of propulsion and its specific handling features. Guidelines were provided for a computer-based maritime training programme.

HUMAN (Model-based Analysis of Human Errors During Aircraft Cockpit System Design, FP7 AAT, 2008–2011) developed a methodology with techniques for predicting human error in complex environments that is applicable in human-centred design of aircraft cockpits. The new methodology, which integrates a cognitive model and virtual simulation platform, was supported with tools for task analysis, model-based simulation and data analysis. It was used to assess the impact of a newly designed system and in analysis and evaluation of the human-machine interaction in aircraft cockpits. The cognitive model was validated using data recorded in flight simulator experiments with 16 human pilots. The modelling approach was extended to interaction of flight crews with cockpit systems.

ISI-PADAS (Integrated Human Modelling and Simulation to Support Human Error Risk Analysis of Partially Autonomous Driver Assistance Systems, FP7 SST, 2008–2011) developed and implemented an improved methodology for risk-based design (RBD) in the design of intelligent systems - Partially Autonomous Driver Assistance System (PADAS). The methodology includes fully automatic simulations, based on models of the vehicle, the environment, the PADAS and the driver. Joint Driver Vehicle Environment (JDVE) Simulation Platform was developed integrating driver models and vehicle and environment models. The RBD methodology applicability was demonstrated on traffic light approaches as use-case scenario.

DRUID (Driving under the Influence of Drugs, FP6 SUSTDEV-2, 2006–2011) analysed data from surveys conducted on roadsides and in hospitals in 13 countries in Europe. The results were combined in a case–control study and the relative risk of serious injury or fatality was calculated. This analysis concluded that alcohol was one of the most dangerous psychoactive substances used by drivers. A classification and categorisation system of medicines with respect to their impact on driving performance was developed for use by physicians and pharmacists. Scientifically based recommendations for policymakers on measures to prevent driving under the influence of psychoactive substances were prepared.

2TRAIN (TRAINing of TRAIN Drivers in Safety Relevant Issues with Validated and Integrated Computer-Based Technology, FP6 SUSTDEV-3, 2006–2009) delivered a European best-practice guideline for training train driver focusing on safety enhancement through improving human factor issues, which is a fundamental cause in most accidents. The latest computer-based training technology was used in developing a modular platform integrating technological solutions and existing training environments in Europe. In addition to the training modules, methods for ongoing competence and performance assessment were developed. The project's results contributed to a common training technology and content for the train drivers in Europe.

TRAIN-ALL (Integrated System for driver TRaining and Assessment using Interactive education tools and New training curricula for ALL modes of road transport, FP6 SUSTDEV-3, 2006–2009) developed simulation tools for driver training in different situations and modes of road transport. The computer-based training system integrated driving simulators for motorcycles, passenger cars (for new and emergency drivers) and trucks. A prototype simulator for multi-user and group training was produced, which can contribute to reducing training time and costs while providing adequate training for various user groups.

ADOPT (Advanced Decision-support System for Ship Design, Operation and Training, FP6 SUSTDEV-3, 2005–2008) defined requirements for development of a decision support tool integrating all factors related to the ship safety. Based on the information on the sensed environmental situation, the ship's condition and behaviour, expected state of the sea on alternative courses, the tool provides the captain with assistance in making decisions on safe and efficient ship handling. A demonstrator for the proposed decision support tool was tested in a training environment.

Vehicles

FAROS (Human Factors in Risk-Based Ship Design Methodology, FP7 SST, 2012–2015) is investigating and quantifying causal links between crew performance failure, ship design and physical environment. Taking into account that the crew is fallible and that the expected errors could be seen as consequences rather than causes, risk models are being developed and tested. Deck layout, arrangement of equipment and its accessibility have been identified as factors affecting whether tasks are implemented with or without difficulty. The conclusion is that the design would maximise crew efficiency and reduce the frequency of human error. Recommendations are to be made to improve ship design.

eVADER (Electric Vehicle Alert for Detection and Emergency Response, FP7 SST, 2011–2014) is identifying warning sounds for electric vehicles to improve the safety of bicyclists and pedestrians, particularly at intersections. Acoustic measurements of ten internal combustion engine (ICE) vehicles have been conducted and nine sounds evaluated. Data were used to formulate innovative methods for improving the acoustic detectability of electric vehicles (EV), plug-in hybrid electric vehicles (PHEV) and hybrid electric vehicles (HEV) operating in electric mode. The project concluded that warning sounds could be provided through recordings of actual ICE sounds, synthesis of ICE-equivalent sounds or non-ICE-like sounds designed to be detectable and to ensure safety of all road users.

AircraftFire (Fire risks assessment and increase of passenger survivability, FP7 AAT, 2011–2013) investigated flammability and burning property of composites and polymers on board aircraft under different fire scenarios. The scenarios focused on fire detection, fire spread and evacuation procedures, depending on the composites used. The results of the scenarios analysed were used in formulating recommendations for the development of efficient technologies to improve aircraft fire prevention and protection including prompt detection and extinction.

ADSEAT (Adaptive seat to reduce neck injuries for female and male occupants, FP7 SST, 2009–2013) provided an improved tool for development and evaluation of adaptive systems focusing on protection from whiplash injuries. A computational dummy model of the average women (EvaRID) was developed. This new model used in conjunction with the existing man model (BioRID) enables crash testing and evaluation of occupant protection of both men and women. Guidelines were formulated for design and evaluation of adaptive seat systems to enhance protection against neck injury.

ASSESS (Assessment of integrated vehicle safety systems for improved vehicle safety, FP7 SST, 2009–2012) developed and tested methods for assessing integrated vehicle safety systems (IVSS). The assessment method was based on selected test scenarios taking into account factors, such as pre-crash driver and vehicle actions that influence system performance and measured in terms of the injury-reducing capacity. An assessment tool was developed for use by industry, policy makers and consumer testing organisations to assess system safety. The project contributed to increasing awareness of consumers about the functionality and benefits of collision mitigation systems for passenger cars.

EXTREME SEAS (Sea Design for Ship Safety in Extreme Seas, FP7 SST, 2009–2012) investigated physical and statistical properties of extreme and rogue waves and the potential risk of structural damage to ships. Advanced numerical and physical simulation models for wave-structure interaction were developed and supported identification of some weaknesses in the current design procedures. New design methodology and tools were developed, and improved warning criteria for extreme sea states and rogue waves were formulated.

TRANSFEU (Transport Fire Safety Engineering in the European Union, FP7 SST, 2009–2012) developed a measurement methodology for toxicity of fire effluents and an associated classification. A holistic fire safety approach for all types of surface transport was also developed. The new measurement methodology was tested on 60 products and because of its repeatability and reproducibility this method has been included in the European standard EN 45545-2 (Requirements for fire behaviour of materials and components). Cost effective methods and modelling tools for fire safety design to predict realistic fire behaviour were developed and validated in various railway vehicle scenarios.

euroFOT (European Large-Scale Field Operational Test on Active Safety Systems, FP7 ICT, 2008–2011) focused on intelligent vehicles equipped with advanced driver assistance systems (ADAS). Eight functions that assist a driver in hazard detection, accident prevention and more efficient driving were tested in more than 1 000 cars and trucks. The findings of the tests were related to the following systems: adaptive cruise control & forward collision warning; navigation systems; blind spot information system; speed regulation system and curve speed warning. The project also revealed links between the intelligent systems used and improvements in driver behaviour, fuel efficiency and traffic safety.

INTERSAFE-2 (Cooperative Intersection Safety, FP7 ICT, 2008–2011) developed and demonstrated a technical solution to significantly reduce injury and fatal accidents at intersections. The proposed solution combined advanced technologies, such as object recognition, relative localisation, cooperative sensor fusion, and vehicular communication. The Cooperative Intersection Safety System (CISS) developed integrates warning and intervention functions. Three vehicles were equipped with the system and its ability to cooperate with road-side infrastructure for safety at intersections was demonstrated.

SAFERAIL (Development of Novel Inspection Systems for Railway Wheelsets, FP7 SST, 2008–2011) focused on rail safety related to train wheel sets. A working prototype of a track-side inspection system was developed and manufactured to identify wheel sets faults before they become serious enough to constitute a safety risk. The new system combined high frequency vibration analysis, acoustic emission and thermography techniques. In addition to the non-destructive testing equipment, manual inspection systems were developed and these inspection methodologies were provided for the rail industry.

SAFERIDER (Advanced telematics for enhancing the SAFEty and comfort of motorcycle RIDERs, FP7 ICT, 2008–2010) studied the potential for active safety and information systems in powered two wheelers based on the ADAS/IVIS subsystems used by cars and trucks. The focus was on developing appropriate human-machine interfaces. The pilot system covered functionalities, such as speed alert, curve warning, frontal collision warning, and navigation & route guidance. The reliability, effectiveness, usability and user acceptance of the safety system were evaluated in off-road and on-road test, in three motorcycle simulators, and nine motorcycle demonstrations.

Infrastructure

INROADS (INtelligent Renewable Optical ADvisory System, FP7 SST, 2011–2014) is developing intelligent road marking applications integrating LED lighting (road stud), sensor and communications systems, and renewable energy sources. As the number of potential LED based applications is substantial, the project is focusing on the most technically challenging applications. The applications under development are designed to improve road user safety on highway sections with no available power source.

Intelligent road markings are being developed, such as **active lane delineation**, sensors to detect approaching vehicles and send a command to illuminate the pavement and verge of the unlit road section; **smart pedestrian crossings** that light up when pedestrians are about to cross the road; **advanced hazard warnings**, sensors on obstacles that trigger a warning to road users; **pavement-embedded signage**, an array of lights is activated displaying signs or fixed/scrolling messages.

SAFETRIP (Satellite application for emergency handling, traffic alerts, road safety and incident prevention, FP7 SST, 2009–2013) built new satellite technology based on S-band communications to optimise the alert chain (information, prevention, intervention) in the event of an incident. The technology was demonstrated in customer-oriented applications supplying three communication services (broadcast, messaging, bi-directional) to improve safer use of road infrastructure. In addition, applications provided drivers with more convenience and comfort during the trip: digital radio, data services, music and video on demand. The SafeTRIP platform is open and can be used by companies to develop other applications to improve road safety.

ARIADNA (Maritime assisted volumetric navigation system, FP7 SST, 2009–2012) developed a maritime and inland navigation system for traffic management in ports, rivers and channels. The system provides vessels with warning and manoeuvring support to avoid collisions, accidents and human errors, and to improve safety in navigation and shipping. The ARIADNA technology is based on the Volumetric Navigation System (VNS) concept. The system combines data on navigation, vessel position and vessel characteristics with time information about relative positions of other vessels and infrastructure in the surroundings. ARIADNA was tested in the Austrian Danube and in the Strait of Gibraltar where the improved navigation and safety capabilities were demonstrated.

SMART RRS (Innovative concepts for smart road restraint systems to provide greater safety for vulnerable road users, FP7 SST, 2008–2012) provided a new smart Road Restraint System (RRS) to reduce traffic accidents involving vulnerable road users, such as motorcyclists, cyclists and passengers. The system contributes to safety of road users at three levels: primary (timely and useful preventive information); secondary (safe crash and decreased injuries severity in case of accident) and tertiary (quick and better assistance). SMARTRRS integrates infrastructure and vehicle-based sensing systems and transfers information to emergency services, road authorities and other road users. The sensing systems are designed to prevent an accident and to mitigate the effects of a collision.

AAS (Integrated Airport Apron Safety Fleet Management, FP7 AAT, 2008–2011) developed and implemented an advanced fleet management system for monitoring and controlling ground service equipment (GSE) vehicles and movements at the apron and manoeuvring area of an airport. The system optimises vehicle running times and number of vehicles and equipment to support daily operations. Safety on apron areas was improved with the decision support tool for real time assignment of staff and vehicle task allocation. The AAS system was tested at Berlin TXL Airport, Porto International Airport and Budapest Airport and led to savings in daily operational costs, reduction in vehicles and equipment requirement, and improved safety in apron areas.

ASSET ROAD (Advanced Safety and Driver Support in Essential Road, FP7 SST, 2008–2011) improved current safety theory and its application in defining measures and technical solutions in an integrated safety system. In this holistic approach, all elements of safety theories were integrated and resulted in ASSET-Road safety theory. Missing technical solutions were defined, developed and demonstrated. The proposed applications incorporate innovative technologies, smart information and sensors systems, and wireless communication/power supply technologies. Accident prevention by improved driver awareness and early warning procedures in the event of an accident or hazards was the highest priority in the applications that were developed and tested.

ROSATTE (ROad Safety ATTributes Exchange Infrastructure in Europe, FP7 ICT, 2008–2010) established an efficient data supply chain from public authorities to commercial map providers with regard to road safety. Common data specifications were prepared and interoperable tools were developed for maintaining and accessing data provided by thousands of road authorities. The tools were validated in tests on roads in six EU Member States. It was concluded that the deployment of map-based advanced driver assistance systems (ADAS) applications has the potential to reduce road casualties and injuries.

COOPERS (Co-OPerative SystEms for Intelligent Road Safety, FP6 IST, 2006–2010) defined, developed and tested innovative, safety related telematics applications for communication between vehicles and road infrastructure and other vehicles by means of wireless communication technologies. The core technologies selected were CALM-IR, DAB, and GSM/GPRS. The system was demonstrated in daily operation under traffic conditions at sites in five EU Member States. The test results demonstrated safety improvement and user acceptance and are thus a step towards development of Intelligent Co-operative Traffic Management Systems.

SAFESPOT (Cooperative Systems for Road Safety, FP6 IST, 2006–2010) provided solutions to connect smart vehicles with smart infrastructure and thus to increase safety at "black spots". The applications are vehicle and infrastructure based and the system architecture is open to enable the addition of future applications. All applications were integrated in "safety margin assistant" to detect potentially dangerous situations and to inform drivers. The applications were demonstrated and tested under real conditions in six EU Member States. Interoperability between countries was also tested. The project contributed to the development of Intelligent Co-operative Traffic Management Systems.

4. Future Challenges for Research and Policy

Increasing mobility of European citizens makes **safer and more secure transport services** key challenges.

Security in all transport modes will continue to be a part of an integrated transport security strategy. The challenge for research related to freight transport is to develop solutions for increasing security throughout the supply chain, without impeding the free flow of trade and independently of the transport mode used. To deliver the desired level of services, cargo security measures should be outcome-oriented based on sound risk assessment and should facilitate movement. Research on passenger security should lead to more effective and privacy friendly technologies (scanners, detectors of new explosives, smart chips) enabling monitoring of a large number of passengers with minimum inconvenience and intrusion. Security at land transport terminals should be at the same level as provided at airports and maritime ports. Innovations need to focus on incorporating security features into the design of vehicles and infrastructure.

EU-funded research and innovations in all transport modes must support action on **transport safety** for "saving thousands of lives" considering as well the social changes in mobility needs. Themes as ageing population and gender issues together with analysis of new societal trends will complement technological research & innovation actions.

The air traffic management infrastructure (SESAR) and the Vessel Traffic Monitoring and Information System (SafeSeaNet) will become the core tools in air and maritime safety and for enforcement of common requirements and standards.

The development of Intelligent Transport Systems (ITS), based on information and communication technologies, has to be on a European basis, as Intelligent Co-operative Traffic Management System. Use of technology innovations, such as satellite and radio navigation and identification systems, will enable improved monitoring and management of flows of goods, passengers and vehicles, making transport services smarter, safer and more secure through a growing level of automation.

The main research and technology challenges in road safety are continued development and application of systems, such as driver assistance systems, (smart) speed limiters, seatbelt reminders, eCall, cooperative systems and vehicle-infrastructure interfaces. Special attention needs to be given to the safety of vulnerable road users through development of safer infrastructure and vehicle technologies.

EU transport research needs to focus on **establishing integrated security and safety systems and common requirements and standards for all transport modes in Europe**. The foundation for future developments has already been laid in key research (SECUR-ED, CONSORTIS, COOPERS, ASSET ROADS, EXCROSS). These projects could be considered to be the cornerstone for innovation and as projects that provide continuity to transport research.

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Glossary

AAT	Aeronautics and Air Transport
ADAS	Advanced Driver Assistance Systems
CBRNE	Chemical, Biological, Radiological, special Nuclear and Explosive
CCTV	Closed-Circuit Television
DAB	Digital Audio Broadcasting
DG MOVE	Directorate-General for Mobility and Transport
EC	European Commission
ERA	European Research Area
EU	European Union
FP6	Sixth Framework Programme
FP7	Seventh Framework Programme
GPRS	General Packet Radio Service
GSM	Global system for mobile communications
ICAO	International Civil Aviation Organization
ICT	Information and Communication Technologies
IMO	International Maritime Organization
IST	Information Society Technologies
ITS	Intelligent Transport Systems
LED	Light-Emitting Diode
OSJD	Organisation for Co-operation between Railways
OTIF	Intergovernmental Organisation for International Carriage by Rail
PTW	Powered Two Wheeler
R&D	Research and Development
RTD	Research, Technology and Development

SST	Sustainable Surface Transport
SUSTDEV	Sustainable Development, Global Change and Ecosystems
TPT	Transport (Including Aeronautics)
TRKC	Transport Research Knowledge Centre
TRS	Thematic Research Summary
UNECE	The United Nations Economic Commission for Europe

ANNEX: Projects by Sub-Theme

Sub-Theme : Security				
Acronym	**Title**	**Funding Programme**	**Project Website**	**Duration**
SECUR-ED	Secured Urban Transport – European Demonstration	FP7	http://www.secur-ed.eu/	2011–2014
PROTECTRAIL	The railway-industry partnership for integrated security of rail transport	FP7	http://www.protectrail.eu/	2010–2014
ADABTS	Automatic Detection of Abnormal Behaviour and Threats in crowded Spaces	FP7	http://cordis.europa.eu/projects/rcn/91158_en.html	2009–2013
SERON	Security of road transport networks	FP7	http://www.seron-project.eu/	2009–2012
CONSORTIS	Concealed Objects Stand-Off Real-Time Imaging for Security	FP7	http://virtual.vtt.fi/virtual/consorti/index.htm	2014–2017
TASS	Total Airport Security System	FP7	http://www.tass-project.eu/	2010–2014
BEMOSA	Behavioural Modelling for Security in Airports	FP7	http://bemosa.technion.ac.il/	2009–2012
ATOM	Airport detection and tracking of dangerous materials by passive and active sensors arrays	FP7	http://www.atom-project.eu/	2009–2012

AMASS	Autonomous maritime surveillance system	FP7	http://www.amass-project.eu/amassproject/	2008–2011
SECTRONIC	Security System for Maritime Infrastructures, Ports and Coastal Zones	FP7	http://www.sectronic.eu/	2008–2011

Sub-Theme : Security (Other relevant projects)				
Acronym	**Title**	**Funding Programme**	**Project Website**	**Duration**
GAMMA	Global ATM security management	FP7	http://www.gamma-project.eu/	2013–2017
FLY-BAG2	Advanced technologies for bomb-proof cargo containers and blast containment units for the retrofitting of passenger airplanes	FP7	http://www.fly-bag2.eu/	2012–2015
CONTAIN	Container Security Advanced Information Networking	FP7	http://www.containproject.com/	2011–2015
SECURESTATION	Passenger station and terminal design for safety, security and resilience to terrorist attack	FP7	http://securestation.group.shef.ac.uk/index.html	2011–2014
RESTRAIL	Reduction of Suicides and Trespasses on RAILway property	FP7	http://www.restrail.eu/	2011–2014
SECUREMETRO	Inherently secure blast resistant and fire safe metro vehicles	FP7	http://securemetro.inrets.fr/	2010–2012
LOGSEC	Development of a Strategic Roadmap towards a Large scale Demonstration Project in European Logistics and Supply Chain Security	FP7	http://www.transport-research.info/web/projects/project_details.cfm?id=38407	2010–2011
EFFISEC	EFFicient Integrated SECurity Checkpoints	FP7	http://www.effisec.eu/	2009–2014

SAVE ME	System and Actions for VEhicles and transportation hubs to support Disaster Mitigation and Evacuation	FP7	http://www.save-me.eu/	2009–2012
EVITA	E-safety Vehicle Intrusion proTected Applications	FP7	http://evita-project.org/	2008–2011
INTEGRITY	Intermodal Global Door-to-door Container Supply Chain Visibility	FP7	http://www.integrity-supplychain.eu/	2008–2011
MODsafe	Modular Urban Transport Safety and Security Analysis	FP7	http://www.modsafe.eu/	2008–2011
ASPIS	Autonomous Surveillance in Public transport Infrastructure Systems	FP7	http://www.aspis-project.eu/	2008–2011
FLY-BAG	Blastworthy Textile-Based Luggage Containers for Aviation Safety	FP7	http://www.transport-research.info/web/projects/project_details.cfm?id=37336	2008–2011
OPERAMAR	An Interoperable Approach to European Union Maritime Security Management	FP7	http://www.transport-research.info/web/projects/project_details.cfm?id=36630	2008–2009
SOFIA	Safe Automatic Flight Back and Landing of Aircraft	FP6	http://www.sofia.isdefe.es/	2006–2010
STAR	Secure ATM CDMA Software-Defined Radio	FP6	http://www.transport-research.info/web/projects/project_details.cfm?id=35385	2006–2010
CHINOS	Container Handling in Intermodal Nodes – Optimal and Secure	FP6	http://www.transport-research.info/web/projects/project_details.cfm?ID=28067	2006–2009

OPTAG	Improving Airport Efficiency, Security and Passenger Flow by Enhanced Passenger Monitoring	FP6	http://www.transport-research.info/web/projects/project_details.cfm?id=35661	2006–2009
SEVECOM	SEcure VEhicle COMmunication	FP6	http://www.sevecom.org/	2006–2008

Sub-Theme : Safety				
Acronym	**Title**	**Funding Programme**	**Project Website**	**Duration**
SUPRA	Simulation of Upset Recovery in Aviation	FP7	http://www.supra.aero/home.htm	2009–2012
2-BE-SAFE	2-wheeler behaviour and safety	FP7	http://www.2besafe.eu/	2009–2011
PROLOGUE	Promoting real life observations for gaining understanding of road behaviour in Europe	FP7	http://www.prologue-eu.eu/	2009–2011
INTERACTION	Differences and similarities in driver INTERACTION with in-vehicle technologies	FP7	http://interaction-fp7.eu/	2008–2012
AZIPILOT	Intuitive Operation and Pilot Training when using Marine Azimuthing Control Devices	FP7	http://pilot.ncl.ac.uk/	2008–2011
HUMAN	Model-based Analysis of Human Errors During Aircraft Cockpit System Design	FP7	http://www.human.aero/	2008–2011
ISI-PADAS	Integrated Human Modelling and Simulation to Support Human Error Risk Analysis of Partially Autonomous Driver Assistance Systems	FP7	http://www.transport-research.info/web/projects/project_details.cfm?id=37254	2008–2011
DRUID	Driving under the influence of drugs, alcohol and medicine	FP6	http://www.druid-project.eu/	2006–2011

2TRAIN	Training of Train Drivers in Safety Relevant Issues with Validated and Integrated Computer-Based Technology	FP6	http://www.2train.uni-wuerzburg.de/	2006–2009
TRAIN-ALL	Integrated System for driver Training and Assessment using Interactive education tools and New training curricula for All modes of road transport	FP6	http://www.transport-research.info/web/projects/project_details.cfm?id=36286	2006–2009
ADOPT	Advanced Decision-support System for Ship Design, Operation and Training	FP6	http://adopt.rtdproject.net/	2005–2008
FAROS	Human Factors in Risk-Based Ship Design Methodology	FP7	http://www.faros-project.eu/	2012–2015
eVADER	Electric Vehicle Alert for Detection and Emergency Response	FP7	http://www.evader-project.eu/	2011–2014
AIRCRAFTFIRE	Fire risks assessment and increase of passenger survivability	FP7	http://www.aircraftfire.eu/	2011–2013
ADSEAT	Adaptive seat to reduce neck injuries for female and male occupants	FP7	http://www.adseat.eu/	2009–2013
ASSESS	Assessment of integrated vehicle safety systems for improved vehicle safety	FP7	http://www.assess-project.eu/	2009–2012
Extreme SEAS	Design for Ship Safety in Extreme Seas	FP7	http://www.mar.ist.utl.pt/extremeseas/home.aspx	2009–2012

TRANSFEU	Transport Fire Safety Engineering in the European Union	FP7	http://www.transfeu.eu/	2009–2012
euroFOT	European Large-Scale Field Operational Test on Active Safety Systems	FP7	http://www.eurofot-ip.eu/	2008–2011
INTERSAFE-2	Cooperative Intersection Safety	FP7	http://www.transport-research.info/web/projects/project_details.cfm?id=44488	2008–2011
SAFERAIL	Development of Novel Inspection Systems for Railway Wheelsets	FP7	http://www.saferail.net/	2008–2011
SAFERIDER	Advanced telematics for enhancing the SAFEty and comfort of motorcycle RIDERs	FP7	http://www.saferider-eu.org/	2008–2010
INROADS	INtelligent Renewable Optical ADvisory System: Road studs	FP7	http://www.transport-research.info/web/projects/project_details.cfm?id=41328	2011–2014
SAFETRIP	Satellite application for emergency handling, traffic alerts, road safety and incident prevention	FP7	http://www.safetrip.eu/	2009–2013
ARIADNA	Maritime assisted volumetric navigation system	FP7	http://ariadna-fp7.eu/	2009–2012
SMART RRS	Innovative concepts for smart road restraint systems to provide greater safety for vulnerable road users	FP7	http://smartrrs.unizar.es/content.php?seccion=16	2008–2012
AAS	Integrated Airport Apron Safety Fleet Management	FP7	http://www.aas-project.eu/	2008–2011

ASSET-ROAD	ASSET Advanced Safety and Driver Support in Essential Road Transport	FP7	http://www.project-asset.com/	2008–2011
ROSATTE	ROad Safety ATTributes Exchange Infrastructure in Europe	FP7	http://www.transport-research.info/web/projects/project_details.cfm?id=44555	2008–2010
COOPERS	Co-operative Systems for Intelligent Road Safety	FP6	http://www.coopers-ip.eu/	2006–2010
SAFESPOT	Cooperative Systems for Road Safety	FP6	http://www.safespot-eu.org/	2006–2010

Sub-Theme : Safety (Other relevant projects)				
Acronym	**Title**	**Funding Programme**	**Project Website**	**Duration**
EVACUATE	A holistic, scenario-independent, situation-awareness and guidance system for sustaining the Active Evacuation Route for large crowds	FP7	http://www.evacuate.eu/	2013–2017
ASCOS	Aviation Safety and Certification of new Operations and Systems	FP7	http://www.ascos-project.eu/	2012–2015
MAN4GEN	Manual Operation for 4th Generation Airliners	FP7	http://www.transport-research.info/web/projects/project_details.cfm?id=45028	2012–2015
EXCROSS	EXploiting safety results aCROSS transportation modes	FP7	http://www.excross.eu/	2011–2013
DACOTA	Road safety Data Collection, Transfer and Analysis	FP7	http://www.dacota-project.eu/	2010–2012
SVETLANA	Safety (and maintenance) improVEment Through automated fLight data ANAlysis	FP7	http://svetlanaproject.eu/	2010–2012
FIREPROOF	Probabilistic Framework for Onboard Fire-safety	FP7	http://www.fireproof-project.eu/	2009–2012
GOALDS	GOAL Based Damage Stability	FP7	http://www.transport-research.info/web/projects/project_details.cfm?id=41661	2009–2012
IMVITER	IMplementation of VIrtual TEsting in safety Regulations	FP7	http://www.imviter.com/	2009–2012

ON-WINGS	ON Wing Ice DetectioN and MonitorinG System	FP7	http://www.transport-research.info/web/projects/project_details.cfm?id=37946	2009–2012
SAFER BRAIN	Innovative Guidelines and Tools for Vulnerable Road Users' Safety in India and Brazil	FP7	http://www.transport-research.info/web/projects/project_details.cfm?id=41682	2009–2012
SAFEWAY2 SCHOOL	Integrated System for Safe Transportation of Children to School	FP7	http://www.safeway2school-eu.org/	2009–2012
EPOCH	Enabling Protection for Older Children	FP7	http://www.epochfp7.org/	2009–2011
FOT-Net	Networking for Field Operational Tests	FP7	http://fot-net.eu/	2008–2010
ESTEEM	Enhancing Safety and Security Aspects in Transport Research in the Euro-Mediterranean Region	FP7	http://www.transport-research.info/web/projects/project_details.cfm?id=37259	2008–2009
I-WAY	Intelligent Cooperative System in Cars for Road Safety	FP6	http://www.transport-research.info/web/projects/project_details.cfm?id=38010	2006–2009
RESET	Reduced Separation Minima	FP6	http://reset.aena.es/start/frames.html	2006–2009
PEPPER	Police Enforcement Policy and Programmes on European Roads	FP6	http://www.vtt.fi/sites/pepper/	2006–2008
SAFEDMI	Safe Driver Machine Interface (DMI) for ERTMS Automatic Train Control	FP6	http://www.transport-research.info/web/projects/project_details.cfm?id=36216	2006–2008

ALERT	Assessment of Life-cycle Effect of Repairs on Tankers	FP6	http://alert.ncl.ac.uk/	2006–2008
FEEDMAP	Technical and Commercial Feasibility Assessment of Map Data Feedback Loops Applied to the ActMAP Framework	FP6	http://www.transport-research.info/web/projects/project_details.cfm?id=45969	2006–2008
TRACE	Traffic Accident Causation in Europe	FP6	http://www.trace-project.org/	2006–2008
COM2REACT	Cooperative Communication System to Realise Enhanced Safety and Efficiency in European Road Transport	FP6	http://www.com2react-project.org/	2006–2007
REPOSIT	Relative Positioning for Collision Avoidance Systems	FP6	http://www.transport-research.info/web/projects/project_details.cfm?id=38052	2006–2007
FLYSAFE	Airborne Integrated Systems for Safety Improvement, Flight Hazard Protection and All Weather Operations	FP6	http://www.transport-research.info/web/projects/project_details.cfm?id=35425	2005–2009
HILAS	Human Integration into the Life-cycle of Aviation Systems	FP6	http://www.transport-research.info/web/projects/project_details.cfm?id=36243	2005–2009
ASICBA	Aviation Safety Improvement using Cost Benefit Analysis	FP6	http://www.transport-research.info/web/projects/project_details.cfm?id=35421	2005–2007
ONBASS	Onboard Active Safety System	FP6	http://www.transport-research.info/web/projects/project_details.cfm?id=35659	2005–2007

APROSYS	Advanced Protection Systems	FP6	http://www.transport-research.info/web/projects/project_details.cfm?id=35419	2004–2009
MARSTRUCT	Network of Excellence on Marine Structures	FP6	http://www.mar.ist.utl.pt/marstruct/	2004–2009
SAFECRAFTS	Safe Abandoning of Passenger Ships – Improvement of Current Lifesaving Appliances Systems	FP6	http://www.transport-research.info/web/projects/project_details.cfm?id=36259	2004–2009
SAFE-RAIL	Development of an Innovative Ground-Penetrating Radar System for Fast and Efficient Monitoring of Rail-Track Substructure Conditions	FP6	http://www.transport-research.info/web/projects/project_details.cfm?id=36267	2004–2008
ISAAC	Improvement of Safety Activities on Aeronautical Complex systems	FP6	http://www.transport-research.info/web/projects/project_details.cfm?id=35432	2004–2007
SAFECOS 05 or 07	Safety Competition for Students	FP6	http://www.transport-research.info/web/projects/project_details.cfm?id=45984	2004–2007
SPARC	Secure Propulsion using Advanced Redundant Control	FP6	http://www.transport-research.info/web/projects/project_details.cfm?id=36021	2004–2007
SAFE-AIRPORT	Development of an Innovative Acoustic System for the Improvement of Co-operative Air Traffic Management	FP6	http://www.transport-research.info/web/projects/project_details.cfm?id=20498	2003–2005

Other projects related both to security and safety				
Acronym	**Title**	**Funding Programme**	**Project Website**	**Duration**
WIDELASE	Monolithic Widely Tunable Interband Cascade Lasers for Safety and Security	FP7	http://cordis.europa.eu/projects/rcn/105120_en.html	2012–2015
EMAR	e-Maritime Strategic Framework and Simulation based Validation	FP7	http://www.emarproject.eu/	2012–2014
E-FREIGHT	European e-freight capabilities for co-modal transport	FP7	http://www.transport-research.info/web/projects/project_details.cfm?id=41599	2010–2013
PPLANE	Personal Plane: Assessment and Validation of Pioneering Concepts for Personal Air Transport Systems	FP7	http://www.transport-research.info/web/projects/project_details.cfm?ID=41310	2009–2012
UNCOSS	Underwater coastal sea surveyor	FP7	http://cordis.europa.eu/projects/rcn/89678_en.html	2008–2012
LAYSA	Multifunctional Layers for Safer Aircraft Composites Structures	FP7	http://www.transport-research.info/web/projects/project_details.cfm?id=37396	2008–2011
MODSAFE	Modular urban transport safety and security analysis	FP7	http://www.transport-research.info/web/projects/project_details.cfm?id=38833	2008–2011
WIMA²S	Wide maritime area airborne surveillance	FP7	http://cordis.europa.eu/projects/rcn/88640_en.html	2008–2011
SINBAD	Safety Improved with a New concept by Better Awareness on airport approach Domain	FP6	http://www.transport-research.info/web/projects/project_details.cfm?id=36273	2007–2010

PROMIT	Promote innovative intermodal freight transport	FP6	http://www.transport-research.info/web/projects/project_details.cfm?id=16693	2006–2009
SPADE-2	Supporting Platform for Airport Decision-making and Efficiency Analysis, Phase 2	FP6	http://www.transport-research.info/web/projects/project_details.cfm?id=36322	2006–2009
CAPOEIRA	Coordination Action of Ports for integration Of Efficient Innovations and development of adequate Research, development and innovation Activities	FP6	http://www.transport-research.info/web/projects/project_details.cfm?id=36311	2006–2008
VISIONS	Visionary concepts for vessels and floating structures	FP6	http://www.transport-research.info/web/projects/project_details.cfm?id=11278	2005–2009
SPREEX	Spill response experience	FP6	http://www.transport-research.info/web/projects/project_details.cfm?ID=35413	2005–2007
USE HAAS	Study on high altitude aircrafts (HAAS) and airships, deployed for specific aeronautical and space applications	FP6	http://www.transport-research.info/web/projects/project_details.cfm?id=37503	2005–2006
MARNIS	Maritime Navigation and Information Services	FP6	http://www.transport-research.info/web/projects/project_details.cfm?id=11127	2004–2008
ROTIS II	Remotely Operated Tanker Inspection System II	FP6	http://www.transport-research.info/web/projects/project_details.cfm?id=36258	2004–2007
B-VHF	Broadband VHF – Aeronautical Communications System Based on MC-CDMA	FP6	http://www.transport-research.info/web/projects/project_details.cfm?id=11112	2004–2006

INMARE	Technologies and Methodologies for Safe, Environmental-friendly and Efficient Shipping Operations of the future	FP6	http://www.transport-research.info/web/projects/project_details.cfm?id=36213	2004–2006
SPADE	Supporting Platform for Airport Decision-making and Efficiency Analysis	FP6	http://www.transport-research.info/web/projects/project_details.cfm?id=36321	2004–2006
EMAR	e-Maritime Strategic Framework and Simulation based Validation	FP7	http://www.emarproject.eu/	2012–2014
E-FREIGHT	European e-freight capabilities for co-modal transport	FP7	http://www.transport-research.info/web/projects/project_details.cfm?id=41599	2010–2013
PPLANE	Personal Plane: Assessment and Validation of Pioneering Concepts for Personal Air Transport Systems	FP7	http://www.transport-research.info/web/projects/project_details.cfm?ID=41310	2009–2012
UNCOSS	Underwater coastal sea surveyor	FP7	http://cordis.europa.eu/projects/rcn/89678_en.html	2008–2012
LAYSA	Multifunctional Layers for Safer Aircraft Composites Structures	FP7	http://www.transport-research.info/web/projects/project_details.cfm?id=37396	2008–2011
MODSAFE	Modular urban transport safety and security analysis	FP7	http://www.transport-research.info/web/projects/project_details.cfm?id=38833	2008–2011
WIMA²S	Wide maritime area airborne surveillance	FP7	http://cordis.europa.eu/projects/rcn/88640_en.html	2008–2011
SINBAD	Safety Improved with a New concept by Better Awareness on airport approach Domain	FP6	http://www.transport-research.info/web/projects/project_details.cfm?id=36273	2007–2010

PROMIT	Promote innovative intermodal freight transport	FP6	http://www.transport-research.info/web/projects/project_details.cfm?id=16693	2006–2009
SPADE-2	Supporting Platform for Airport Decision-making and Efficiency Analysis, Phase 2	FP6	http://www.transport-research.info/web/projects/project_details.cfm?id=36322	2006–2009
CAPOEIRA	Coordination Action of Ports for integration Of Efficient Innovations and development of adequate Research, development and innovation Activities	FP6	http://www.transport-research.info/web/projects/project_details.cfm?id=36311	2006–2008
VISIONS	Visionary concepts for vessels and floating structures	FP6	http://www.transport-research.info/web/projects/project_details.cfm?id=11278	2005–2009
SPREEX	Spill response experience	FP6	http://www.transport-research.info/web/projects/project_details.cfm?ID=35413	2005–2007
USE HAAS	Study on high altitude aircrafts (HAAS) and airships, deployed for specific aeronautical and space applications	FP6	http://www.transport-research.info/web/projects/project_details.cfm?id=37503	2005–2006
MARNIS	Maritime Navigation and Information Services	FP6	http://www.transport-research.info/web/projects/project_details.cfm?id=11127	2004–2008
ROTIS II	Remotely Operated Tanker Inspection System II	FP6	http://www.transport-research.info/web/projects/project_details.cfm?id=36258	2004–2007
B-VHF	Broadband VHF – Aeronautical Communications System Based on MC-CDMA	FP6	http://www.transport-research.info/web/projects/project_details.cfm?id=11112	2004–2006

INMARE	Technologies and Methodologies for Safe, Environmental-friendly and Efficient Shipping Operations of the future	FP6	http://www.transport-research.info/web/projects/project_details.cfm?id=36213	2004–2006
SPADE	Supporting Platform for Airport Decision-making and Efficiency Analysis	FP6	http://www.transport-research.info/web/projects/project_details.cfm?id=36321	2004–2006