SAFER
VEHICLE AND TRAFFIC SAFETY CENTRE AT CHALMERS

Wireless Communications Vehicle-to-Vehicle and Vehicle-to-Infrastructure

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SAFER PRE-STUDY NO. AD4
2008-04-10

Abstract

This state-of-the-art survey addresses wireless communication vehicle-to-vehicle and vehicle-to-infrastructure. With infrastructure is here meant roadside equipment. Today, wireless links are used for e.g. collecting tolls, telephony, traffic congestion warnings (TCM), positioning (GPS). Wireless communication can also be used within safety, efficiency and infotainment areas. The purpose of this report is to make a survey of the available open project related information and summarize it. The considered projects were located in Europe, USA and Japan.

Finally a total of 79 projects were considered significant. The approach for getting an overview of these projects was to combine project descriptions (i.e. project explicit views) with project classification metrics (i.e. project implicit views). It is believed that this approach results in a representative state-of-the-art overview of wireless communication vehicle-to-vehicle and vehicle-to-infrastructure projects.

In this report links are also given to a number of related organisations (about a hundred).

Apart from the projects as such it is possible to see differences in Europe, USA and Japan using the surveyed projects. There is a strong governmental support in USA and Japan. In Europe governmental support is indirect via the European Commission and the picture is more heterogeneous with many different countries involved. As it seems this is reflected in

- The higher number of projects in Europe compared to USA and Japan.
- More overlapping projects in Europe compared to USA and Japan. Several projects seem to address the same issues.

In Europe, maybe the projects Coopers, Safespot and CVIS will become the central projects since all three are large projects with many important participants and addressing many application areas.

Key words:

state of the art, wireless, communication , v2v, v2i, safety

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1 Terminology

Organisation	An interest group that is not limited in time.
Project	One task or a group of tasks that is limited in time.
v2i	Vehicle to infrastructure (communication), the same as c2i (car to infrastructure)
v2v	Vehicle to vehicle (communication), the same as c2c (car to car)

2 Scope

This state-of-the-art survey addresses wireless communication vehicle-to-vehicle and vehicle-to-infrastructure. With infrastructure is here meant roadside equipment. Today, wireless links are used for e.g. collecting tolls, telephony, traffic congestion warnings (TCM), positioning (GPS). Wireless communication can be used within safety, efficiency and infotainment areas. The purpose of this report is to make a survey of the available open information and summarize it in a state-of-the-art document. The document can be used e.g. to identify aspects that are not covered or lack satisfactory solutions or as input to research proposals. However, it is difficult to make an unambiguous definition of what should be included in this kind of survey. There are several reasons for this such as

- Which countries worldwide should be considered.
- How to handle continuously ongoing research in universities (where one purpose is to support PhD-studies).
- How to consider conferences and scientific papers.
- The border between included and excluded items; there are always items that are strongly or weekly related and in their turn there are always other items that are also strongly or weekly related etc. Thus a strictly defined set is not possible to achieve.

In any case, the purpose of a state-of-the-art survey is to create an overview of the addressed area making it possible to perform further analyses.

For this survey the following prerequisites apply

- A breadth first search is used
- Active (not passive) safety is addressed i.e. means for avoiding injuries and collisions.
- Traffic efficiency and infotainment are included.
- Relevant organisations are included and sorted.
- Focus on Europe, Japan and USA since they are dominant in the vehicle application area. Other countries could also be of interest e.g. China, Canada and South-Korea, however, not included here.
- Only *projects* are considered i.e. time limited tasks. Thus continuous research activities in universities are excluded. Also conferences and scientific papers are excluded.
- Company specific projects have been excluded (detailed information concerning these is generally difficult to get).
- Only publicly available web-pages have been considered.
- Future autonomous cars (sometimes denoted cybercars) are not considered
- Pure administrative projects are not considered thus the included projects generate some kind of technical artefact(s).

Even with these limitations there are still 79 projects described in this survey.

Finally, it should be noted that this survey cannot claim being complete, not even within the restrictions given above, however believed to be a representative set of state-of-the-art for the addressed area.

3 Approach

3.1 Search

The search for projects and organisations has been made in the following way:

- Starting from generally known projects their links are gathered.
- Extensive search on the Internet

3.2 Characterisation

In order to get an overview of a project a special template is used as shown below

Overview				
3.3 "name/identifier"				
Duration:				
Financing:				
Size:				
Country interest:				
Link:				
Summary:				
Focus **Application type**	**Vehicle human**	**Infrastructure human**	**Technical**	
Safety application				
Efficiency application				
Infotainment application				
Application independent				
Artefact **Area of work**	**New algorithm / New technology**	**Specification**	**Realisation**	**Evaluation**
Vehicle				
Communication				
Infrastructure				
Management				

As can be seen there are three overall fields: *Overview*, *Application type* and *Area of work* where the latter two fields are used for project classification. The classification concerns the *major* impressions. For example, a project with 12 European partners and one partner from Japan will anyhow be characterised as European.

The *Overview* consists of the following fields:

- The *name/identifier* of the project
- *Duration* – calendar time
- *Financing* – name/identifier of e.g. research sponsor, partners etc
- *Size* – the first hand choice is man months but other measures could be: money, number of partners etc. The purpose is to get an opinion of the impact of the project and understand its available resources.
- *Country interest* – main interested countries and one or more of the following: *USA, Europe, Japan, Other* where Other denotes a country outside Europe and not USA and Japan.
- *Link* – web link to project home page or other relevant information
- *Summary* – short description of the purpose and achievements of the project

The *Application type* consists of the following fields:

- *Safety application* – an application for avoiding injuries, vehicle damage etc.
- *Efficiency application* – an application for route planning, avoiding road work etc. Also comfort related applications are included here.
- *Infotainment application* – an application for weather forecast, video/music download etc
- *Application independent* – an application that cannot be directly mapped to the three types above

Note that a project may contain both application dependent and application independent parts.
Each *Application type* has one or more focuses:

- *Vehicle human* – focus on driver or passenger
- *Infrastructure human* – focus on operator or management persons
- *Technical* – focus on technical solutions

The *Area of work* consists of the following fields:

- *Vehicle* – the part of the application local to the vehicle
- *Communication* – the part of the application used for exchanging information vehicle to vehicle and vehicle to infrastructure
- *Infrastructure* – the non-mobile part of the application external to a vehicle
- *Management* – issues related to how people work e.g. organisation, roles, quality etc

Each *Area of work* generates one or more artefacts:

- *New algorithm / New technology* – new algorithms or technologies are generated
- *Specification* – requirement specification or other types of specifications are generated
- *Realisation* – implementation in sw, hw or by other means
- *Evaluation* – assessment is performed and documented

For *Application type* and *Area of work* an ‘x’ denotes *relevant* and an empty cell denotes *not relevant* for the project. Note that a project can cover several aspects i.e. several ‘x’ can exist.

The list below shows if information is available for all considered projects or not.

- Name/identifier – always available
- Duration – always available (only one exception: start time of DSSS)
- Financing – always available
- Size – not always available and, further, different measures are used. However, for all projects having a size estimate the number of partners is always available. 13 projects have no size estimate at all.
- Country interest – always available
- Link – always available
- Summary – always available
- Application type – always available
- Area of work – always available

3.4 Classification metrics

3.4.1 General

For evaluation of projects *classification metrics* can be defined. To be representative, only information described as "always available" in the list above should be used. By using information in *Duration, Size, Country interest*, *Application type* and *Area of work* it is possible to get an overview that does not explicitly name individual projects (for *Size* 13 projects have no information but since 66 projects remain *Size* can anyhow be used, however with somewhat less credibility). Further, different perspectives can be used for the overview by defining different classification metrics.

Note that it is not possible to just count projects listed above for Europe, USA and Japan to get an overview of the amount of research since

- the projects found might not be representative
- the extent (money, partners) vary to a large degree
- the focus of projects vary e.g. there could be several projects that overlap

3.4.2 Total scope

This metric shows where efforts have been put and where they have not. This metric includes all evaluated projects and values are given by summing 'x' in each of the *Application type* and *Area of work* cells respectively.

3.4.3 Total scope per country

This metric shows (for Europe, USA and Japan separately), where efforts have been put and where they have not. This metric includes all evaluated projects (for Europe, USA and Japan separately) and values are given by summing 'x' in each of the *Application type* and *Area of work* cells respectively. The values are normalized with respect to the number of projects for Europe, USA and Japan.

3.4.4 Application type generality

This metric shows how specific projects are with respect to *Application type*. The number of projects with one *Application type* 'x' is counted, with two 'x' is counted and so on.

3.4.5 Area of work generality

This metric shows how specific projects are with respect to *Area of work*. The number of projects with one *Area of work* 'x' is counted, with two 'x' is counted and so on.

4 Projects

Overview
4.1 3GT
Duration: June 2002 – December 2003
Financing: EU 5th FP, Directorate General Information Society
Size: 15 partners
Country interest: Europe
Link: http://www.ertico.com/en/activities/activities/3gt_website.htm
Summary: The goal of the 3GT project is to help establish OSGi (Open Services Gateway initiative) -based in-vehicle telematics platforms on the European mass market by ensuring interoperability between the products of different middleware providers, terminal manufacturers and service providers. This will be done by establishing common telematics interfaces for OSGi-based service delivery. 3GT is characterised by the following three key processes: • Developing OSGi-based specifications for the interface between vehicles and control centres as well as the interface between control centres and service providers • Testing and validation of these specifications at five European test sites (Gothenburg, Munich, Paris, Rüsselsheim and Torino) • Proposing these specifications to be considered as an open standard by the relevant standardisation body The project enables this by starting from existing standards, of which OSGi is the most important. 3GT is extending OSGi's functionality, filling key missing pieces to realise a full telematics solution.

Focus **Application type**	**Vehicle human**	**Infrastructure human**	**Technical**	
Safety application				
Efficiency application				
Infotainment application				
Application independent			x	
Artefact **Area of work**	**New algorithm / New technology**	**Specification**	**Realisation**	**Evaluation**
Vehicle				
Communication		x	x	x
Infrastructure				
Management				

Overview

4.2 ACT-MAP

Duration: 2003 – 2004

Financing: European Commission DG Information Society, ERTICO

Size: 8 partners

Country interest: Europe

Link:
http://www.ertico.com/en/subprojects/actmap/objectives__approach/objectives__approach.htm

Summary:
The aim of the ActMAP project is to investigate and develop mechanisms for online incremental updates of digital map databases into the vehicle. Up-to-date map components containing dynamic or static location-based content should be integrated and/or attached to the in-vehicle digital map. These mechanisms impose an important milestone for the availability of future location-based services and the quality of the map databases in future vehicles. ActMAP is building a test environment to validate the developed update mechanism(s).

Focus **Application type**	**Vehicle human**	**Infrastructure human**	**Technical**	
Safety application				
Efficiency application			x	
Infotainment application				
Application independent				
Artefact **Area of work**	**New algorithm / New technology**	**Specification**	**Realisation**	**Evaluation**
Vehicle	x		x	x
Communication				
Infrastructure	x		x	x
Management				

Overview

4.3 AHS

Duration: 1989 and forward

Financing: Ministry of Land, Infrastructure and Transport

Size: 18 companies

Country interest: Japan

Link: http://www.its.go.jp/ITS/1998HBook/chapter3/3-3e.html

Summary:
Advanced cruise-assist Highway System (AHS) is a new highway system to transmit the collected information of obstacles and road surface conditions to vehicles by installing facilities with advanced detection and communication functions on roads and the circumferences. The goal of AHS is to reduce traffic accidents, enhance safety, improve transportation efficiency as well as reduce the operational work of drivers. A number of related effects are also expected. In Japan, AHS research is being carried out in the following fields:

- AHS-"i" (information): focusing on providing information;
- AHS-"c" (control): vehicle control assistance;
- AHS-"a" (automated cruise): fully automated driving.

Many kinds of road-side infrastructures for monitoring highway conditions (such as other vehicles, obstacles, highway surface conditions and vehicle position), controlling the vehicle based on highway condition, and road-to-vehicle communications are necessary for the realization of AHS. Information such as traffic condition, weather and highway alignment is also required. As for vehicle functions, obstacle detection and avoidance, speed control, driving control and man-machine interface are required.

Focus / Application type	Vehicle human	Infrastructure human	Technical	
Safety application			x	
Efficiency application			x	
Infotainment application				
Application independent				
Artefact / Area of work	**New algorithm / New technology**	**Specification**	**Realisation**	**Evaluation**
Vehicle			x	x
Communication			x	x
Infrastructure			x	x
Management				

Overview

4.4 AIRNET

Duration: January 2004 – December 2006

Financing: EU 6 FP

Size: 269.9 man months, 5 partners

Country interest: Europe

Link: http://www.airnet-project.com/

Summary:
AIRNET is addressing safety and efficiency by developing and experimenting an innovative EGNOS low-cost modular platform for the surveillance, control and management of airport vehicles (catering, baggage, fuel, maintenance, firemen, police, customs, etc.). This platform will implement the recommendations of EUROCONTROL for A-SMGCS, and will also implement a set of innovative wireless communication networks (TETRA, WiFi, VDL4). The detailed objectives of AIRNET are to :

- improve airport users safety on all the areas of the airport, by providing essential and reliable information to relevant airport stakeholders.
- improve the efficiency of operations and airport capacity, by providing services to airport operators ("decision-support") to optimise the flows of vehicles on the apron area and to cope with crisis and emergency situations.

Focus / Application type	Vehicle human	Infrastructure human	Technical	
Safety application			x	
Efficiency application			x	
Infotainment application				
Application independent				
Artefact / Area of work	**New algorithm / New technology**	**Specification**	**Realisation**	**Evaluation**
Vehicle		x	x	x
Communication			x	x
Infrastructure		x	x	x
Management		x		

Overview

4.5 AKTIV-AS

Duration: 2007 – 2010

Financing: German Federal Ministry of Economics and Technology - BMWi

Size: 13 partners + universities, 37,5 M€

Country interest: Europe

Link: http://www.aktiv-online.org/englisch/aktiv-cocar.html

Summary:
The major objective of the Aktiv-AS project is application oriented research work for active safety based on the promising results of the previous research initiative INVENT. Therefore prototypes for different left open challenges, such as emergency braking, continuous lateral control, intersection assistance and vulnerable road users, will be developed and tested for real traffic situations. The research work will be performed in 5 Aktiv-AS subprojects:

- In this subproject "Active Hazard Braking" systems will be developed to avoid collisions and to mitigate consequences of accidents.
- The objective of "Integrated Lateral Assistance" is a continuous, integrated lateral guidance in the full speed range from 0 to 180 km/h for lane-keeping and lane-change as well as inside of construction sites.
- The main focus of the subproject "Intersection Assistance" is to reduce the number of accidents at intersections by supporting the driver while entering and crossing an intersection or turning into.
- The subproject "Pedestrian and Cyclist Safety" aims at the development and test of active measures to improve safety of vulnerable road-users (VRU) utilizing anticipatory sensing systems capable of detecting an imminent accident in advance in order to avoid collisions or at least to reduce their consequences significantly.
- The cross-sectional project "Driver Awareness and Safety" deals with the detection of driver alertness using surround sensor information and/or in-vehicle video cameras.

Focus **Application type**	**Vehicle human**	**Infrastructure human**	**Technical**	
Safety application			x	
Efficiency application				
Infotainment application				
Application independent				
Artefact **Area of work**	**New algorithm / New technology**	**Specification**	**Realisation**	**Evaluation**
Vehicle			x	x
Communication			x	x
Infrastructure			x	x
Management				

Overview

4.6 AKTIV-VM

Duration: 2007 – 2010

Financing: Federal Ministry of Economics and Technology - BMWi

Size: 19 partners + universities, 18 M€

Country interest: Europe

Link: http://www.aktiv-online.org/englisch/aktiv-vm.html

Summary:
The interaction of intelligent vehicle systems and intelligent infrastructure units is the objective of the Aktiv-VM project. This novel kind of team work will create new modes of co-operation between automotive industry, road network operators and the ICT sector. But "Cooperation in traffic" also means a stronger interaction of technical processes which will be enabled by use of new technologies, software and new communication media. The 6 Aktiv-VM applications combine traffic and information centres, road-side infrastructure and intelligent vehicles in a novel manner:

- The "Network Optimizer" is working on the current traffic situation calculated in a centre, which will be interpreted and transferred into a package of information and measures.
- The "Virtual Traffic Guidance System" will play a key role within the road side infrastructure systems. In addition to display traffic information on a message-sign, it will be communicated directly into the vehicles.
- The "Cooperative Traffic Signal" will care for the control of traffic flow at traffic junctions.
- "Adaptive Navigation" is developing cooperative vehicle-infrastructure technologies for dynamic navigation and for driver information.
- Technologies for optimization of traffic flow by anticipatory and cooperative driving in special situations are the objective of the "Situation-Responsive Driving" application.
- The "Information Platform" will be the central node for strategy and traffic information. It is handling the preparation of data and information from different sources and the provision of application-specific information on different content levels.
- Precise statements concerning the effect potential of those applications will be supplied by a subproject called "Assessment". This evaluation will be based on extensive field-tests to be performed in the test field Hessen.

Focus **Application type**	**Vehicle human**	**Infrastructure human**	**Technical**	
Safety application				
Efficiency application			x	
Infotainment application				
Application independent				
Artefact **Area of work**	**New algorithm / New technology**	**Specification**	**Realisation**	**Evaluation**

Vehicle			x	x
Communication			x	x
Infrastructure			x	x
Management				

Overview

4.7 Ambient Networks

Duration: January 2004 – December 2005

Financing: EU FP6

Size: 41 partners

Country interest: Europe

Link: www.ambient-networks.org/

Summary:
To define and validate complete and coherent solutions for ambient networking, based on a range of different scenarios and business cases, including:

- an architecture, which enables the easy and dynamic composition of disparate networks amid an ever-increasing heterogeneity of technologies and provider structures,
- the definition of a set of adaptive and self-configuring mobile network components, which will reduce planning, deployment, configuration and network maintenance costs,
- a comprehensive, integrated security framework, preserving end-to-end network protection and robustness against attacks.

Focus / Application type	Vehicle human	Infrastructure human	Technical	
Safety application				
Efficiency application				
Infotainment application				
Application independent			x	

Artefact / Area of work	New algorithm / New technology	Specification	Realisation	Evaluation
Vehicle				
Communication	x	x		
Infrastructure				
Management				

Overview

4.8 ANEMONE

Duration: June 2006 – June 2008

Financing: EU FP6

Size: 6 partners

Country interest: Europe

Link: https://www.ist-anemone.eu/index.php/Home_Page

Summary:

The current challenges of the Internet are to accommodate future needs and usages such as billions of fixed and mobile users and devices, reliable transport of all type of data and ubiquitous, seamless and uninterrupted access. This results in a growing demand of researchers and developers for an open testbed to validate new complex applications, services and devices in a mobile and wireless context. The ANEMONE project will realize a large-scale testbed providing support of mobile users and devices and enhanced services by integrating cutting edge IPv6 mobility and multihoming initiatives together with the majority of current and future wireless access technologies.

Focus / Application type	Vehicle human	Infrastructure human	Technical	
Safety application				
Efficiency application				
Infotainment application				
Application independent			x	

Artefact / Area of work	New algorithm / New technology	Specification	Realisation	Evaluation
Vehicle				
Communication				x
Infrastructure				
Management				

Overview

4.9 ASV

Duration: Phase 1 1991 – 1995, Phase 2 1996 – 2000, Phase 3 2001 – 2005, Phase 4 2006 – 2010

Financing: Ministry of Land, Infrastructure and Transport

Size: 13 (14?) partners, Japanese vehicular manufacturers plus academic and other organizations

Country interest: Japan

Link: http://www.iatss.or.jp/english/research/30-1/pdf/30-1-13.pdf
http://www.mitsubishi-motors.com/corporate/about_us/technology/review/e/pdf/2007/19e_07.pdf

Summary: (Phase 4)
The goal of Advanced Safety Vehicle (ASV) is to drastically reduce accidents caused by driver error. Both for passenger vehicles and motorcycles. Important aspects are

- Development of inter-vehicle communication and includes “vehicle intelligence”.
- Introduction of some inter-vehicle communication type driver assistance systems
- Inter-vehicle communication will support when onboard sensors are not sufficient.

The following tasks are defined:

- Modelling of collisions to be covered by communication technology.
- Communication range derived from collision models.
- Concept specification defined from communication range.

Comment: There is not much information available for this project.

Focus / Application type	Vehicle human	Infrastructure human	Technical	
Safety application			x	
Efficiency application				
Infotainment application				
Application independent				
Artefact / Area of work	**New algorithm / New technology**	**Specification**	**Realisation**	**Evaluation**
Vehicle			x	x
Communication			x	x
Infrastructure			x	x
Management				

Overview

4.10 ATESST

Duration: 2006 – 2008 Q1

Financing: EU FP6-IST

Size: 11 partners, 25 Person years/4MEuro

Country interest: Europe

Link: http://www.atesst.org/

Summary:
This project addresses system modelling techniques and will deliver an automotive architecture description language, ADL. The ADL will be based on the EAST ADL from the ITEA project EAST-EEA and aligned with the AUTOSAR initiative and the OMG (UML2 profiles and SysML). An ADL provides a means to handle the complexity and improve safety, reliability, cost and development efficiency of automotive electronic systems. Also, the support for variability and re-use will be amended. Variability of automotive system increases the complexity that engineers are facing and is a major threat to safety and reliability. The ATESST results will be validated through the implementation of a prototype tool based on the Eclipse framework and an automotive demonstrator. The demonstrator will contain safety functions of different character, such as adaptive cruise control, remote speed limits and engine management.

Focus **Application type**	**Vehicle human**	**Infrastructure human**	**Technical**	
Safety application			x	
Efficiency application				
Infotainment application				
Application independent			x	
Artefact **Area of work**	**New algorithm / New technology**	**Specification**	**Realisation**	**Evaluation**
Vehicle		x		
Communication				
Infrastructure				
Management				

Overview

4.11 CarTALK 2000

Duration: 3 years, started August 2001

Financing: EU FP5

Size: 7 partners

Country interest: Europe

Link: http://www.cartalk2000.net/

Summary:
The European Project CarTALK 2000 is focussing on new driver assistance systems which are based upon inter-vehicle communication. The main objectives are the development of co-operative driver assistance systems and the development of a self-organising ad-hoc radio network as a communication basis with the aim of preparing a future standard. As for the assistance system, the main issues are:

- assessment of today's and future applications for co-operative driver assistance systems,
- development of software structures and algorithms, i.e. new fusion techniques,
- testing and demonstrating assistance functions in probe vehicles in real or reconstructed traffic scenarios.

In order to get an overview on potential and promising communication-based assistance systems, CarTALK 2000 distinguishes application clusters in the following way:

- information and warning functions
- communication-based longitudinal control systems
- co-operative assistance systems.

To achieve a suitable communication system, algorithms for radio ad-hoc networks with extremely high dynamic network topologies are developed and prototypes are tested in probe vehicles.

Focus **Application type**	**Vehicle human**	**Infrastructure human**	**Technical**	
Safety application			x	
Efficiency application				
Infotainment application				
Application independent			x	
Artefact **Area of work**	**New algorithm / New technology**	**Specification**	**Realisation**	**Evaluation**
Vehicle			x	x
Communication	x	x	x	x
Infrastructure				
Management				

Overview

4.12 Chauffeur 1 and 2

Duration: 1996 – 1998 Chauffeur 1, 2000 – 2003 Chauffeur 2

Financing: EU FP 4 Chauffeur 1, EU FP 5 Chauffeur 2

Size: 17 partners Chauffeur 1, Chauffeur 2 12 partners

Country interest: Europe

Link: http://www.lynuxworks.com/solutions/industrial/in-action/chauffeur2.php
http://ec.europa.eu/information_society/activities/esafety/doc/call_4/final_seiss.pdf

Summary:

Chauffeur 1
Main objectives:

- Develop two fully operative prototypes of CHAUFFEUR heavy duty vehicles incorporating Tow-Bar functions.
- Demonstrate and test the Tow-Bar application under real traffic conditions.
- Socio-economic assessment of Tow-Bar application.
- Implication strategies considering legal issues.

Chauffeur 2
Main objectives:

- Developing the CHAUFFEUR-Assistant as an extension of the Tow Bar System of CHAUFFEUR 1 by adding interoperable system functions which allow following of any other heavy duty vehicle.
- Platooning: Realisation of three heavy duty vehicles platoon and demonstration of typical platooning manoeuvres in test environment.
- Horizontal support function as human machine interface, system evaluation and system concepts, scenarios and traffic simulation, concepts for freight logistics, benefit-cost analysis for the system, user acceptance, legal and liability implications

Focus **Application type**	**Vehicle human**	**Infrastructure human**	**Technical**	
Safety application				
Efficiency application			x	
Infotainment application				
Application independent				
Artefact **Area of work**	**New algorithm / New technology**	**Specification**	**Realisation**	**Evaluation**
Vehicle			x	x
Communication				
Infrastructure				
Management				x

Overview
4.13 CoCar
Duration: November 1, 2006 – April 30, 2009.
Financing: German Ministry for Education and Research
Size: 5 partners, 4 M€
Country interest: Europe
Link: http://www.aktiv-online.org/englisch/aktiv-cocar.html
Summary: The CoCar project is aiming at basic research for C2C and C2I communication for future cooperative vehicle applications using cellular mobile communication technologies. Five partners out of the telecommunications- and automotive industry develop platform independent communication protocols and innovative system components. Innovation perspectives and potential future network enhancements of cellular systems for supporting cooperative, intelligent vehicles will be identified and demonstrated.

Focus **Application type**	**Vehicle human**	**Infrastructure human**	**Technical**	
Safety application				
Efficiency application				
Infotainment application				
Application independent			x	
Artefact **Area of work**	**New algorithm / New technology**	**Specification**	**Realisation**	**Evaluation**
Vehicle				
Communication		x		x
Infrastructure				
Management				

Overview

4.14 COM2REACT

Duration: 2006-01-01 – 2007-12-31

Financing: European Commission Sixth Framework Programme

Size: 13 partners

Country interest: Europe

Link: http://www.com2react-project.org/

Summary:
The COM2REACT project has the potential of increasing road transport efficiency thus improving safety and contributing to greater standardization and harmonization throughout Europe. COM2REACT will establish a multi-level, scalable cooperative system involving two-way vehicle to vehicle (V2V) and vehicle to center (V2C) communication, which will facilitate significant improvements in the flow of information acquired by moving vehicles, its quality and reliability, thereby enhancing road efficiency and traffic safety on urban, intercity arterials, and rural roads. A key feature of COM2REACT is a virtual traffic control sub-centre, which controls a moving group of vehicles in close proximity. The virtual sub-centre (VSC) functions locally via the V2V communication system, processing data acquired by the vehicles and rapidly providing instructions related to local traffic and safety situations. It also transmits, by way of V2C communication, selective data to RCC and receives, in return, instructions to distribute to the vehicles. The role of VSC is set, unnoticeable by the driver, to one of the vehicles in the group according to rules imbedded in all COM2REACT vehicles.

The specific scientific and technological objectives of the COM2REACT project are as follows:

- Develop the technology for virtual sub-centre (VSCs)
- Develop traffic state, accident risk, and environmental state analysis and prediction models and performance evaluation tools for a VSC.
- Adapt communication technology; In-car communication system, Vehicle to vehicle communication system, Vehicle to center communication

Focus **Application type**	**Vehicle human**	**Infrastructure human**	**Technical**	
Safety application				
Efficiency application			x	
Infotainment application				
Application independent				
Artefact **Area of work**	**New algorithm / New technology**	**Specification**	**Realisation**	**Evaluation**
Vehicle				
Communication				
Infrastructure	x		x	
Management		x		

Overview

4.15 ComCar

Duration: 1999 – 2002

Financing: German Ministry for Education and Research

Size: 4 partners

Country interest: Europe

Link: www.comcar.de

Summary:
The COMCAR project targets at the conception and prototypical realisation of an innovative mobile communication network, which shall satisfy the increasing demand for IP-based multimedia and telematics services especially in cars and railways. The main focus in COMCAR is on asymmetrical and interactive mobile IP-based services. COMCAR investigates both the integration of an additional downlink into UMTS and the co-operation of mobile with digital broadcast (DxB) systems to enable high-quality asymmetric IP communication. Methods shall be developed which allow a dynamic assignment of frequency ranges to communication services and their fair coexistence. COMCAR will provide a flexible communication environment in which QoS parameter will change on a wide scale. COMCAR will develop mobile middleware technologies that allow adaptive mobile multimedia applications to react user-tailored to the changing user situation. To achieve these targets, the COMCAR project tackles the following key issues:

- Innovative mobile communication system for high-quality IP services
- IP protocols and services
- Communication to and in vehicles
- Demonstrator

Focus **Application type**	**Vehicle human**	**Infrastructure human**	**Technical**	
Safety application				
Efficiency application				
Infotainment application				
Application independent			x	
Artefact **Area of work**	**New algorithm / New technology**	**Specification**	**Realisation**	**Evaluation**
Vehicle				
Communication	x	x		
Infrastructure				
Management				

Overview

4.16 COMeSafety

Duration: 2006 – 2009

Financing: EU FP 6

Size: 7 partners

Country interest: Europe

Link: http://www.comesafety.org/

Summary:
The COMeSafety Project supports the eSafety Forum with respect to all issues related to vehicle-to-vehicle and vehicle-to-infrastructure communications as the basis for cooperative intelligent road transport systems. COMeSafety provides a platform for both the exchange of information and the presentation of results. Consolidated results and interests are submitted to the European and worldwide standardisation bodies. With liaisons to all relevant stakeholders, the provision of information and preparation of strategic guidelines COMeSafety supports directly the eSafety Forum on the items of cooperative systems for road safety and traffic efficiency, which will speed up the system deployment. COMeSafety project objectives:

- Co-ordination and consolidation of research results and their implementation
- eSafety Forum support
- Worldwide harmonization
- Frequency allocation
- Dissemination

Focus / Application type	Vehicle human	Infrastructure human	Technical	
Safety application				
Efficiency application				
Infotainment application				
Application independent			x	

Artefact / Area of work	New algorithm / New technology	Specification	Realisation	Evaluation
Vehicle				
Communication				
Infrastructure				
Management	x	x		

Overview

4.17 CONCERT

Duration: 1996 – 1998

Financing: EU FP 4

Size: 8 partners

Country interest: Europe

Link: http://cordis.europa.eu/telematics/tap_transport/research/projects/concert.html

Summary:
The CONCERT project had completed twelve demonstrations of transport telematics applications in cities in seven EU countries. CONCERT was orchestrated by putting integrated payment with smart cards, pricing and access control for restraint on road use, and multimodal information for travellers into harmony with related hypotheses of behavioural impact.
to configure and build demonstrations of telematics applications of travel demand management, including elements of intermodality and network management. CONCERT addressed two key sub-areas of demand management:

- increasing the connectivity with public transport, as an alternative to "car-all-the-way' travel
- introducing charges for the provision of roads facilities for private traffic.

Focus / Application type	Vehicle human	Infrastructure human	Technical	
Safety application				
Efficiency application	x	x	x	
Infotainment application				
Application independent				
Artefact / Area of work	**New algorithm / New technology**	**Specification**	**Realisation**	**Evaluation**
Vehicle				x
Communication				
Infrastructure			x	x
Management				

Overview

4.18 COOPERS

Duration: 2006 – 2010

Financing: EU FP 6

Size: 40 partners, 16,8 M€

Country interest: Europe

Link: http://www.coopers-ip.eu/

Summary:
COOPERS stands for CO-OPerative SystEms for Intelligent Road Safety and focuses on the development of innovative telematics applications on the road infrastructure with the long term goal of a "Co-operative Traffic Management" between vehicle and infrastructure, to reduce the self opening gap of the development of telematics applications between car industry and infrastructure operators. COOPERS provides vehicles and drivers with real time local situation based, safety related status and infrastructure status information distributed via dedicated Infrastructure to Vehicle Communication link (I2V).

For drivers:

- traffic jam warning and guidance
- in-car display and alert of area-specific speed limits
- lane specific, selective ban of lorries
- estimated time of arrival, based on current traffic situation on the network
- car breakdown/emergency services

For network operators:

- enhanced traffic management based on floating car data
- safety related information for drivers, speed and distance proposal
- data exchange between operators for international seamless service handover
- monitoring of transport flows and information exchange for changing demands of transport

The purpose is to define, develop and test new safety related services, equipment and applications using two way communication between road infrastructure and vehicles from a traffic management perspective. COOPERS will build upon existing equipment and infrastructure as far as possible to incorporate bi-directional infrastructure-vehicle links as an open standardised wireless communication technology. The role of motorway operators in offering and retrieving safety relevant and traffic management information for specific road segments on European motorways based on infrastructure and in-vehicle data will be investigated.

Focus Application type	Vehicle human	Infrastructure human	Technical	
Safety application				
Efficiency application			x	
Infotainment				

application				
Application independent				
Artefact **Area of work**	**New algorithm / New technology**	**Specification**	**Realisation**	**Evaluation**
Vehicle			x	x
Communication				
Infrastructure			x	x
Management			x	x

Overview

4.19 COVER

Duration: Started March 2006, 3 years

Financing: EU FP 6

Size: 9 partners, 4 137 330 EURO

Country interest: Europe

Link: http://www.cvisproject.org/en/links/cover.htm

Summary:
The project main focus will be on the cooperation between the infrastructure and vehicles in order to support or enable the driver and/or the vehicle to perform a certain traffic related actions and increase infrastructure efficiency. By integrating semantic technologies, intelligent agents, in-car and infrastructure sensor data, multi-channel communication technologies and context-aware and multi-modal (voice/graphics) interfaces, COVER will provide user-friendly, cost-effective, interoperable semantic-driven cooperative systems able to gain unprecedented road transport efficiency as well as implement advanced eSafety applications. The project will be engaged in the development of applications such as intelligent speed adaptation, including static (new roads, speed limits changed by authorities), temporary (road works, schools) and dynamic (traffic responsive, road and/or weather conditions) speed limits; advanced cruise-assist highway systems that uses sensors to detect dangers that drivers and on-board sensors are unable to detect; truck platooning, i.e., the coordination of traffic management systems and trucks in order to safely and efficiently manage queues, congestions, etc.

Focus **Application type**	**Vehicle human**	**Infrastructure human**	**Technical**	
Safety application				
Efficiency application			x	
Infotainment application				
Application independent				
Artefact **Area of work**	**New algorithm / New technology**	**Specification**	**Realisation**	**Evaluation**
Vehicle			x	x
Communication				
Infrastructure			x	x
Management				

Overview

4.20 CVHAS subproject Expediting Vehicle Infrastructure Integration

Duration: 2005-01-18 – 2006-03-16

Financing: CVHAS is a federal pooled-fund program.

Size: 3 partners

Country interest: USA

Link: https://database.path.berkeley.edu/quarterly/index.cgi?reqtype=publicviewmou&mouid=454&section=Public

Summary:
This is a project within Cooperative Vehicle-Highway Automation Systems (CVHAS).

Vehicle-Infrastructure Integration (VII) is a set of intelligent transportation system technologies and a potentially effective tool that uses wireless communication such that California's roadway systems can be better managed, for responding to daily vehicle flow while also minimizing traffic congestion and improving safety. This project between California DOT, California PATH and Daimler Chrysler will demonstrate two potential Vehicle Infrastructure Integration (VII) services (traffic probe vehicle [allowing vehicle position, speed and other potentially useful parameters to be provided to the TMC] and safety [automatic notification of slippery road surface], using real cars on Caltrans roadways. This applied research project presages an operational test and a deployment. It explores and addresses key engineering development activities associated with the point deployment of these services in a realistic setting. As such, it will pave the way for VII by in effect jump-starting technological work. In the end there will be a demonstration of the VII-type services investigated by this project, with interested in-State and national VII players invited.

Comment: There is not much information available for this project.

Focus / Application type	Vehicle human	Infrastructure human	Technical	
Safety application			x	
Efficiency application			x	
Infotainment application				
Application independent				
Artefact / Area of work	**New algorithm / New technology**	**Specification**	**Realisation**	**Evaluation**
Vehicle			x	x
Communication				
Infrastructure			x	x
Management				

Overview

4.21 CVHAS subproject Integrated Multi-Channel Vehicle-Vehicle and Vehicle-Roadside Communications for ITS

Duration: 2004-06-30 – 2007-06-30

Financing: CVHAS is a federal pooled-fund program.

Size:

Country interest: USA

Link: https://database.path.berkeley.edu/quarterly/index.cgi?reqtype=publicviewmou&mouid=450&section=Public

Summary:
This is a project within Cooperative Vehicle-Highway Automation Systems (CVHAS).

This project seeks to develop and test integrated communication and channel switching protocols for the North America 5.9 Ghz DSRC technology that are currently under standardization. The research challenge is to uncover ways to address the demand of safety applications while preserving the valuable versatility of DSRC. A DSRC simulator will be used to investigate various options in the protocol design, such as roadside station assisted simulcast of safety messages in service channels. Additionally, the effectiveness of such protocols will be shown by simultaneously executing a lane change assistance safety application and a tolling style service. The aim is to find a way to enable multi-channel operation within the DSRC architecture without compromising on the fast, high-priority communication needs of safety services.

Comment: There is not much information available for this project.

Focus / Application type	Vehicle human	Infrastructure human	Technical	
Safety application				
Efficiency application				
Infotainment application				
Application independent			x	
Artefact / Area of work	**New algorithm / New technology**	**Specification**	**Realisation**	**Evaluation**
Vehicle				
Communication		x	x	x
Infrastructure				
Management				

Overview

4.22 CVIS

Duration: 2006-02-01 – 2010-01-31

Financing: European Commission Sixth Framework Programme

Size: 59 partners

Country interest: Europe

Link: http://www.cvisproject.org/

Summary:

The CVIS objectives are:

- to create a unified technical solution allowing all vehicles and infrastructure elements to communicate with each other in a continuous and transparent way using a variety of media and with enhanced localisation;
- to enable a wide range of potential cooperative services to run on an open application framework in the vehicle and roadside equipment;
- to define and validate an open architecture and system concept for a number of cooperative system applications, and develop common core components to support cooperation models in real-life applications and services for drivers, operators, industry and other key stakeholders;
- to address issues such as user acceptance, data privacy and security, system openness and interoperability, risk and liability, public policy needs, cost/benefit and business models, and roll-out plans for implementation.

CVIS will produce the following key results:

- a multi-channel terminal capable of maintaining a continuous Internet connection over a wide range of carriers, including cellular, mobile Wi-Fi networks, infra-red or short-range microwave channels, ensuring full interoperability in the communication between different makes of vehicle and of traffic management systems;
- an open architecture connecting in-vehicle and traffic management systems and telematics services at the roadside, that can be easily updated and scaled up to allow implementation for various client and back-end server technologies;
- techniques for enhanced vehicle positioning and the creation of local dynamic maps, using satellite positioning, radio triangulation and the latest methods for location referencing;
- extended protocols for vehicle, road and environment monitoring to allow vehicles to share and verify their data with other vehicles or infrastructure nearby, and with a roadside service centre;
- application design and core software development
- deployment enabling toolkit in the form of models, guidelines and recommendations in the areas of openness and interoperability; safe, secure and fault-tolerant design; utility, usability and user acceptance; costs, benefits and business models; risks and liability; cooperative systems as policy tool; and deployment road-maps.

Focus Application type	Vehicle human	Infrastructure human	Technical	
Safety application				

Efficiency application				
Infotainment application				
Application independent			x	
Artefact / Area of work	**New algorithm / New technology**	**Specification**	**Realisation**	**Evaluation**
Vehicle	x	x	x	
Communication		x		
Infrastructure		x	x	
Management				

Overview

4.23 DAIDALOS

Duration: 2003 – 2008

Financing: EU FP 6

Size: Phase 1 46 partners 25.7 M€, Phase 2 37 partners 22.1 M€

Country interest: Europe

Link: http://www.cvisproject.org/en/links/daidalos.htm http://www.ist-daidalos.org/

Summary:
The goal of the project is a secure, personalized and pervasive access to content and services built on heterogeneous networks and infrastructures for the mobile user. The objective of Daidalos is to develop and demonstrate an open architecture based on a common network protocol (IPv6). High priority is given to impacting on the standardisation and specification efforts that are ongoing in the international scientific and industrial communities. The overall Daidalos objectives are to:

- Design, prototype and validate the necessary infrastructure and components for efficient distribution of services over diverse network technologies beyond 3G,
- Integrate complementary network technologies to provide pervasive and user-centred access to these services,
- Develop an optimized signalling system for communication and management support in these networks,
- Demonstrate the results of the work through strong focus on user-centered and scenario-based development of technology

Focus / Application type	Vehicle human	Infrastructure human	Technical	
Safety application				
Efficiency application				
Infotainment application				
Application independent			x	

Artefact / Area of work	New algorithm / New technology	Specification	Realisation	Evaluation
Vehicle				
Communication		x	x	x
Infrastructure				
Management				

Overview

4.24 Drive

Duration: April 2000 – April 2004

Financing: EU FP 5

Size: 15 partners

Country interest: Europe

Link: www.ist-drive.org

Summary:

The overall objective of the DRiVE project is:

- to enable spectrum efficient high-quality wireless IP in a heterogenous multi-radio environment.
- to deliver in-vehicle multimedia-services, which ensure universally available access to information and support for education and entertainment.

To reach these challenging objectives DRiVE is divided in four work packages:

- develop methods for dynamic frequency allocation and for co-existence of different radio technologies (GSM, GPRS, UMTS, DAB, DVB-T) in one frequency band to increase the total spectrum efficiency and reach.
- realise an IPv6-based mobile infrastructure that ensures the optimised inter-working of cellular and broadcast networks. The IP-infrastructure will provide support for asymmetric communication, for uni-, multi-, and broadcast, for quality of service and for continuous service in case of hand-over.
- develop adaptive services for a multi-radio vehicular environment, integrates the key concepts of DRiVE developed in WP1&2 to demonstrate them and validate the benefits by user trials and field test.

Focus **Application type**	**Vehicle human**	**Infrastructure human**	**Technical**	
Safety application				
Efficiency application				
Infotainment application				
Application independent			x	
Artefact **Area of work**	**New algorithm / New technology**	**Specification**	**Realisation**	**Evaluation**
Vehicle				
Communication	x	x	x	x
Infrastructure				
Management				

Overview
4.25 DSRC
Duration: January 2000 – June 2002
Financing: EU FP 5
Size: 11 partners
Country interest: Europe
Link: http://cordis.europa.eu/data/PROJ_FP5/ACTIONeqDndSESSIONeq112422005919ndDOCeq728ndTBLeqEN_PROJ.htm
Summary: The project will establish a common interface between CEN compliant DSRC units and the in-vehicle electronics, allowing integrating the DSRC communication link as standard equipment in the vehicle. The project will develop 2 prototypes of the DSRC communication link (Alcatel and Q-Free) and 2 prototypes of the in-car electronics (Bosch and Renault) and implement them in test cars (Opel and Renault) to validate the prototypes in connection with EFC services and TTI services in operational conditions on the Cofiroute network. Apart from standardisation proposals on the overall architecture and common interface specifications, the project will also produce recommendations on related issues such as antenna position and design.

Focus **Application type**	**Vehicle human**	**Infrastructure human**	**Technical**	
Safety application				
Efficiency application				
Infotainment application				
Application independent			x	

Artefact **Area of work**	**New algorithm / New technology**	**Specification**	**Realisation**	**Evaluation**
Vehicle				
Communication		x	x	x
Infrastructure				
Management				

Overview

4.26 DSSS

Duration: ? – 2008 (tests)

Financing: UTMS, the Universal Traffic Management Society of Japan

Size:

Country interest: Japan

Link: http://www.utms.or.jp/english/system/dsss.html

Summary:
DSSS, the Driving Safety Support System, is an ITCS (Integrated Traffic Control Systems)
project by UTMS, the Universal Traffic Management Society of Japan. The system supports drivers in making judgment for safe driving using infrastructure of traffic control systems. DSSS uses technologies such as infrared beacons and computers to provide real-time traffic information to drivers. The benefits of the system are expected to increase drivers' awareness of risk or safety, and to reduce drivers' decision-making burden. The system is also intended to make drivers reduce speed at intersections. Furthermore, as the next step, it could intervene in the operation of the vehicle if a driver doesn't respond to a risky situation. One of the functions of the system is to alert drivers approaching an intersection, giving information about the traffic signs or lights via an in-vehicle device. Various sensors are used to detect cars, motorcycles, and pedestrians that are not in the driver's sight. Based on this information, the DSSS alert drivers via message display boards or in-vehicle units. Approximately 20 types of subsystems could be installed by 2008, with 5 of these currently being tested -- the beacons are placed in "accident-prone" areas, and are each designed to help prevent a certain type of mishap, be it a rear-end collision, right-turn fender bender, or flattening of an innocent bystander or two.

Main Benefits are to

- reduce traffic accidents at intersections
- lessen driver's burden of making decisions
- increase driver's awareness about safe driving

Focus / Application type	Vehicle human	Infrastructure human	Technical	
Safety application			x	
Efficiency application				
Infotainment application				
Application independent				
Artefact / Area of work	**New algorithm / New technology**	**Specification**	**Realisation**	**Evaluation**
Vehicle			x	x
Communication			x	x
Infrastructure			x	x
Management				

Overview

4.27 EASIS

Duration: 2004 – 2006

Financing: European Commission sixth Framework Programme

Size: 21 partners, 9.4 M€

Country interest: Europe

Link: http://www.easis-online.org/wEnglish/news_easis/news.shtml?navid=1

Summary:
The EASIS approach is to develop a standardised in-vehicle electronic architecture and a standardised system engineering approach for integrated safety systems and to provide an enabling technology for the introduction of integrated safety systems. The following aspects are considered

- A modular scalable E/E-architecture for active, passive and integrated safety systems
- Standardised signal and functional interfaces to environment detection systems, telematics, powertrain, chassis, and HMI
- Embedded system safety analysis
- Prototype implementation and validators
- Means to handle high system complexity in the development process
- Provision of a migration path into existing automotive system architectures
- Provision of a high availability and safety even in case of single component failures
- Preparation for standardisation

Work packages concern Software architecture, Hardware architecture, System dependability, Processes and tools and Validation.

Focus **Application type**	**Vehicle human**	**Infrastructure human**	**Technical**	
Safety application				
Efficiency application				
Infotainment application				
Application independent			x	
Artefact **Area of work**	**New algorithm / New technology**	**Specification**	**Realisation**	**Evaluation**
Vehicle		x	x	x
Communication				
Infrastructure				
Management				

Overview

4.28 EAST-EAA

Duration: 2001 – 2004

Financing: ITEA Information Technology for European Advancement

Size: 24 partners

Country interest: Europe

Link: http://www.east-eea.net/

Summary:
The major goal of EAST-EEA is to enable a proper electronic integration through definition of an open architecture. This will allow to reach hardware and software interoperability and re-use for mostly distributed hardware. The project aims are achieved by defining a layered software architecture focussed on a middleware concept, which provides interfaces and services to support portability of embedded software modules on a high quality level. A central part of the work in EAST-EEA is to define, specify and partly implement a middleware and communication concept for an automotive embedded electronic architecture. The communication layer offers basic communication services to the middleware that can be adapted to the vehicle networks via device drivers. Both, middleware and communication layer concepts have been implemented and validated in demonstrators from different automotive domains using the methods developed in the project.

Focus **Application type**	**Vehicle human**	**Infrastructure human**	**Technical**	
Safety application				
Efficiency application				
Infotainment application				
Application independent			x	
Artefact **Area of work**	**New algorithm / New technology**	**Specification**	**Realisation**	**Evaluation**
Vehicle		x	x	x
Communication				
Infrastructure				
Management				

Overview

4.29 eIMPACT

Duration: 2006 – 2007

Financing: EU FP 6

Size: 13 partners

Country interest: Europe

Link: http://www.eimpact.info/

Summary:
eIMPACT assesses the socio-economic effects of Intelligent Vehicle Safety Systems (IVSS), their impact on traffic safety and efficiency. It addresses policy options and the views of the different stakeholders involved: users, OEMs, insurance companies, and society. With determining these effects, eIMPACT also provides an indication of the prospects for introducing IVSS. Key activities include:

- the identification of the most promising stand-alone and co-operative IVSS technologies
- the development of scenarios for IVSS for the years 2010 and 2020
- the impact of IVSS traffic safety and efficiency in these scenarios
- the identification of policies to enable the implementation of IVSS

The output will be an assessment of the socio-economic impact including a picture of the costs and benefits for the stakeholders and the macroeconomic effects.

Focus Application type	Vehicle human	Infrastructure human	Technical	
Safety application				
Efficiency application				
Infotainment application				
Application independent	x	x		
Artefact Area of work	**New algorithm / New technology**	**Specification**	**Realisation**	**Evaluation**
Vehicle				
Communication				
Infrastructure				
Management				x

Overview

4.30 E-MERGE

Duration: April 2002 – June 2004

Financing: European Commission (EC) Information Society Directorate General

Size: 15 partners, 4,261,879 EURO

Country interest: Europe

Link: http://www.gstforum.org/en/subprojects/rescue/about_gst_rescue/introduction/e-merge.htm

Summary:
E-MERGE determined the functional architecture for sending information - together with the 112 voice call - directly to the emergency services in case of an vehicle incident. This information includes details about where and when the accident occurred, vehicle identification and information about the severity of the crash. Once implemented on a pan-European level, such a system will enable a faster and more accurate emergency response.

Comment: This is actually passive safety but included here anyhow since it involves the same components as active safety considered in this report.

Focus / Application type	Vehicle human	Infrastructure human	Technical	
Safety application			x	
Efficiency application				
Infotainment application				
Application independent				
Artefact / Area of work	**New algorithm / New technology**	**Specification**	**Realisation**	**Evaluation**
Vehicle			x	x
Communication				
Infrastructure			x	x
Management				

Overview

4.31 FeedMAP

Duration: March 2006 – August 2008

Financing: EC Directorate General Information Society and Media

Size: 12 partners

Country interest: Europe

Link: http://www.ertico.com/en/subprojects/feedmap/feedmap.htm

Summary:
The objective of the project is to assess the technical and economic feasibility of map data correction by providing a map data feedback loop applied to a map data updating frame-work using the ActMAP standardized exchange formats and mechanisms. A cooperative framework will be proposed including the definition of source data concept, system architecture, information flow model and organisational models. This will build the foundation for the next generation of digital maps: learning cooperative digital maps for ADAS and Navigation applications through the joint use of the ActMAP and FeedMAP concepts in order to create a sustainable source of map updates.

Focus **Application type**	**Vehicle human**	**Infrastructure human**	**Technical**	
Safety application				
Efficiency application			x	
Infotainment application				
Application independent				
Artefact **Area of work**	**New algorithm / New technology**	**Specification**	**Realisation**	**Evaluation**
Vehicle			x	x
Communication				
Infrastructure		x	x	x
Management		x		

Overview

4.32 FIDEUS

Duration: 2005 – 2008

Financing: European Commission sixth Framework Programme

Size: 13 partners

Country interest: Europe

Link: http://www.impacts.org/projects/fideus/fideus.html
http://www.cvisproject.org/en/links/fideus.htm

Summary:
FIDEUS promotes a co-ordinated approach involving the automotive industry, logistics companies and city decision-makers. The aim is to make available appropriate vehicles, to ensure that delivery operations are efficient, and that cities have the necessary information and tools to be able to define and manage effective mobility policies for goods traffic. Critically, all FIDEUS vehicle types are equipped with high-tech driving, loading and communications technologies, enabling improved interaction with traffic control centres and with each other.

Comment: There is not much information available for this project. Artefacts are educated guesses.

Focus **Application type**	**Vehicle human**	**Infrastructure human**	**Technical**	
Safety application				
Efficiency application			x	
Infotainment application				
Application independent				
Artefact **Area of work**	**New algorithm / New technology**	**Specification**	**Realisation**	**Evaluation**
Vehicle			x	x
Communication				
Infrastructure			x	x
Management		x	x	x

Overview

4.33 Fleetnet

Duration: September 2000 – December 2003

Financing: German Bundesministerium für Bildung und Forschung, partly

Size: 10 partners

Country interest: Europe

Link: http://www.et2.tu-harburg.de/fleetnet/english/vision.html

Summary:
The objectives of FleetNet are to develop a platform for inter-vehicle communications, to implement demonstrator applications, to develop promising introduction strategies, and to standardize the solutions found. Many of the potential applications of FleetNet will only yield best benefits to drivers and passengers if the market penetration is high. Therefore a major concern is to create conditions that allow inter-vehicle communication systems to be installed in cars independent of their makes and brands. Thus, the project results are opened and standardized at appropriate international standardization bodies. Another objective of FleetNet is to implement the main functionalities of the developed communication protocols and to integrate them into demonstration cars. In addition, to show the benefit of inter-vehicle communication systems, appropriate applications for demonstration are implemented. Last not least a study on business cases and market introduction strategies complements the technical objectives and helps to reconcile the technical results with the demands of the market

Focus **Application type**	**Vehicle human**	**Infrastructure human**	**Technical**	
Safety application				
Efficiency application				
Infotainment application				
Application independent			x	
Artefact **Area of work**	**New algorithm / New technology**	**Specification**	**Realisation**	**Evaluation**
Vehicle				
Communication		x	x	x
Infrastructure				
Management		x		

Overview

4.34 GOOD ROUTE

Duration: 2006 – 2008

Financing: 6th European Framework,

Size: 15 partners, 4.887.402,00 €

Country interest: Europe

Link: http://www.goodroute-eu.org/

Summary:
GOOD ROUTE aims to develop a cooperative system for dangerous goods vehicles routing, monitoring, re-routing (in case of need), enforcement and driver support, based upon dynamic, real time date, in order to minimise the Societal Risks related to their movements, whereas still generating the most cost efficient solution for all actors involved in their logistic chain.
For this scope, a new classification scheme of the dangerous goods (according to ADR) with infrastructure based safety measures, context of transportation (i.e. level of loading) and vehicle characteristic, will be performed, dynamic data collection and fusion will be realised from Infrastructure to Vehicle (I2V)/ Vehicle to Vehicle (V2V) sources and a series of on-board sensors, risk calculation algorithms will be realised, leading to a new route guidance function, the "minimum risk route guidance". The system will be integrated with an automatic, local node based, enforcement functionality and tested in 3 Pilots throughout Europe (in Finland, Switzerland and Italy), with emphasis in densely populated areas, tunnels and bridges. In addition, rerouting info and estimated delays will be communicated to the vehicles logistic chain, thus optimally combining safety with transportation efficiency enhancement.

Focus **Application type**	**Vehicle human**	**Infrastructure human**	**Technical**	
Safety application			x	
Efficiency application				
Infotainment application				
Application independent				
Artefact **Area of work**	**New algorithm / New technology**	**Specification**	**Realisation**	**Evaluation**
Vehicle			x	x
Communication				
Infrastructure	x		x	x
Management		x		x

Overview

4.35 GST subproject Floating Car Data

Duration: March 2004 – February 2007

Financing: European Union's 6th Framework Programme

Size: 6 partners, GST total budget: 21,5 million Euro

Country interest: Europe

Link: http://www.gstforum.org/en/7_sub-projects/enhanced_floating_car_data_efcd/

Summary:
For high-quality traffic and safety information services, floating car data are essential to generate content. The project is developing an open system for FCD, making it possible that vehicles equipped with advanced sensors yield information that is processed and transferred to a service centre. The service centre will have the capability to manage the type and quantity of data and timing of data uploads from vehicles. Efficient communication via different channels and security mechanisms developed under GST will be used. The resulting system will make it possible that different players implement different service concepts. The work will contribute to European standardisation activities.

Comment: Not much information is available.

Focus / Application type	Vehicle human	Infrastructure human	Technical	
Safety application				
Efficiency application				
Infotainment application				
Application independent			x	
Artefact / Area of work	**New algorithm / New technology**	**Specification**	**Realisation**	**Evaluation**
Vehicle				
Communication		x	x	x
Infrastructure				
Management				

Overview

4.36 GST subproject Rescue

Duration: March 2004 – February 2007

Financing: European Union's 6th Framework Programme

Size: 10 partners, GST total budget: 21,5 million Euro

Country interest: Europe

Link:
http://www.gstforum.org/en/subprojects/rescue/about_gst_rescue/about_gst_rescue.htm

Summary:
GST RESCUE's main feature is to ensure that information about an incident is available in the emergency vehicles and that the emergency vehicle reaches the incident scene rapidly and safely. To ensure this, GST RESCUE will complete the in-vehicle emergency call chain, guide the emergency service to incident scene by accurate locations, trial blue corridors and coning systems (vehicle-to-vehicle communication) - thus warning other road users of the approach of the emergency services. In addition, thanks to GST RESCUE, the emergency response can greatly highly benefit from the exchange of information between the rescue units and control rooms such as police or hospitals – thus helping their own efforts to save lives.

Comment: Not much information is available.

Focus Application type	Vehicle human	Infrastructure human	Technical	
Safety application			x	
Efficiency application				
Infotainment application				
Application independent				
Artefact Area of work	**New algorithm / New technology**	**Specification**	**Realisation**	**Evaluation**
Vehicle				
Communication		x	x	x
Infrastructure				
Management				

Overview

4.37 GST subproject Safety Channel

Duration: March 2004 – February 2007

Financing: European Union's 6th Framework Programme

Size: 13 partners, GST total budget: 21,5 million Euro

Country interest: Europe

Link:
http://www.gstforum.org/en/subprojects/safety_channel/about_gst_safety_channel/about_gst_safety_channel.htm

Summary:
The Safety Channel sub-project of the GST Integrated Project aims to develop and validate a "Safety Channel" concept for the priority communication of dynamic information and warnings relevant to traffic, road and weather conditions. The Safety Channel will support the generation, management and delivery of safety related information to drivers such as variable speed limits, hazard warnings, weather alerts and dynamic traffic information that will lead to improved road safety and mobility.

Comment: Not much information is available.

Focus / Application type	Vehicle human	Infrastructure human	Technical	
Safety application			x	
Efficiency application				
Infotainment application				
Application independent				
Artefact / Area of work	**New algorithm / New technology**	**Specification**	**Realisation**	**Evaluation**
Vehicle				
Communication		x	x	x
Infrastructure				
Management				

Overview

4.38 HeavyRoute

Duration: September 2006 – March 2009

Financing: Funding through the EC Directorate General Research

Size: 8 partners

Country interest: Europe

Link: http://heavyroute.fehrl.org/?m=1

Summary:
Heavyroute project will work to provide the tools, the systems and the data collection and interpretation processes that will effectively link Europe's road infrastructure via electronic mapping systems to the truck operators and drivers. The project will focus on applying and combining existing and newly developed systems, technologies, databases and models to develop an advanced HGV management and route guidance system. The objectives are to improve road safety and capacity while reducing the negative impacts on the environment and the road and bridge maintenance costs (reducing the rate of deterioration caused by heavy traffic).
Example activities in HeavyRoute are:

- Deriving a system architecture concept
- Design and development of innovative route guidance and driver support applications for HGVs based on database contents and effect models
- Traffic simulation and assessment of possible effects and future scenarios from traffic management solutions implemented on European scale using route guidance solutions, particularly taking into account critical sections (bridges, ferries, tunnels, cities)
- Simulation of traffic flows due to different management strategies using economical incentives (price differentiation, etc) and legislative means.

Focus **Application type**	**Vehicle human**	**Infrastructure human**	**Technical**	
Safety application			x	
Efficiency application			x	
Infotainment application				
Application independent				
Artefact **Area of work**	**New algorithm / New technology**	**Specification**	**Realisation**	**Evaluation**
Vehicle			x	x
Communication			x	x
Infrastructure		x	x	x
Management				x

Overview

4.39 HIDENETS

Duration: 2006 – 2008

Financing: The EU's Framework Programme 6

Size: 9 partners

Country interest: Europe

Link: http://www.hidenets.aau.dk/

Summary:

The aim of HIDENETS is to develop and analyze end-to-end resilience solutions for distributed applications and mobility-aware services in ubiquitous communication scenarios. Technical solutions will be developed for applications with critical dependability requirements in the context of selected use-cases of ad-hoc car-to-car communication with infrastructure service support. The HIDENETS solutions are expected to contribute to a user perception of trustworthiness of future wireless services, as this perception is strongly impacted by availability and resilience aspects. Such perception is critical for the technical and business success of these services.

To reach its main objectives, HIDENETS will:

- Provide architectural and design solutions concerning both network/protocol elements and technology components and their ensemble as 'middleware', required for the deployment of highly available and resilient mobility-aware services.
- Identify development tools and mechanisms like design patterns and testing methodologies to assist the implementation of said service qualities.
- Develop methodologies for the quantitative evaluation and analysis of the achieved QoS of applications and services.
- Provide an implementation of the relevant parts of the design solutions to constitute a proof of concept prototype in the automotive application domain covering both ad-hoc car-to-car and server based (infrastructure) scenarios.
- Perform an assessment of the dependability and QoS provided by the solutions developed in HIDENETS through the evaluation of the selected scenarios both at model resolution level and at the experimentation on the experimental laboratory set up.

Focus **Application type**	**Vehicle human**	**Infrastructure human**	**Technical**	
Safety application				
Efficiency application				
Infotainment application				
Application independent			x	
Artefact **Area of work**	**New algorithm / New technology**	**Specification**	**Realisation**	**Evaluation**

Vehicle				
Communication	x	x	x	x
Infrastructure				
Management				

Overview

4.40 HIGHWAY

Duration: April 2004 – January 2007

Financing: European Commission IST Programme of the 6th Research Framework

Size: 10 partners, 3,020,160 Euro

Country interest: Europe

Link: http://www.ist-highway.org/

Summary:
HIGHWAY, through the combination of smart real-time maps, UMTS 3G mobile technology, positioning systems and intelligent agent technology, 2D/3D spatial tools and speech synthesis/voice recognition interfaces will provide European car drivers and pedestrians with eSafety services and at the point of need interaction with multimedia (text, audio, images, real-time video, voice/graphics) and value-added location-based services.

HIGHWAY maps will help drivers facing critical driving situation resulting from road topography, e.g., by delaying incoming phone calls or triggering safety mechanisms based on map information like the radius of the curve ahead or speed limits or data like an accident ahead. In addition to decreasing the probability for accidents and minimising potential damage to drivers and property, HIGHWAY services will be more cost-effective, efficient (saving time to customers) and informative (e.g., better informing travellers who can have difficulty discovering what is available or on offer in an area they arrive).

Focus **Application type**	**Vehicle human**	**Infrastructure human**	**Technical**	
Safety application			x	
Efficiency application			x	
Infotainment application			x	
Application independent				
Artefact **Area of work**	**New algorithm / New technology**	**Specification**	**Realisation**	**Evaluation**
Vehicle			x	x
Communication				
Infrastructure		x	x	x
Management				

Overview

4.41 HUMANIST

Duration: March 2004 – March 2008

Financing: Directorate General of Information Society of the European Commission.

Size: 24 partners, 5 360 000 €.

Country interest: Europe

Link: http://www.noehumanist.org/

Summary:
The goal of the HUMANIST Network of Excellence is to promote a Human centred design approach and also to federate research in its scientific domain, by creating a European Virtual Centre. The creation of the virtual centre is an answer to the scattering of research capacities in Europe. This will be done by setting up strong connections between partners inside the NoE. The relationship with Universities and Academic World outside the NoE will not be set aside, and will be enhanced through training programmes and welcoming young researchers.
Outputs from NoE will also be targeted toward other relevant stakeholders such as National and European public authorities, Standardisation Bodies, National and European RTD Projects. Diffusion and transfer of knowledge, in addition to common partnerships between NoE and these entities will ensure flow of information in order to disseminate the concept of Human centred design outside the Network. Such a diffusion of information will ensure the effectiveness of the expected impacts.

HUMANIST aims at federating the research in the domain of user/system interactions and their applications on in-vehicle information systems and advanced driver assistance systems and creating at term a European Virtual Centre on these topics. The key issue of HUMANIST Network of Excellence is to promote Human centred design for IVIS and ADAS to conceive them according to drivers' needs and requirements in order to ensure their acceptability and to improve road safety.

Focus **Application type**	**Vehicle human**	**Infrastructure human**	**Technical**	
Safety application	x			
Efficiency application				
Infotainment application				
Application independent				
Artefact **Area of work**	**New algorithm / New technology**	**Specification**	**Realisation**	**Evaluation**
Vehicle	x	x		
Communication				
Infrastructure				
Management				

Overview

4.42 IM@GINE IT

Duration: 2004 – 2005

Financing: EU 6th Research Framework

Size: 16 partners, 4.49 Million Euro

Country interest: Europe

Link: http://www.imagineit-eu.com/

Summary:
The main objective is to provide one and single access point through which the end user can obtain location based, intermodal transport information (dynamic and static), mapping & routing, navigation and other related services everywhere in Europe, anytime, taking unto account personal preferences. Thus, the key phrase behind IM@GINE IT is: facilitation of seamless travel in Europe.

Focus / Application type	Vehicle human	Infrastructure human	Technical	
Safety application			x	
Efficiency application			x	
Infotainment application				
Application independent				
Artefact / Area of work	**New algorithm / New technology**	**Specification**	**Realisation**	**Evaluation**
Vehicle				
Communication				
Infrastructure		x	x	x
Management				

Overview

4.43 INVENT

Duration: 2001 – 2005

Financing: Federal Ministry for Research and Education (BMBF) -partly

Size: 24 partners

Country interest: Europe

Link: http://www.invent-online.de/

Summary:
Hence, we urgently need solutions that will make traffic safer and more efficient. The development and investigation of such solutions is the goal of the research initiative INVENT. In the future, new technologies will help to avoid accidents and reduce congestion. By a fusion of traffic, information, and communication technologies, new assistance systems will emerge, capable of providing continuous support to drivers, determining the best route, and, in critical situations, even saving lives. Cars will inter-communicate automatically and warn one another of dangerous incidents or conditions ahead. Results of congestion research will allow traffic management systems to dissolve or even entirely prevent congestion. The following component projects are defined:

- *Traffic Performance Assistance* is designed to make traffic flow more smoothly and relieve traffic jams
- *Network Traffic Equalizer* in which specialists are incorporating sophisticated traffic management strategies into a new generation of navigation systems using advanced methods including machine intelligence
- Avoiding wasted trips, guaranteeing precise delivery times to customers of delivery services these are the goals of *Traffic Management in Transport and Logistics*.

Comment: Not much information is available.

Focus / Application type	Vehicle human	Infrastructure human	Technical	
Safety application			x	
Efficiency application			x	
Infotainment application				
Application independent				
Artefact / Area of work	**New algorithm / New technology**	**Specification**	**Realisation**	**Evaluation**
Vehicle			x	x
Communication				
Infrastructure			x	x
Management				

Overview

4.44 INVETE

Duration: 2000 – 2002

Financing: EU FP5

Size: 9 partners

Country interest: Europe

Link: http://cordis.europa.eu/data/PROJ_FP5/ACTIONeqDndSESSIONeq112422005919ndDOCeq1269ndTBLeqEN_PROJ.htm

Summary:
The aim of INVETE is to specify, develop and validate a modular intelligent in-vehicle terminal (IVT). The IVT can be used for different transport services i.e., regular and flexible collective transport and in different transport modes e.g., bus and taxi. The IVT is designed to operate in different communications environments like GSM and private radio network (PRN). There will be 30 IVTs designed and prototyped. Communication protocols and software for flexible collective transport services will be developed to support the full utilisation of the IVT. An IVT will be designed based on the specifications, and prototyped. The applications and communication protocols which are needed for the services used during demonstration in the different sites will be developed. The IVT prototype will be integrated with on-board equipment and verified in three member states in laboratory conditions and in real operating conditions.

There will be four major developments during the lifecycle of the project. Firstly, the project will draw together the specifications for the IVT, based on identified user needs. Secondly, the IVT will be designed and a prototype prepared for verification. Thirdly, after verification of the IVT in laboratory and in real operating conditions, the updated prototypes for demonstrations will be delivered.

Comment: There is not much information available.

Focus **Application type**	**Vehicle human**	**Infrastructure human**	**Technical**	
Safety application				
Efficiency application			x	
Infotainment application				
Application independent				
Artefact **Area of work**	**New algorithm / New technology**	**Specification**	**Realisation**	**Evaluation**
Vehicle			x	x
Communication			x	x
Infrastructure			x	x
Management				

Overview

4.45 IVI subproject CICAS

Duration: 2004 – 2008

Financing: Federal and state departments of transportation (DOTs) and vehicle manufacturers

Size: 40 partners in IVI

Country interest: USA

Link: http://www.its.dot.gov/cicas/index.htm

Summary:
This is a project within Intelligent Vehicle Initiative (IVI).

CICAS (Cooperative Intersection Collision Avoidance Systems) is a four-year Intelligent Transportation Systems (ITS) program partnership between the U.S. Department of Transportation (USDOT), automobile manufacturers and State and local departments of transportation. Its purpose is to develop vehicle-infrastructure cooperative systems that address intersection crash problems related to stop sign violations, traffic signal violations, stop sign movements and unprotected signalized left turn movements. The goal of CICAS is to facilitate the implementation of cooperative intersection safety systems that effectively reduce the number of intersection crashes. There are three operational concepts for CICAS being researched:

- CICAS-Violation (CICAS-V): a system that warns the driver via an in-vehicle device when it appears likely that the driver will violate a traffic signal or stop sign.
- CICAS-Stop Sign Assist (CICAS-SSA): a system that uses a Dynamic Message Sign (DMS) to tell drivers on the minor road when it is unsafe to enter the intersection due to insufficient gaps in traffic on the main road.
- CICAS-Signalized Left Turn Assist (CICAS-SLTA): a system that uses a DMS or in-vehicle sign to tell drivers when it is unsafe to make an unprotected left turn at a signalized intersection.

Comment: There is not much information available for this project.

Focus / Application type	Vehicle human	Infrastructure human	Technical	
Safety application			x	
Efficiency application				
Infotainment application				
Application independent				
Artefact / Area of work	**New algorithm / New technology**	**Specification**	**Realisation**	**Evaluation**
Vehicle			x	x
Communication			x	x
Infrastructure			x	x
Management				

Overview

4.46 IVI subproject VII

Duration: 2004 – 2008

Financing: Federal and state departments of transportation (DOTs) and vehicle manufacturers

Size: 40 partners in IVI

Country interest: USA

Link: http://www.its.dot.gov/vii/index.htm

Summary:
This is a project within Intelligent Vehicle Initiative (IVI).

The Vehicle Infrastructure Integration (VII) program is a cooperative effort between the U. S. Department of Transportation (USDOT), State governments and the automobile industry to develop and test an information infrastructure that uses the most advanced communications technologies to exchange real-time information between the roadside and vehicles to improve safety and mobility. Dedicated Short Range Communications (DSRC) equipment operating in the 5.9 gigahertz frequency range is placed on the roadways and within the vehicle. Specific applications are being developed to test a broad variety of potential safety and mobility uses of the VII system including:

- Warning drivers of unsafe conditions or imminent collisions.
- Warning drivers if they are about to run off the road or speed around a curve too fast.
- Informing system operators of real-time congestion, weather conditions and incidents.
- Providing operators with information on corridor capacity for real-time management, planning and provision of corridor-wide advisories to drivers.

Collision-avoidance technologies that will use the VII infrastructure are being developed as part of the Cooperative Intersections Avoidance (CICAS) program. The automobile industry is also developing prototype private-sector applications for “opt-in” value-added services to drivers. VII seeks to achieve a significant reduction in vehicle crashes, reduce vehicle delay through State and local management of the surface transportation network based on real-time traffic information and reduce the cost of road maintenance. VII seeks to answer the fundamental question of whether it is technically feasible, economically viable and socially acceptable to coordinate the deployment of a nationwide communication system on the road infrastructure and in all vehicles sold in the U.S. That determination will support a joint decision by the public and private sectors whether to deploy VII in the U.S.

Comment: There is not much information available for this project.

Focus Application type	Vehicle human	Infrastructure human	Technical	
Safety application			x	
Efficiency application			x	
Infotainment application				

Application independent				
Artefact **Area of work**	**New algorithm / New technology**	**Specification**	**Realisation**	**Evaluation**
Vehicle			x	x
Communication			x	x
Infrastructure			x	x
Management				

Overview

4.47 I-WAY

Duration: 2006 – 2008

Financing: EC-funded research project

Size: 14 partners, 4.655.998,00 €

Country interest: Europe

Link: http://www.iway-project.eu/

Summary:
I-WAY aims to enhance drivers perception on road environment and improve his responses in time critical traffic scenarios by providing real time information from other vehicles in the vicinity and from effectively located roadside equipment as well. The project will develop new and efficient methods for processing multi-sensorial signals based on sensor management and data fusion techniques. The Situation Assessment Module will combine data from the external sources (the roadside equipment and other vehicles) along with the features extracted from the various on-board sensors and with the aid of various intelligent classification techniques will detect hazards and risky situations on the road. I-WAY's objective is to increase road safety and transport efficiency by supporting drivers with warnings and suggestions about traffic jams, accidents, presence of obstacles, lane deviation, as well as warnings for drivers drowsiness thanks to on car sensors that recognize weather conditions, distance from various types of obstacle on the road, including automobiles, the road shape and the driver's fatigue.

The in-vehicle subsystem consists of the following modules

- The vehicle sensing module.
- The data acquisition module.
- The mobile interfaces of the vehicle.
- The situation assessment module.
- The communication module

The External Transport System which includes:

- The Roadside equipment
- The Road Management System

Focus / Application type	Vehicle human	Infrastructure human	Technical	
Safety application	x			
Efficiency application	x			
Infotainment application				
Application independent				
Artefact / Area of work	**New algorithm / New technology**	**Specification**	**Realisation**	**Evaluation**
Vehicle	x		x	x
Communication				

Infrastructure			x	x
Management				

Overview

4.48 MCP

Duration: 2000 – 2001

Financing: CORDIS

Size: 20 partners

Country interest: Europe

Link: http://eurescom.eu/~ftproot/web-deliverables/public/P1000-series/P1046/T1/MCP/MCP%20summary.html

Summary:
The purpose of the Multimedia Car Platform (MCP) is to offer new communication, navigation and entertainment services for car drivers and passengers. The Multimedia Car Platform will carry its users to the broadband multimedia world by providing interoperability between broadcasting and cellular mobile communications networks thus adding a whole new dimension for multimedia in the car. Demand for new mobile multimedia services (mainly IP based) is coming from the European car industry and their customers, content and program providers. The user will be unaware of crossing boundaries of different networks and will be unaware of which network is actually used, i.e. the information will reach the final user through the most adequate access network depending on the service necessities. The introduction of positioning services into multimedia will encourage the installation of a new service infrastructure complementing today's national and global services, as e.g. DVB-T and WWW.

The Multimedia Car Platform will manage and handle the type of available network access, terminal decoding capacity and user preferences in terms of delay, quality and available rendering modes. The top-level goals of the MCP project are the following:

- To design innovative mobile multimedia services including use cases.
- To specify and implement the architecture for interoperable hybrid networks.
- To provide the technical means in order to make the MCP system transparent to the final user.
- To integrate and to combine communications, entertainment and navigation in the Multimedia Car Platform.
- To build the first mobile multimedia terminal and demonstrate it at major events.
- To foster convergence between broadcasting and mobile communications networks and services.

Comment: There is not much information available.

Focus Application type	Vehicle human	Infrastructure human	Technical	
Safety application				
Efficiency application				
Infotainment application			x	
Application independent				
Artefact	**New algorithm /**	**Specification**	**Realisation**	**Evaluation**

Area of work	New technology			
Vehicle		x	x	
Communication				
Infrastructure		x	x	
Management				

Overview

4.49 MISS

Duration: 2005-01-01 – 2007-01-01

Financing: European Commission 6th Framework Programme, STREP

Size: 14 partners

Country interest: Europe

Link: http://www.missproject.net/

Summary:
This project wants to increase citizens and operators safety by enabling a just in time intelligent computation of an open dynamic road surveillance network and streamlining alerting tasks under the daily duty provided by clerical staff. The main objectives of the MISS project is building a "Unified Operative Centre" (UOC), aimed at improving vehicle safety and mobility. The platform will be composed by two main components:

1. an Unified Operative Centre (UOC) where data coming from a monitoring system that is comprised of a set of mobile and fixed distributed devices will be stored and analysed by an innovative simulation algorithm to find a strategy to improve the end-users safety and security and to avoid traffic congestion.

2. an innovative on-board kit: it will be installed on the fleet cars and will include a black box here named MSCU (MISS Storage & Communication Unit), where raw environmental and infrastructure data will be stored and elaborated; then, these data will be sent via a radio-communication network to the Unified Operative Centre.

An extensive demonstration on the field will be undertaken in the area of Bologna (Italy) to test the overall integrated road safety system under operational trial conditions. Two small satellite demos will be set up in other two European sites to check knowledge cross-over.

Focus / Application type	Vehicle human	Infrastructure human	Technical	
Safety application			x	
Efficiency application			x	
Infotainment application				
Application independent				
Artefact / Area of work	**New algorithm / New technology**	**Specification**	**Realisation**	**Evaluation**
Vehicle			x	x
Communication			x	x
Infrastructure			x	x
Management				

Overview

4.50 MITRA

Duration: September 2004 – September 2006

Financing: European Commission 6th Framework Programme

Size: 14 partners

Country interest: Europe

Link: http://www.mitraproject.info/html/overview.html

Summary:

The objective of MITRA is to prototype a new operational system based on regional responsibilities for the monitoring of dangerous goods transportation in Europe. This concept aims at providing the Civil Security centres with a real-time knowledge of the position and contents of dangerous vehicles circulating in their responsibility area, warning and alert displays in case of dangerous situations, and crisis management information, allowing intervention teams to react immediately in case of an accident, with a maximum of safety. The project will deliver a prototype consisting of 3 User Monitoring Terminals, with the appropriate decision support software modules, together with a Risk-Knowledge platform, containing all information about dangerous goods and propagation models. Deployed in 3 major Civil Security centres (France, Germany and Spain) for field-trials and validation campaign, the system will be submitted to real-scale emergency scenarios.

Focus **Application type**	**Vehicle human**	**Infrastructure human**	**Technical**	
Safety application			x	
Efficiency application				
Infotainment application				
Application independent				
Artefact **Area of work**	**New algorithm / New technology**	**Specification**	**Realisation**	**Evaluation**
Vehicle				
Communication				
Infrastructure			x	x
Management			x	x

Overview

4.51 MORYNE

Duration: January 2006 – January 2008

Financing: EC-funded project within the 6th Framework Programme

Size: 11 partners

Country interest: Europe

Link: http://www.fp6-moryne.org/

Summary:
A Local Road Traffic Management Systems is implemented by a closed-loop with the following functions:

- Collection and processing of data / information from road vehicles
- Dispatch of collected information towards a Traffic Management Centre
- Transmission of information from Traffic Management Centre towards road vehicles, traffic control centres and distributed traffic control devices.

Co-operation between nodes allows increasing the traffic management scope to a wider geographical area in a bottom-up type of expansion through hierarchical levels.

Project MORYNE

- focuses on traffic in urban and sub-urban areas
- addresses the issues of Public Traffic Management and City Traffic Management
- considers using Public Transport vehicles (buses, tramways) as elements of a network of mobile sensors.

Project MORYNE will focus on:

- The development of an approach for new safety- and efficiency-oriented transport management and traffic management.
- The development and validation of technologies for appropriate sensing, information processing, communication, interfaces.
- The development of an in-laboratory demonstrator.
- The validation of the proposed concepts through field testing.
- The analysis of potential impacts (social, economic, environmental) and the definition of further steps.

Focus Application type	Vehicle human	Infrastructure human	Technical	
Safety application			x	
Efficiency application			x	
Infotainment application				
Application independent				
Artefact Area of work	**New algorithm / New technology**	**Specification**	**Realisation**	**Evaluation**
Vehicle			x	x
Communication				

Infrastructure			x	x
Management				x

Overview

4.52 NOW

Duration: 2004 – 2008

Financing: Daimler AG, BMW AG, Volkswagen AG, Fraunhofer Institute for Open Communication Systems, NEC Deutschland GmbH, Siemens AG (-2006), IMST GmbH (2006-), embedded wireless GmbH (2006-), Federal Ministry of Education and Research

Size: 11 partners

Country interest: Europe

Link: http://www.network-on-wheels.de/vision.html

Summary:
The main objectives of Network on wheels (NOW) are to solve technical key questions on the communication protocols and data security for car-to-car communications and to submit the results to the standardization activities of the Car2Car Communication Consortium, which is an initiative of major European car manufacturers and suppliers. Furthermore, a test bed for functional tests and demonstrations is implemented which will be developed further on toward a reference system for the Car2Car Communication Consortium specifications. Network on wheels will support active safety applications as well as infotainment applications and will thus provide an open communication platform for a broad spectrum of applications.

Main objectives of NOW

- Communication protocols and data security algorithms for inter-vehicle ad hoc communication systems
- To support active safety applications, infotainment applications with infrastructure and between vehicles
- Radio systems based on IEEE 802.11 technology
- Standardization on European level with the Car2Car Communication Consortium
- Implementation of a reference system
- Planning of introduction strategies and business models

Focus / Application type	Vehicle human	Infrastructure human	Technical	
Safety application				
Efficiency application				
Infotainment application				
Application independent			x	
Artefact / Area of work	**New algorithm / New technology**	**Specification**	**Realisation**	**Evaluation**
Vehicle				
Communication		x	x	
Infrastructure				
Management				

Overview

4.53 PATH subproject Address Resolution, Configuration Management, and Routing in Wireless Communication for AVCS

Duration: 1997-09-01 – 1999-06-30

Financing: Caltrans Division of Research and Innovation (DRI), US Department of Transportation, other state and local agencies and private industry. (The whole PATH.)

Size:

Country interest: USA

Link:
https://database.path.berkeley.edu/quarterly/index.cgi?reqtype=publiclistmous&section=Public

Summary:
This is a project within Partners for Advanced Transit and Highways (PATH).

A difficult task in the design of vehicle-vehicle and vehicle-roadway data communication systems for the regulation and coordination layers is the design of protocols (or distributed algorithms) for vehicle address resolution, configuration management, and routing. We propose to solve these three problems by inventing protocols for each problem. The protocols will be formally specified, verified for correctness, and analyzed for performance. We will also examine how these protocols can be implemented in the wireless systems currently used or under development in PATH: the Wavelan radios, MPI system and the Infrared network.

Comment: There is not much information available for this project.

Focus **Application type**	**Vehicle human**	**Infrastructure human**	**Technical**	
Safety application				
Efficiency application				
Infotainment application				
Application independent			x	
Artefact **Area of work**	**New algorithm / New technology**	**Specification**	**Realisation**	**Evaluation**
Vehicle				
Communication		x	x	x
Infrastructure				
Management				

Overview

4.54 PATH subproject A robust communication link and architecture design for the AHS

Duration: 1999-09-24 - 2000-09-30 (first project), 2000-09-25 – 2002-12-31 (second project)

Financing: Caltrans Division of Research and Innovation (DRI), US Department of Transportation, other state and local agencies and private industry. (The whole PATH.)

Size:

Country interest: USA

Link:
https://database.path.berkeley.edu/quarterly/index.cgi?reqtype=publiclistmous&section=Public

Summary:
There are two projects within Partners for Advanced Transit and Highways (PATH).

First project:
This project first investigates the different communication requirements and quality of service (such as messages of varying lengths and priorities) for data access in AHS communications. It will then design robust communication link and data access protocols by considering the problem that the overall communication architecture for an AHS is complicated by (i) the propagation environment of the signals, (ii) the existence of multiple interference signals, and (iii) the mobility and dynamic character of platoons. Given the complications, existing and emerging commercial technologies will be evaluated to determine if they can fulfill the communication requirements of an AHS. Finally, the focus will be on the design of a hierarchical communication system architecture that supports all different layers (application, transport, network, data link, physical) and fulfills the communication requirements.

Second project:
This project is a continuation of MOU389. It continues to investigate the different communication requirements and quality of service (such as messages of varying lengths and priorities) for data access in AHS communications. It will then design robust communication link and data access protocols by considering the problem that the overall communication architecture for an AHS is complicated by (i) the propagation environment of the signals, (ii) the existence of multiple interference signals, and (iii) the mobility and dynamic character of platoons. Given the complications, existing and emerging commercial technologies will be evaluated to determine if they can fulfill the communication requirements of an AHS. Finally, the focus will be on the design of a hierarchical communication system architecture that supports all different layers (application, transport, network, data link, physical) and fulfills the communication requirements.

Comment: There is not much information available for this project.

Focus Application type	Vehicle human	Infrastructure human	Technical	
Safety application				
Efficiency application				

Infotainment application				
Application independent			x	
Artefact **Area of work**	**New algorithm / New technology**	**Specification**	**Realisation**	**Evaluation**
Vehicle				
Communication		x	x	
Infrastructure				
Management				

Overview

4.55 PATH subproject Designing a Framework for Vehicle-to-Vehicle and Vehicle-to-Roadside Communication

Duration: 1997-08-29 – 2001-09-30

Financing: Caltrans Division of Research and Innovation (DRI), US Department of Transportation, other state and local agencies and private industry. (The whole PATH.)

Size:

Country interest: USA

Link:
https://database.path.berkeley.edu/quarterly/index.cgi?reqtype=publiclistmous&section=Public

Summary:
This is a project within Partners for Advanced Transit and Highways (PATH).

The aim of this proposal is to create a framework for vehicle-to-vehicle and vehicle-to-highway communications. In this proposal we design a suitable hierarchical communication structure that can support the mobile environment with the distinct characteristic that the topology of the communication network changes and has to be adapted as the mobiles (vehicles and platoons) move. We will populate the structure with channel assignment protocol and fault handling algorithms as pertains to the communication systems. We simulate the system using SHIFT and SmartAHS.

Comment: There is not much information available for this project.

Focus / Application type	Vehicle human	Infrastructure human	Technical	
Safety application				
Efficiency application				
Infotainment application				
Application independent			x	

Artefact / Area of work	New algorithm / New technology	Specification	Realisation	Evaluation
Vehicle				
Communication		x	x	x
Infrastructure				
Management				

Overview

4.56 PATH subproject Enhanced AHS safety through the integration of vehicle control and communication

Duration: 1999-08-24 – 2001-06-30 (first project), 2000-07-01 – 2003-12-31 (second project)

Financing: Caltrans Division of Research and Innovation (DRI), US Department of Transportation, other state and local agencies and private industry. (The whole PATH.)

Size:

Country interest: USA

Link:
https://database.path.berkeley.edu/quarterly/index.cgi?reqtype=publiclistmous&section=Public

Summary:
There are two projects within Partners for Advanced Transit and Highways (PATH).

First project:
This project will develop three related concepts which exploit the cooperative nature of AHS (with vehicles communicating and coordinating with each other and the roadway) to yield safety and capacity gains. The first task uses communication systems to implement dynamic position tracking of vehicles on an AHS and fully coordinated platoon maneuvers. The second task will develop and experimentally test an algorithm that exploits the position tracking and communication abilities to estimate the friction characteristics of the road and construct a map of the roadway's friction characteristics as a function of location. The third task merges the results in the previous two tasks with existing and emerging PATH work on emergency maneuvers to produce a detailed simulation of emergency stopping of a platoon on slippery roads.

Second project:
This project is a continuation of MOU388. It continues to develop three related concepts which exploit the cooperative nature of AHS (with vehicles communicating and coordinating with each other and the roadway) to yield safety and capacity gains. The first task uses communication systems to implement dynamic position tracking of vehicles on an AHS and fully coordinated platoon maneuvers. The second task will develop and experimentally test an algorithm that exploits the position tracking and communication abilities to estimate the friction characteristics of the road and construct a map of the roadway's friction characteristics as a function of location. The third task merges the results in the previous two tasks with existing and emerging PATH work on emergency maneuvers to produce a detailed simulation of emergency stopping of a platoon on slippery roads.

Comment: There is not much information available for this project.

Focus / Application type	Vehicle human	Infrastructure human	Technical	
Safety application			x	
Efficiency application				

Infotainment application				
Application independent				
Artefact **Area of work**	**New algorithm / New technology**	**Specification**	**Realisation**	**Evaluation**
Vehicle			x	x
Communication				
Infrastructure				
Management				

Overview

4.57 PATH subproject Evaluating Wireless Broadband System at CA SRRAs

Duration: 2005-08-26 – 2008-06-30

Financing: Caltrans Division of Research and Innovation (DRI), US Department of Transportation, other state and local agencies and private industry. (The whole PATH.)

Size:

Country interest: USA

Link:
https://database.path.berkeley.edu/quarterly/index.cgi?reqtype=publiclistmous&section=Public

Summary:
This is a project within Partners for Advanced Transit and Highways (PATH).

The meet the increasing demand for Internet access by the traveling public, the California Department of Transportation (Caltrans) has partnered with the Great Valley Center (GCV) to launch a field operational test of wireless Internet and Internet kiosks at two rest sreas (Phillip S. Raine and Enoch Christoffersen) along State Route (SR) 99. The field test technology would provide the following traveler-related information to the public by kiosk, laptop computers, personal data assistants, and cell phone: Transportation and safety information such as emergency information, road condition, and road closures; Tourist information on local attractions and services such as parks, museums, hotels, and restaurants; Historical information on the Central Valley. The objectives of this field test and related WiFi technologies, include: Improving traveler safety, reducing traveler delays, promoting tourism of local natural, cultural, and historical resources, and contributing to California's economic development. This project is a research evaluation of the field trest, including institutional, user, and financial analyses as well as expert assistance to showcase the field test at the 2005 ITS World Congress.

Comment: There is not much information available for this project.

Focus **Application type**	**Vehicle human**	**Infrastructure human**	**Technical**	
Safety application				
Efficiency application				
Infotainment application			x	
Application independent				
Artefact **Area of work**	**New algorithm / New technology**	**Specification**	**Realisation**	**Evaluation**
Vehicle				
Communication				x
Infrastructure				x

Management				

Overview

4.58 PATH subproject Failure Diagnosis and Monitoring Design for Intra-Platoon Communication Systems

Duration: 1997-09-23 – 1999-06-30

Financing: Caltrans Division of Research and Innovation (DRI), US Department of Transportation, other state and local agencies and private industry. (The whole PATH.)

Size:

Country interest: USA

Link:
https://database.path.berkeley.edu/quarterly/index.cgi?reqtype=publiclistmous&section=Public

Summary:
This is a project within Partners for Advanced Transit and Highways (PATH).

The objective of this proposal is to design a fault diagnosis and monitoring system for intra-platoon communication systems. The intra-platoon follower control relies on a time-drive communication system to supply front and lead vehicle information at regular intervals of time. This information is used for real-time longitudinal control. The reliable operation of this communication system is important for safe and comfortable longitudinal control. We will develop general diagnostic and monitoring designs that minimize the set of assumptions used in diagnostic design, and base our designs on common properties of the systems.

Comment: There is not much information available for this project.

Focus **Application type**	**Vehicle human**	**Infrastructure human**	**Technical**	
Safety application			x	
Efficiency application				
Infotainment application				
Application independent				
Artefact **Area of work**	**New algorithm / New technology**	**Specification**	**Realisation**	**Evaluation**
Vehicle			x	
Communication			x	
Infrastructure				
Management				

Overview

4.59 PATH subproject Integrated Multi-Channel Vehicle-Vehicle and Vehicle-Roadside Communications for ITS

Duration: 2004-06-30 – 2007-06-30

Financing: Caltrans Division of Research and Innovation (DRI), US Department of Transportation, other state and local agencies and private industry. (The whole PATH.)

Size:

Country interest: USA

Link:
https://database.path.berkeley.edu/quarterly/index.cgi?reqtype=publiclistmous&section=Public

Summary:
This is a project within Partners for Advanced Transit and Highways (PATH).

This project seeks to develop and test integrated communication and channel switching protocols for the North America 5.9 Ghz DSRC technology that are currently under standardization. The research challenge is to uncover ways to address the demand of safety applications while preserving the valuable versatility of DSRC. A DSRC simulator will be used to investigate various options in the protocol design, such as roadside station assisted simulcast of safety messages in service channels. Additionally, the effectiveness of such protocols will be shown by simultaneously executing a lane change assistance safety application and a tolling style service. The aim is to find a way to enable multi-channel operation within the DSRC architecture without compromising on the fast, high-priority communication needs of safety services.

Comment: There is not much information available for this project.

Focus / Application type	Vehicle human	Infrastructure human	Technical	
Safety application				
Efficiency application				
Infotainment application				
Application independent			x	
Artefact / Area of work	**New algorithm / New technology**	**Specification**	**Realisation**	**Evaluation**
Vehicle				
Communication		x	x	x
Infrastructure				
Management				

Overview

4.60 PATH subproject ITS Band Roadside to Vehicle Communications in a highway Setting - Protocol Layer

Duration: 2004-11-24 – 2006-06-30 (first project), 2005-06-29 – 2008-06-30 (second project)

Financing: Caltrans Division of Research and Innovation (DRI), US Department of Transportation, other state and local agencies and private industry. (The whole PATH.)

Size:

Country interest: USA

Link: http://www.path.berkeley.edu/PATH/Research/current/safety/5214.html

Summary:
There a two projects within Partners for Advanced Transit and Highways (PATH).

First project:
The development of ITS radio communication is moving rapidly on several fronts. In order to help California leverage this promising technology, we propose to develop a DSRC/WAVE test-bed for testing and evaluation of the radio and communication protocol standards in the context of high-value ITS applications. This project proposes to leverage the MIMO radios being developed by UCLA for ITS communications. The research plan is to: (1) Produce four highly programmable DSRC compliant radios consistent with basic elements of the current IEEE/ASTM standard specifications and the recent FCC ruling determining the DSRC bandplan, (2) Integrate four DSRC radios into the testbed, (3) Develop a protocol architecture for easy plug and play in the testbed with DSRC protocol prototypes produced by different research groups, (4) Deliver one implementation for each module in the architecture, constituting a functioning DSRC protocol stack from medium access control to application layers on top of the radios, and (5) Demonstrate a collision warning, a toll-type transaction, and a multimedia download while two vehicles travel at high-speed. The impact of this project will be to deliver the first facility able to test true DSRC hardware, capable of handling control channel as well as service channel applications, at high speeds, across a realistic distance.

Second project:
The development of ITS radio communication is moving rapidly on several fronts. In order to help California leverage this promising technology, we propose to develop a DSRC/WAVE test-bed for testing and evaluation of the radio and communication protocol standards in the context of high-value ITS applications. This project proposes to leverage the MIMO radios being developed by UCLA for ITS communications. The research plan is to: (1) Produce four highly programmable DSRC compliant radios consistent with basic elements of the current IEEE/ASTM standard specifications and the recent FCC ruling determining the DSRC bandplan, (2) Integrate four DSRC radios into the testbed, (3) Develop a protocol architecture for easy plug and play in the testbed with DSRC protocol prototypes produced by different research groups, (4) Deliver one implementation for each module in the architecture, constituting a functioning DSRC protocol stack from medium access control to application layers on top of the radios, and (5) Demonstrate a collision warning, a toll-type transaction, and a multimedia download

while two vehicles travel at high-speed. The impact of this project will be to deliver the first facility able to test true DSRC hardware, capable of handling control channel as well as service channel applications, at high speeds, across a realistic distance.

Comment: There is not much information available for this project.

Focus **Application type**	**Vehicle human**	**Infrastructure human**	**Technical**	
Safety application				
Efficiency application				
Infotainment application				
Application independent			x	
Artefact **Area of work**	**New algorithm / New technology**	**Specification**	**Realisation**	**Evaluation**
Vehicle				
Communication		x	x	x
Infrastructure				
Management				

Overview

4.61 PATH subproject Optimized Vehicle Control/Communication Interaction in an Automated Highway Systems

Duration: 1997-08-29 – 2000-12-31

Financing: Caltrans Division of Research and Innovation (DRI), US Department of Transportation, other state and local agencies and private industry. (The whole PATH.)

Size:

Country interest: USA

Link:
https://database.path.berkeley.edu/quarterly/index.cgi?reqtype=publiclistmous&section=Public

Summary:
This is a project within Partners for Advanced Transit and Highways (PATH).

This goal of the project is to define and optimize the interaction between the communication system and the vehicle control system, from both a hardware and software standpoint. The project proposes to use existing vehicle control algorithms developed by PATH researchers at U.C. Berkeley and off-the-shelf communication technology to design a coordination protocol by these the control and communication systems can affect the various maneuvers required by an automated highway system.

Comment: There is not much information available for this project.

Focus / Application type	Vehicle human	Infrastructure human	Technical	
Safety application				
Efficiency application				
Infotainment application				
Application independent			x	
Artefact / Area of work	**New algorithm / New technology**	**Specification**	**Realisation**	**Evaluation**
Vehicle				
Communication		x		
Infrastructure				
Management				

Overview

4.62 PReVENT subproject WILLWARN

Duration: 2004 – 2006

Financing: FP6 European Commission

Size: 7 partners, 3.3 MEURO

Country interest: Europe

Link: http://www.prevent-ip.org/en/prevent_subprojects/safe_speed_and_safe_following/willwarn/willwarn_02.htm subproject

Summary:
The three-year WILLWARN subproject is developing, integrating and validating a safety application that warns the driver whenever a safety-related critical situation occurring beyond the driver's field of view. This includes the development of on-board hazard detection, in-car warning management, and decentralised warning distribution by vehicle-to-vehicle communication on a road network. Positioning, relevance checks, message transport, and on-board message evaluation will enable a low-cost and reliable solution for wireless local danger warnings.

The key issues of WILLWARN include:

- Improved safety through vehicle-to-vehicle and vehicle-to-infrastructure communication
- High benefit for the user even at low equipment rates using cars as relays for transporting messages in a road network
- Design of a basic system at low cost

WILLWARN will cover the following scenarios:

- Detection and warning of obstacles on the road, warning if one's own car is an obstacle for others
- Warning of emergency vehicles or slow vehicles
- Detection of reduced friction or reduced visibility through bad weather
- Warning of dangerous spots such as construction zones through electronic beacons

A major result will be the functional system design of the wireless local danger warning application with the following components:

- Hazard detection algorithms (logics and observers) based on CAN data, GPS, and optional environment sensors e.g. radar
- Warning Message Management with messaging and forwarding strategies
- On-board relevance checks and warning evaluation
- Communication requirements, choice of radios, frequency allocation, and standardisation. System architecture and protocols for routing and application
- Guidelines for Human Machine Interface

Focus Application type	Vehicle human	Infrastructure human	Technical	
Safety application	x		x	
Efficiency				

application				
Infotainment application				
Application independent				
Artefact **Area of work**	**New algorithm / New technology**	**Specification**	**Realisation**	**Evaluation**
Vehicle	x		x	
Communication				
Infrastructure			x	
Management				

Overview

4.63 REACT

Duration: 2005 – 2006

Financing: European Commission 6th framework program

Size: 10 partners

Country interest: Europe

Link: https://www.eurtd.org/QuickPlace/project-react/Main.nsf/h_Toc/9DC7EC3C99E93073C1256FD2002EB225/?OpenDocument

Summary:
The REACT project will represent a breakthrough towards the long-term vision of reducing traffic deaths significantly and improving transport infrastructure efficiency. Integrating state-of-the-art technologies, REACT will sense natural and infrastructure conditions within and in the vicinity of each equipped vehicle, will transmit sensed real-time data to a central server where they will be analyzed by a set of sophisticated prediction and decision-making models, and will generate 1) safety alerts, speed and route recommendations, to be communicated to specific vehicle drivers; and 2) relevant information for road and law enforcement authorities.

The relevant aspects of REACT project are as follows:

- Develop/adapt real time mobile sensors that measure natural and infrastructure conditions
- Develop a method for generating in-car recommendations to the driver based strictly on data from the vehicle's in-car sensors
- Develop state-of-the-art secure communication capability for two-way communication between car and central server.
- Develop/adapt analysis, prediction, and decision-making models in a central server

Achievement of REACT's technological objectives will make possible the following results:

- Obtaining a comprehensive picture of real time transport reality on all roads through ubiquitous mobile sensors (achievable after large-scale implementation of REACT)
- Monitoring safety risk factors and not just traffic flow and transport time factors
- Monitoring driver activity – because drivers are the key cause of traffic fatalities
- Analysis and prediction leading to intelligent recommendations and information for authorities that will reduce traffic fatalities and increase transport system efficiency significantly
- System operation can, over time, provide useful input into the planning for extensions of the transport network.

Focus / Application type	Vehicle human	Infrastructure human	Technical	
Safety application	x		x	
Efficiency application			x	
Infotainment				

application				
Application independent				
Artefact Area of work	**New algorithm / New technology**	**Specification**	**Realisation**	**Evaluation**
Vehicle			x	
Communication			x	
Infrastructure			x	
Management		x		x

Overview

4.64 REPOSIT

Duration: January 2006 – July 2007

Financing: EC 6th FP

Size: 5 partners, **543.098 €**

Country interest: Europe

Link: http://www.ist-reposit.org/

Summary:
REPOSIT develops a novel concept to prevent accidents through collision avoidance based on Vehicle to Vehicle (V2V) communication. REPOSIT addresses usage of V2V communications and Relative GPS (RGPS) algorithms with existing Collision Avoidance Systems (CAS) on
Intersection and Longitudinal cases by

- Enabling RADAR concept as a Warning System in a vehicle.
- Modelling and designing V2V communications algorithms, RGPS algorithms and CAS algorithms.
- Integrating V2V+RGPS+CAS and extracting simulation results.
- Analysing In-Car integration and Product Certification and Standardisation aspects.

To reach its objectives, REPOSIT will perform:
(1) Analysis of user needs and system specifications applicable to v2v, RGPS and CAS.
(2) Translation into algorithms and models of suitable v2v communications, RGPS and CAS for test and simulation.
(3) Simulation results will be analysed and conclusions obtained.
(4) Additionally, in-vehicle integration feasibility analysis, certification procedures and interaction with standardization activities will be addressed, as well as liaison with related initiatives and convenient dissemination of results.

Focus / Application type	Vehicle human	Infrastructure human	Technical	
Safety application			x	
Efficiency application				
Infotainment application				
Application independent				
Artefact / Area of work	**New algorithm / New technology**	**Specification**	**Realisation**	**Evaluation**
Vehicle	x	x	x	x
Communication	x	x	x	x
Infrastructure			x	x
Management				

Overview

4.65 SAFE TUNNEL

Duration: January 2001 – August 2004

Financing: European Commission 5th Framework Programme

Size: 10 partners

Country interest: Europe

Link: http://www.crfproject-eu.org/

Summary:
SAFE TUNNEL main objective is to contribute to reduce the overall number of accidents inside road tunnels through preventive safety measures. The vehicle-infrastructure integration shall be achieved at three levels: Check of on-board devices to detect/predict anomalies and the relevant information transmission to the control centre; Control of the access inside tunnel and management of the communication vehicle-infrastructure; Control of the speed inside tunnel by vehicle telecontrol and a moving spot light system. Work specific objectives include: Development of two demonstrator trucks equipped with preventive diagnosis devices, tele control and HMI facilities; Development of the control centre to manage SAFE TUNNEL applications; Analysis of the needs of tunnel operator for managing safety related operations with electronic devices; Analysis of driver requirements for an effective on-board Human Machine Interface; Transmission of data in the Frejus area (tunnel included) by a public telecom network (GSM/UMTS)- Demonstrations of SAFE TUNNEL concept by field tests at Frejus Tunnel. Evaluation activities include: Technical & Impact analysis, User acceptance evaluation, Socio-economic impact estimation & Cost Benefit analysis; Recommendations for Standardisation bodies.

Focus **Application type**	**Vehicle human**	**Infrastructure human**	**Technical**	
Safety application	x	x	x	
Efficiency application				
Infotainment application				
Application independent				
Artefact **Area of work**	**New algorithm / New technology**	**Specification**	**Realisation**	**Evaluation**
Vehicle			x	x
Communication			x	x
Infrastructure		x	x	x
Management				x

Overview

4.66 SAFESPOT subproject COSSIB

Duration: 2006 – 2009 (the whole SAFESPOT project)

Financing: European Commission 6th Framework Program

Size: (the whole SAFESPOT project) 51 partners, 38 M€

Country interest: Europe

Link: http://www.safespot-eu.org/pages/page.php?mm=2&sm=5

Summary:
The aim of this sub-project is to specify and develop a set of co-operative safety systems appropriate for road scenarios in which there is an emphasis based on the contribution of roadside equipment. A number of applications will be evaluated and validated on test sites (in France, Italy, Germany, the Netherlands, and Sweden) which reproduce use cases characterised by given driving contexts. The underlying objective is:

- to increase the Active Safety Margin for motorised vehicles, pedestrians and cyclists;
- to improve the range, quality and reliability of the safety-related information available to 'intelligent vehicles' (which already have autonomous on-board systems) by providing 'cooperative' awareness through the real time reconstruction of the driving context and environment;
- to create applications which are also appropriate and useful for non equipped vehicles and road users such as motorcycles, pedestrians;

The impact of these applications will be to:

- to support drivers and other road users in taking preventive action, thus avoiding accidents;
- to manage existing incidents to minimise further negative safety impact.

The applications will be carefully 'defined' not only in terms of the technical solution proposed, but also the practical implications - organisational, legal, financial, etc - of their real world implementation. In order to gather the necessary insight into the implications of their deployment, operation and maintenance, the applications will be implemented in selected test sites which are as close as possible to real world conditions. As a result, besides the demonstration of the applications, it will be possible to make a comprehensive evaluation that clear information on their real-life safety impact and feasibility.

Focus **Application type**	**Vehicle human**	**Infrastructure human**	**Technical**	
Safety application			x	
Efficiency application				
Infotainment application				
Application independent				
Artefact **Area of work**	**New algorithm / New technology**	**Specification**	**Realisation**	**Evaluation**
Vehicle			x	x

Communication				
Infrastructure			x	x
Management				x

Overview

4.67 SAFESPOT subproject INFRASENS

Duration: 2006 – 2009 (the whole SAFESPOT project)

Financing: European Commission 6th Framework Program

Size: (the whole SAFESPOT project) 51 partners, 38 M€

Country interest: Europe

Link: http://www.safespot-eu.org/pages/page.php?mm=2&sm=2

Summary:
The possibility of integration of vehicle-based information through 'co-operative systems', and the application of new technologies and techniques to roadside sensing, offer exciting potential which could significantly change the role of the infrastructure in the safety context. Nevertheless, for this potential to become a reality, it will be necessary to find valid solutions to a set of critical factors or requirements which are central to safety-related applications. The challenge faced by INFRASENS is to provide valid solutions to these requirements. It will be met by undertaking the following five activities:

- by integrating networks of roadside sensors;
- by developing improved algorithms;
- by developing techniques for the fusion of non-homogeneous data from a variety of sources;
- by predisposing 'distributed' actuation systems with which it can be possible to communicate warnings, advice etc to vehicles and drivers by means of the infrastructure;
- by ensuring that the SAFESPOT system can share information (data and actions) with traffic management and control systems, for their mutual benefit.

Focus / Application type	Vehicle human	Infrastructure human	Technical	
Safety application			x	
Efficiency application				
Infotainment application				
Application independent				
Artefact / Area of work	**New algorithm / New technology**	**Specification**	**Realisation**	**Evaluation**
Vehicle	x			
Communication				
Infrastructure	x			
Management				

Overview

4.68 SAFESPOT subproject SCOVA

Duration: 2006 – 2009 (the whole SAFESPOT project)

Financing: European Commission 6th Framework Program

Size: (the whole SAFESPOT project) 51 partners, 38 M€

Country interest: Europe

Link: http://www.safespot-eu.org/pages/page.php?mm=2&sm=4

Summary:
The overall objective of this sub-project is to collect needs and requirements, to specify and to develop the safety application based on cooperative system implementing the active Safety Margin concept. Moreover the sub-project will validate and evaluate those applications on the real test site reproducing the different use cases that will be available on the different driving contexts. The development will be characterized by a complete reconstruction of the driving context and road environment using in combination on-board sensors data and cooperative system information (vehicles net concept):

- to support drivers preventively to the proper maneuvers in the different contexts;
- to prevent the critical situation or manage them correctly;
- to enhance the intervention of the vehicle systems (e.g. not only low friction condition).

Typical accident situations and related scenarios are listed here:

- Lane change in a generic one-way road;
- Frontal collision in a generic two-ways road;
- Rear-end collision in a critical road segment in a tunnel;
- Lateral collision in a black spot such as a junction;
- Road departure in a black spot such as a dangerous bend;
- Static obstacles in a black spot such as road work.

Focus / Application type	Vehicle human	Infrastructure human	Technical	
Safety application			x	
Efficiency application				
Infotainment application				
Application independent				
Artefact / Area of work	**New algorithm / New technology**	**Specification**	**Realisation**	**Evaluation**
Vehicle		x	x	x
Communication				
Infrastructure				
Management				

Overview

4.69 SAFESPOT subproject SINTECH

Duration: 2006 – 2009 (the whole SAFESPOT project)

Financing: European Commission 6th Framework Program

Size: (the whole SAFESPOT project) 51 partners, 38 M€

Country interest: Europe

Link: http://www.safespot-eu.org/pages/page.php?mm=2&sm=3

Summary:
Among all technologies - available or currently under development - some play a crucial role in building the overall SAFESPOT architecture and enabling SAFESPOT applications. Objective of SINTECH subproject is, thus, to analyse such technologies, to adapt and enhance them in order to properly integrate them into the vehicle and infrastructure platforms. Prototypes developed within WP3.4 will consist mainly in software implementations and will be a contribution to SAFEPROBE and INFRASENS activities, where such software modules will be integrated into the vehicle and infrastructure prototypal platforms.

Main technologies (Technical Tasks) considered in SINTECH are:

- Co-operative relative localisation: highly accurate and reliable localisation system
- Local temporary vehicle maps for safety applications
- Ad hoc dynamic vehicle-vehicle-infrastructure network
- ...

This is an open list because additional innovative co-operative technologies may arise during the project. Such technologies are continuously monitored and, if needed, imported into SINTECH. For the first 18 months the projects starts with the three indicated technical tasks.

Focus **Application type**	**Vehicle human**	**Infrastructure human**	**Technical**	
Safety application				
Efficiency application				
Infotainment application				
Application independent			x	
Artefact **Area of work**	**New algorithm / New technology**	**Specification**	**Realisation**	**Evaluation**
Vehicle	x		x	
Communication				
Infrastructure	x		x	
Management				

Overview

4.70 SAFESPOT subproject SCORE

Duration: 2006 – 2009 (the whole SAFESPOT project)

Financing: European Commission 6th Framework Program

Size: (the whole SAFESPOT project) 51 partners, 38 M€

Country interest: Europe

Link: http://www.safespot-eu.org/pages/page.php?mm=2&sm=7

Summary:
Main objective of SP7 – SAFESPOT Core Architecture (SCORE) is the definition of a System Core Architecture to be used as a reference across Europe for both the development of new ITS safety services and the development of applications increasing the ITS traffic efficiency. Activities within SCORE subproject will be performed in co-operation by teams of experts (cooperative system cluster) coming from SAFESPOT and other related projects and standardization activities. This approach will guarantee the convergence between specifications developed concurrently by different projects and committees and then will give the possibility to integrate corresponding architectural components into a common reference system architecture.
Such a definition will involve:

- the specification of a high level architecture, that will consider all possible applications safety and traffic efficiency) and technologies coming from SAFESPOT, C2C-C (Car to Car Communication) Consortium and other relevant European research projects;
- the detailed specification of SAFESPOT reference system architecture, with particular focus on local area vehicle-vehicle-infrastructure network (based on C2C-C technology and protocols) as communication infrastructure;
- the definition of architectural guidelines to design and develop vehicle and road side infrastructure platforms (contribution to other SPs).
- the definition of certification areas and associated certification modules as elements of validation for the subprojects contributing to the implementation of the SAFESPOT reference system architecture.

Focus **Application type**	**Vehicle human**	**Infrastructure human**	**Technical**	
Safety application				
Efficiency application				
Infotainment application				
Application independent			x	
Artefact **Area of work**	**New algorithm / New technology**	**Specification**	**Realisation**	**Evaluation**
Vehicle		x		
Communication				
Infrastructure		x		
Management				x

Overview

4.71 SAFESPOT subproject SAFEPROBE

Duration: 2006 – 2009 (the whole SAFESPOT project)

Financing: European Commission 6th Framework Program

Size: (the whole SAFESPOT project) 51 partners, 38 M€

Country interest: Europe

Link: http://www.safespot-eu.org/pages/page.php?mm=2&sm=1

Summary:
The main objective of this subproject is the development of an interoperable "vehicle probing" system, source of safety related information. In particular, the vehicle could be considered as a fundamental "junction for a spread network of knowledge" on safety, able to receive data coming from different sources like:

- vehicle on-board sensors;
- vehicle data;
- other vehicles through vehicle-to-vehicle communication (V2V)
- infrastructure through vehicle-to-infrastructure communication (V2I);

and to transmit, after a classification, selection and fusion, an update version of them to the other cooperative vehicles and infrastructure.

To reach this objective, the following activities are foreseen:

- Definition of use cases
- Definition of a flexible and configurable on-board architecture
- Specification of useful vehicle internal data (vehicle sensors, surround sensors, geo-position module, etc.)
- Specification of useful vehicle external data (data from neighbours and infrastructure over communication system) for example in terms of interface definitions (content and format) and of requirements (accuracy, availability, latency,
- Definition of modalities for receiving and transmitting data collected from probe vehicles shared among all car makers
- Definition of a common standard shared and interoperable of the data coming from probe vehicles
- Specification of data fusion algorithms (including data storage) for "internal vehicle data"
- Specification of data fusion algorithms for "cooperative data" (internal & external) considering data requirements (accuracy, availability, latency,.)
- Definition of test cases and analysis of test results

Focus Application type	Vehicle human	Infrastructure human	Technical	
Safety application			x	
Efficiency application				
Infotainment application				
Application				

independent				
Artefact **Area of work**	**New algorithm / New technology**	**Specification**	**Realisation**	**Evaluation**
Vehicle	x	x		x
Communication				
Infrastructure		x		x
Management				

Overview

4.72 SAVE

Duration: 1996 – 1998

Financing: EC 4th Framework

Size: 12 partners

Country interest: Europe

Link: http://cordis.europa.eu/telematics/tap_transport/research/projectsum/save.html

Summary:
SAVE aims to develop an integrated system capable of detecting driver status problems which may indicate an imminent danger of an accident or other emergency. In such cases, the system will inform the driver, the surrounding traffic and (if necessary) an emergency centre. If the driver is seriously impaired and incapable of safely controlling the vehicle, the SAVE system will automatically manoeuvre the vehicle to the roadside, where effective help can be provided. The first stage of the development programme is the realisation of subsystems to detect drunk driving, fatigue and critical incidents in real time, which are called Driver Impairment Monitoring (DIM). All subsystems and their elements, as well as the final system, will be extensively tested in a series of pilots, which will include five driving simulators and three instrumented cars, in three pilot circles and seven pilot sites. The project will be completed by providing design guidelines and draft regulations on Emergency systems, and carrying out extensive exploitation and dissemination of project results through National Automobile Clubs and Car Manufacturers.

Focus / Application type	Vehicle human	Infrastructure human	Technical	
Safety application	x		x	
Efficiency application				
Infotainment application				
Application independent				
Artefact / Area of work	**New algorithm / New technology**	**Specification**	**Realisation**	**Evaluation**
Vehicle		x	x	x
Communication				
Infrastructure		x	x	x
Management				

Overview

4.73 SeVeCom

Duration: 2006 – 2008

Financing: FP6 European Commission

Size: 7 partners, 4.67 MEURO

Country interest: Europe

Link: http://www.sevecom.org/

Summary:
SeVeCom (Secure Vehicular Communication) is an EU-funded project that focuses on providing a full definition and implementation of security requirements for vehicular communications. The Sevecom vision is that future vehicular communication and inter-vehicular communication infrastructures will be widely deployed in order to bring the promise of improved road safety and optimised road traffic. Sevecom addresses security of the future vehicle communication networks, including both the security and privacy of inter-vehicular communication and of the vehicle-infrastructure communication. Its objective is to define the security architecture of such networks, as well as to propose a roadmap for integration of security functions in these networks.
With the goal of enhancing the immunity of future road safety applications against a wide range of security threats, Sevecom focuses on communications specific to road traffic. Three major aspects will be examined.

- Threats, such as bogus information, denial of service or identity cheating.
- Requirements, like authentication, availability, and privacy.
- Operational Properties, including network scale, privacy, cost and trust.

Focus **Application type**	**Vehicle human**	**Infrastructure human**	**Technical**	
Safety application				
Efficiency application				
Infotainment application				
Application independent			x	
Artefact **Area of work**	**New algorithm / New technology**	**Specification**	**Realisation**	**Evaluation**
Vehicle				
Communication		x		
Infrastructure				
Management				

Overview

4.74 SMARTWAY

Duration: 2004 – 2010

Financing: Ministry of Land, Infrastructure and Transport, The National Institute for Land and Infrastructure Management, Private corporations (joint research)

Size:

Country interest: Japan

Link: http://downloads.transportation.org/InternationalDay/Hirai.pdf
http://www.nilim.go.jp/japanese/its/3paper/pdf/060131trb.pdf
http://www.hido.or.jp/itsos/

Summary
Smartway Project / Advanced Cruise-Assist Highway Systems Project is a road-based concept, which will serve as the platform for Advanced Cruise-Assist Highway Systems (AHS). The Smartway Project has been enhanced as a national level project, which enables communication among vehicle, driver and pedestrian with advanced ITS technologies. In addition, in January 2006, New IT Reform Strategy has been issued by the central government. The strategy stresses realization of the world safest road transport with less than 5000 of traffic death. Smartway will work as a basis for the realization of the goal in the strategy.

A demonstration, Smartway Demo 2006, took place February 22 to 24 2006.

Smartway 2007 services:

- Providing information on obstacles ahead
- Roadside sensors detect stopped vehicles beyond a curve
- Drivers are alerted using pictures and voice announcements.
- Providing information on conditions ahead
- Camera images of tunnels and locations of frequent congestion are
- provided as still images
- Merging assistance
- The presence of vehicles approaching the merge point is detected from the roadside
- Access to the Internet

Comment: There is not much information available for this project.

Focus / Application type	Vehicle human	Infrastructure human	Technical	
Safety application			x	
Efficiency application				
Infotainment application				
Application independent				
Artefact / Area of work	**New algorithm / New technology**	**Specification**	**Realisation**	**Evaluation**

Vehicle				
Communication			x	x
Infrastructure			x	x
Management				

Overview

4.75 TRACKSS

Duration: 2006 – 2008 June

Financing: FP6 European Commission

Size: 15 partners, 4.4 MEURO

Country interest: Europe

Link: http://www.trackss.net/

Summary:

TRACKSS has one strategic goal:

- Developing new systems for cooperative sensing and predicting flow, infrastructure and environmental conditions surrounding traffic, with a view to improve road transport operations safety and efficiency.

This strategic goal will be achieved by means of a number of specific objectives, namely:

1. The development and/or improvement of a number of breakthrough sensing technologies.
2. The design and integration of knowledge sharing capabilities into a sensor network, giving optimal integration into the Cooperative Transport Systems.
3. Enabling the modular integration of the sensors developed by the project into the Cooperative Transport Systems architecture.
4. Making use of the most advanced data fusion and integration techniques in order to get as much information as possible from the data collected.
5. Developing a knowledge based DSS (Decision Support System) to assess and predict the
ambient conditions affecting the safety and efficiency of transport.
6. Last, but not least, validating the project results by means of three validation scenarios:

- Test Track: the project developments will be validated in a controlled environment.
- Crossing: the project developments will be validated in a real intersection.
- Network: the project developments will be validated in a section of a real network.

Focus Application type	Vehicle human	Infrastructure human	Technical	
Safety application			x	
Efficiency application			x	
Infotainment application				
Application independent				
Artefact Area of work	**New algorithm / New technology**	**Specification**	**Realisation**	**Evaluation**
Vehicle			x	x
Communication			x	x
Infrastructure			x	x
Management				

Overview

4.76 TRAVEL-GUIDE

Duration: April 2000 – April 2002

Financing: FP5 European Commission

Size: 12 partners

Country interest: Europe

Link: http://www.travel-guide.iao.fraunhofer.de/

Summary:
The main goal of TRAVEL-GUIDE is to develop guidelines concerning information provision by traffic information and traffic management systems (in-vehicle information devices as well as infrastructural systems). TRAVEL-GUIDE will assess the needs of drivers in terms of content, presentation, availability, reliability, timing and priority of the information provided, conduct relevant tests and suggest new methods in order to meet user needs and requirements raised by the development of the Trans-European Networks. The development of guidelines for driver information systems should help to maximise the benefits of these systems.

Focus / Application type	Vehicle human	Infrastructure human	Technical	
Safety application				
Efficiency application			x	
Infotainment application				
Application independent				
Artefact / Area of work	**New algorithm / New technology**	**Specification**	**Realisation**	**Evaluation**
Vehicle			x	x
Communication				
Infrastructure			x	x
Management				

Overview

4.77 WATCH-OVER

Duration: 2006 – 2008

Financing: FP6 European Commission

Size: 13 partners, 5.9 MEURO

Country interest: Europe

Link: http://www.watchover-eu.org/index.html

Summary:
The goal is the design and development of a cooperative system for the prevention of accidents involving vulnerable road users in urban and extra-urban areas. WATCH-OVER intends to examine the detection of vulnerable road users in the complexity of traffic scenarios in which pedestrians, cyclists and motorcyclists are walking or moving together with cars and other vehicles. The technical challenge is the development of a cooperative system for real time detection and relative localisation of vulnerable users that includes innovative short range communication and video sensing technologies. The implementation challenge is the deployment of a reliable system that is versatile for different vehicles and vulnerable road users.

Projects main activities are:

- identification of user requirements and relevant use cases
- specification of system architecture, functions and applications
- selection and adaptation of the most promising short range communication technologies
- design and development of new generation automotive CMOS cameras
- implementation of software algorithms for real time detection of vulnerable road users
- design and development of the system customised for different users
- results dissemination and deployment

Focus / Application type	Vehicle human	Infrastructure human	Technical	
Safety application			x	
Efficiency application				
Infotainment application				
Application independent				
Artefact / Area of work	**New algorithm / New technology**	**Specification**	**Realisation**	**Evaluation**
Vehicle			x	
Communication			x	
Infrastructure				
Management				

Overview

4.78 VICS

Duration: 1991 – 1996

Financing: Ministry of Land, Infrastructure and Transport

Size:

Country interest: Japan

Link: http://www.its.go.jp/ITS/topindex/topindex_g03_3.html
http://www.vics.or.jp/english/index.html

Summary:
When a car navigation system is equipped with the VICS function (Vehicle Information and Communication System), the driver can obtain road and traffic information in real time, including information on traffic congestion and restrictions. If the car navigation system is a model that determines routes to the driver's destination, it can automatically recalculate the expected time of arrival based on traffic congestion, or figure out a detour to avoid the traffic congestion.

More than 27.2 million units of car navigation systems have been sold from 1997 up to now.

Focus / Application type	Vehicle human	Infrastructure human	Technical	
Safety application				
Efficiency application			x	
Infotainment application				
Application independent				
Artefact / Area of work	**New algorithm / New technology**	**Specification**	**Realisation**	**Evaluation**
Vehicle				
Communication			x	x
Infrastructure			x	x
Management				

Overview

4.79 VSC-A

Duration: December 2006 – November 2009.

Financing: US Department of Transportation (80 %)

Size: 5 partners, 12 million dollars

Country interest: USA

Link: http://www.car-to-car.org/fileadmin/dokumente/pdf/security_2006/sec_06_04_laberteaux_CAMP.pdf
http://www-nrd.nhtsa.dot.gov/pdf/nrd-12/CAMP3/pages/VSCC.htm

Summary:
Vehicle Safety Communications (VSC) is a project within CAMP Crash Avoidance Metrics Partnership addressing communication. The main objectives are:

- Develop scalable, common vehicle safety communication architecture, protocols, and messaging framework (interfaces) necessary to achieve interoperability and cohesiveness among different vehicle manufacturers. Standardize this messaging framework and the communication protocols (including message sets) to facilitate future deployment
- Develop accurate and affordable vehicle positioning technology needed, in conjunction with the 5.9 GHz DSRC, to support most of the safety applications with high potential benefits
- Develop and verify (on VSC-A system test bed) a set of objective test procedures for the elected vehicle safety communications applications

Focus / Application type	Vehicle human	Infrastructure human	Technical	
Safety application			x	
Efficiency application				
Infotainment application				
Application independent				
Artefact / Area of work	**New algorithm / New technology**	**Specification**	**Realisation**	**Evaluation**
Vehicle				
Communication		x	x	x
Infrastructure				
Management				

5 Organisations

5.1 General

Below is a list of relevant organisations separated into the following groups:

- Organisations having a worldwide scope
- Organisations having a more country specific scope (grouped as USA, Japan, Europe, Rest of the world)

Even though the list cannot be considered as complete (especially not for Rest of the world) it includes most of the important and relevant organisations.

5.2 Worldwide

ABI Research http://www.abiresearch.com/
Auto Alliance http://autoalliance.org/index.php?flash=yes
CALM http://www.calm.hu/
FIA – Federation Internationale de l'Automobile http://www.fia.com/
FISITA (International Federation of Automotive Engineering Societies)
http://www.fisita.com/
Global Transportation http://www.global-transportation.com/
GRSP Global Road Safety Partnership http://www.grsproadsafety.org/
IEEE Vehicular Technology Society http://www.vtsociety.org/
IFRTD http://www.ewh.ieee.org/tc/its/
Institute of Transportation Engineers, ITE http://www.ite.org/
Intelligent Transportation Systems Council http://www.ewh.ieee.org/tc/its/
International Road Federation http://www.irfnet.org/
IRU http://www.iru.org/
SAE http://www.sae.org/servlets/index
SIMBA http://www.simbaproject.org/
UITP http://www.uitp.com/
UN Institute for Traffic Care http://www.itctraffic.com/
World Conference on Transport Research Society, WCTRS http://www.wctrs.org/

5.3 USA

AASHTO http://www.transportation.org/
CAMP Crash Avoidance Metrics Partnership http://www-nrd.nhtsa.dot.gov/pdf/nrd-12/CAMP3/images/CAMP-IVIThirdAnnualReport.pdf
CVHAS http://www.cvhas.org/
Drive and Stay Alive http://www.driveandstayalive.com/
FHWA International http://international.fhwa.dot.gov/index.cfm
FMCSA Federal Motor Carrier Safety Administration http://www.fmcsa.dot.gov/
International Transportation Safety Association http://www.ntsb.gov/
ITS America http://www.itsa.org/
ITS http://www.its.dot.gov/index.htm
IVI Intelligent Vehicle Initiative http://www.its.dot.gov/ivi/ivi.htm

NHTSA http://www.nhtsa.dot.gov/
PATH Partners for Advanced Transit and Highways http://www.path.berkeley.edu/
RITA Intelligent Transportation Systems http://www.itsdocs.fhwa.dot.gov/index.htm
The AAA Foundation for Traffic Safety http://www.aaafoundation.org/
Transportation Research Board http://www.trb.org/
US Department of Transportation http://www.dot.gov/
US Department of Transportation Rural ITS Toolbox
http://www.itsdocs.fhwa.dot.gov/JPODOCS/REPTS_TE/13477.html
US DOT http://www.dot.gov/
US DOT (ITS) http://www.its.dot.gov/index.htm
VIIC http://www.vehicle-infrastructure.org/
VSCC Vehicle Safety Communication Consortium http://www-nrd.nhtsa.dot.gov/pdf/nrd-12/CAMP3/pages/VSCC.htm

5.4 Japan

Ad Hoc Network Consortium http://www.adhoc-nwk-consortium.jp/index-e.html
AHSRA http://www.ahsra.or.jp/index_e.html
HIDO Highway Industry Development Organization http://www.hido.or.jp/ITSHP_e/
IATSS International Association of Traffic and Safety Sciences
http://www.iatss.or.jp/english/
InternetCar http://www.sfc.wide.ad.jp/InternetCAR/
ITS Info-communications Forum http://www.itsforum.gr.jp/E_index.html
ITS Japan http://www.its-jp.org/english/
JAMA http://www.jama-english.jp/index.html
Japan Automobile Research Institute (JARI) http://www.jari.or.jp/en/index.html
JSAE Society of Automotive Engineers of Japan http://www.jsae.or.jp/index_e.php
MLIT (Ministry of Land, Infrastructure and Transport) http://www.its.go.jp/ITS/index.html
Organization for Road System Enhancement (ORSE) http://www.orse.or.jp/english/
UTMS Universal Traffic Management Society of Japan
http://www.utms.or.jp/english/index.html
WIDE http://www.wide.ad.jp/index.html

5.5 Europe

ADASE 2 http://www.adase2.net/
AIDE http://www.aide-eu.org/
ASECAP http://www.asecap.com/english/index.html
AUTOSAR http://www.autosar.org/find02_07.php
Car2Car http://www.car-to-car.org/
CARSENSE http://www.carsense.org/
COST-Transport Home Page http://www.cordis.lu/cost-transport/home.html
EARPA http://www.earpa.org/
ERTICO – ITS Europe http://www.ertico.com/
ERTRAC - European Road Transport Research Advisory Council http://www.ertrac.org/
eSafety Effects Database http://www.esafety-effects-database.org/
eSafetySupport http://www.esafetysupport.org/

eSCOPE
http://www.escope.info/en/esafety_activities/related_projects/finished_projects/escope_-_esafety_observatory.htm
ESFORS http://www.esfors.org
ETSC European Transport Safety Council http://www.etsc.be/home.php
EUCAR http://www.eucar.be/ http://www.eucar.be/start.html
European Automobile Manufacturers Association (ACEA) http://www.acea.be/
European Conference of Ministers of Transport, ECMT http://www.cemt.org/
European Enhanced Vehicle-safety Committee, EEVC http://www.eevc.org/
European Federation for Transport and Environment, T&E http://www.t-e.nu/
European professional Association of operators of toll road infrastructures
European Road Safety Charter http://www.paueducation.com/charter/
European Road Safety Observatory http://www.erso.eu/
European Transport Safety Council, ETSC http://www.etsc.be/
European Union Road Federation (ERF) http://www.erf.be/
INRETS http://www.inrets.fr/
IVSS http://www.ivss.se/
LICIT http://www.inrets.fr/ur/licit/licit.htm
NESSI http://www.nessi-europe.com/Nessi/Home/tabid/36/Default.aspx
Nordisk Vegteknisk Forbund http://www.nvf53.org/
PIARC - World Road Association http://www.piarc.org/en/
PREDIT http://www.predit.prd.fr/predit3/homePage.fo
PSC Europe http://www.publicsafetycommunication.eu/
ReSIST NoE http://www.resist-noe.org
ROSEBUD http://partnet.vtt.fi/rosebud/
ROSETTA http://www.trg.soton.ac.uk/rosetta/index.htm
SAFETYNET http://www.safetynet.de/
SERENITY http://www.serenity-project.org/
SpeedAlert http://www.speedalert.org/
Sveafordon http://www.sveafordon.com/
WINNER https://www.ist-winner.org/

5.6 Rest of the world

AITS India http://www.itsindia.org/
EU-INDIA http://www.euindia.info/
KOTBA http://www.kotba.org/html/view.asp?hid=32&menu=113&pid=131

6 Results

6.1 Classification metrics

6.1.1 Total scope

All projects are included in the table below. The number of 'x' for each cell has been summed.

Europe, USA, Japan – A total of 79 projects				
Focus **Application type**	**Vehicle human**	**Infrastructure human**	**Technical**	
Safety application	6	1	34	
Efficiency application	2	1	23	
Infotainment application			3	
Application independent	1	1	28	
Artefact **Area of work**	**New algorithm / New technology**	**Specification**	**Realisation**	**Evaluation**
Vehicle	9	12	42	37
Communication	6	25	37	35
Infrastructure	5	10	39	35
Management	1	8	3	12

6.1.2 Total scope per country (normalized)

Below is the result for Europe. Note the diversity of the projects. The counted number of 'x' in each cell has been divided by number of projects (normalization) and multiplied by 100 (to give per cent).

Europe – A total of 60 projects				
Focus **Application type**	**Vehicle human**	**Infrastructure human**	**Technical**	
Safety application	10	2	40	
Efficiency application	3	2	32	
Infotainment application			3	
Application independent	2	2	35	
Artefact **Area of work**	**New algorithm / New technology**	**Specification**	**Realisation**	**Evaluation**
Vehicle	15	20	57	50
Communication	10	28	37	35
Infrastructure	8	17	52	43
Management	2	13	5	20

Below is the result for USA. Note that the projects are more focussed than Europe. The counted number of 'x' in each cell has been divided by number of projects (normalization) and multiplied by 100 (to give per cent).

USA – A total of 14 projects				
Focus **Application type**	**Vehicle human**	**Infrastructure human**	**Technical**	
Safety application			43	
Efficiency application			14	
Infotainment application			7	
Application independent			50	
Artefact **Area of work**	**New algorithm / New technology**	**Specification**	**Realisation**	**Evaluation**
Vehicle			36	29
Communication		57	71	64
Infrastructure			21	29
Management				

Below is the result for Japan. Note that the projects are more focussed than Europe. The counted number of 'x' in each cell has been divided by number of projects (normalization) and multiplied by 100 (to give per cent).

Japan – A total of 5 projects				
Focus **Application type**	**Vehicle human**	**Infrastructure human**	**Technical**	
Safety application			80	
Efficiency application			40	
Infotainment application				
Application independent				
Artefact **Area of work**	**New algorithm / New technology**	**Specification**	**Realisation**	**Evaluation**
Vehicle			60	60
Communication			100	100
Infrastructure			100	100
Management				

6.1.3 Application type generality

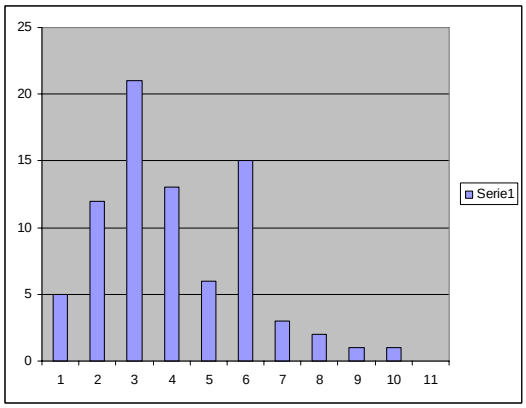
The table below shows the number of projects having one 'x' in the *Application type*, two 'x' etc. There is a strong project focus on a single application type.

Number of 'x'	Number of projects
1	59
2	16
3	4

6.1.4 Area of work generality

The table below shows the number of projects having one 'x' in the *Area of work*, two 'x' etc. The low value for 5 is not significant. The distribution could be approximated by a normal distribution.

Number of 'x'	Number of projects
1	5
2	12
3	21
4	13
5	6
6	15
7	3
8	2
9	1
10	1



6.2 Impact

A reasonable assumption is that the more partners involved the higher is the project's impact and influence. The sorted list below shows the projects with most partners.

Project	Number of partners	Country interest
CVIS	59	Europe
SAFESPOT	51	Europe
DAIDALOS	46	Europe
Ambient Networks	41	Europe
COOPERS	40	Europe
IVI	40	USA
EAST-EAA	24	Europe
HUMANIST	24	Europe
INVENT	24	Europe
MCP	20	Europe

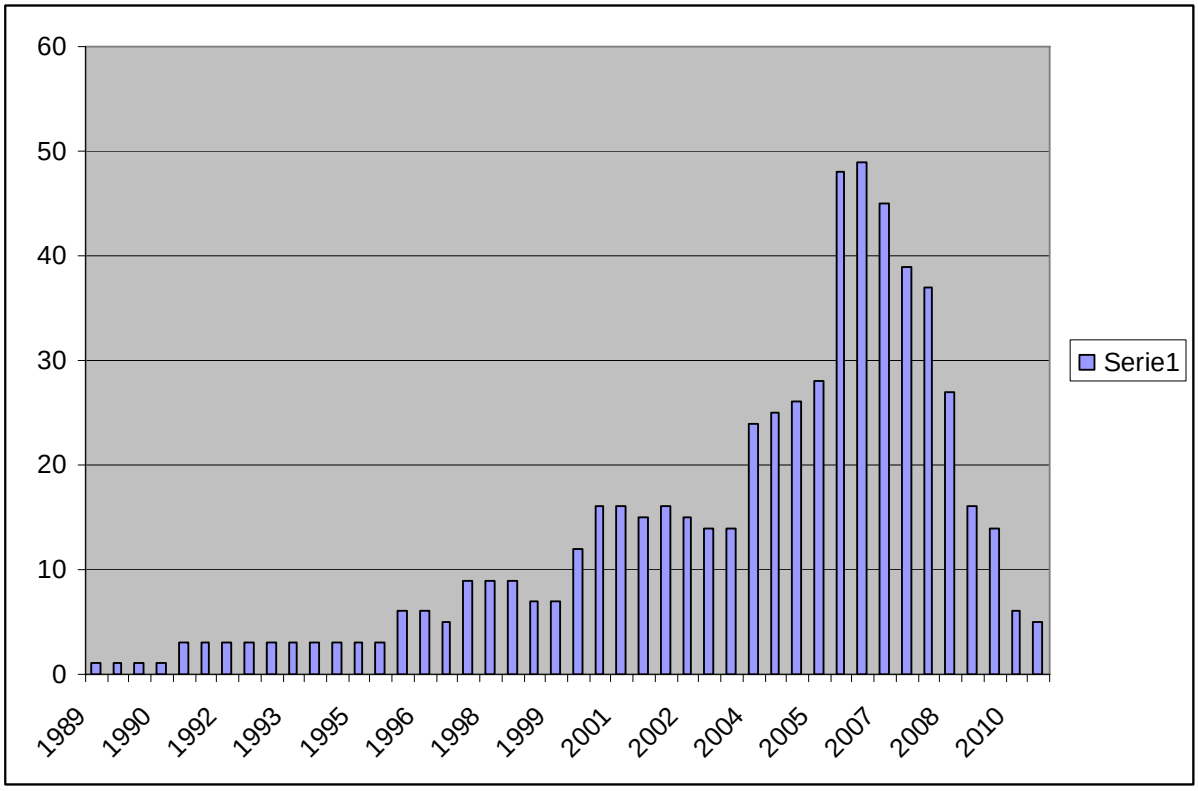
Note the significant gap between IVI and EAST-EAA. The projects could be divided into two groups:

- A medium sized group having 4 – 24 partners (about 50 projects) where projects are approximately distributed according to normal distribution.

- A high end group having 40 – 59 partners. The existence of this group might indicate the strive for consensus especially since most projects in this group concern Europe with it's many different projects.

6.2.1 Number of projects vs. time

The figure below shows the number of concurrent projects for each half year from 1989 – 2010. One should be very careful when drawing any conclusions from this figure but at least it shows the number of initiatives (the extent, scope etc vary). The increased number of projects up to 2007 is significant. The peak around 2006-2007 could indicate a maximum number of projects but it is not possible to decide for certain before the end of 2008. Thus, it is currently not possible to claim that the number of projects will decrease in the future.



Comment: Since start time of DSSS is not known DSSS is not included.

6.3 Comparison Europe, USA, Japan

There is a strong governmental support in USA and Japan. In Europe governmental support is indirect via the European Commission and the picture is more heterogeneous with many different countries involved. As it seems this is reflected in

- The higher number of projects in Europe compared to USA and Japan.
- More overlapping projects in Europe compared to USA and Japan. Several projects seem to address the same issues.

A strong governmental support improves cost-effectiveness since the number of overlapping projects could be minimized. In Europe, maybe the projects Coopers, Safespot and CVIS will become the central projects (thus "replacing" governmental support) since all three are large projects with many important participants and addressing many application areas.

There is also a somewhat different prioritisation

- In Europe and USA the main focus is on safety.
- In Japan the main focus is on traffic congestion.

A generalisation concerning project artefacts is:

- USA and European projects end with a demonstrator or theoretical results (e.g. a standard).
- Japan projects end with a product and deployment. Public full scale verification is common.

7 Conclusions

As listed in the Scope section above there were several prerequisites needed in order to limit the scope while maintaining the breadth first approach. In spite of that, as many as 79 projects were still considered significant. The challenge was then to present information from the projects in a way that made it possible to draw general conclusions.

The report probably covers European projects well. For USA and Japan project information is more difficult to extract and information is often not complete. Information for old finished projects is sometimes difficult to find and in some cases information was also contradictory.

The approach using project descriptions (i.e. project explicit views) together with project classification metrics (i.e. project implicit views) is a suitable way for getting a state-of-the-art breadth-first overview. However, it is sometimes difficult to classify a project unambiguously. An example is that all projects involve specifications, in one way or another, but to judge if they are the real artefacts of the project is more difficult.

The results as given above show that the following aspects are currently not in focus

- the role of humans
- infotainment
- management issues

Instead the focus is and has been on technical aspects and their realisations. The projects are focussed on few *Application types* (in most cases only one). For *Area of work* the spread is wider (from one to ten areas) with a mean value of four addressed areas.

For future work the survey could be extended

- to include other countries
- to classify and evaluate organisations
- to classify and evaluate research at universities
- to classify and evaluate company specific projects (however, information is probably hard to get)
- to make a more detailed project classification for a subset of projects (this requires non-public information as well)

As a final summary, it is believed that this report gives a representative state-of-the-art survey of wireless communication vehicle-to-vehicle and vehicle-to-infrastructure projects based on publicly available information.

8 References

References are given within each project description respectively.