COMeSafety <newsletter>

Newsletter for European ITS Related Research Projects

July 2008 Issue 5

European Commission
Specific Support Activity

Information Society Technologies

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SIXTH FRAMEWORK PROGRAMME

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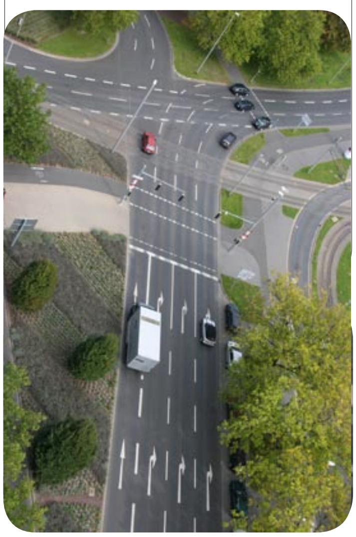

COMeSafety's contribution to standardisation

(by Dr. Ilse Kulp, BMW Research and Technology)

When COMeSafety started in 2006, many European projects and activities were planned or already on their way dealing with different aspects of Car2X communication and cooperative systems. A European wide process was missing to consolidate the results und to support the projects to introduce these results into the European and world wide standardisation.

Rudy Mietzner (Cirquent), Timo Kosch (BMW Research and Technology), and Dieter Seeberger (Daimler) proposed a new consolidation process as one of the main guiding principles of COMeSafety (see Figure1). The basic idea was to collect the requirements of the projects under consideration. These requirements needed to be consolidated. The results of the consolidation would provide a basis for the European and world-wide standardisation and the frequency allocation process.

Now, 2 years later, the process is alive. COMeSafety is chairing an architecture task force that is both collecting and consolidating the requirements and defining an architectural framework. The three currently running big integrated projects dealing with cooperative systems, CVIS, COOPERS and SAFESPOT are all actively participating in this work. Furthermore, members of these projects are also active in the C2C Communication Consortium, which provides industry-wide platforms to harmonize the technical details and forward them to European standardisation in ETSI.

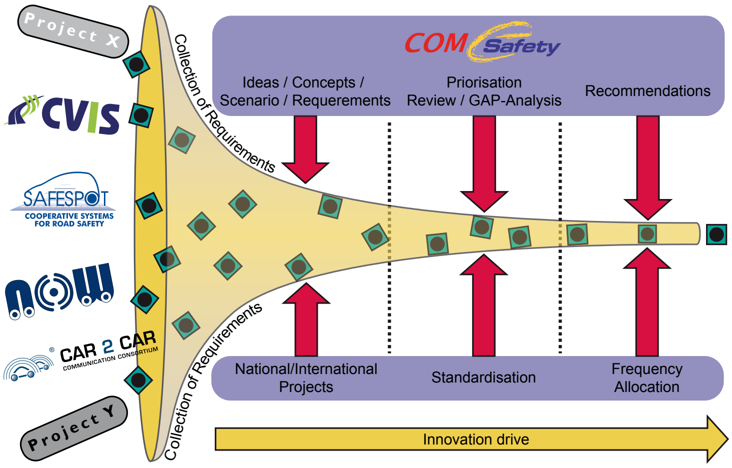

Figure 1: Aim of COMeSafety – New Consolidation Process ©2008-COMeSafety

Figure 2 shows the connection between projects and standardisation. The process is a sequence of collaboration, consolidation and harmonisation into standardisation, which is fostered by the support of COMeSafety (see figure 3).

A key problem is finding the way of getting the best progress. For solving that problem a so called group of experts is established to coordinate all activities in a qualified way. Triggered by COMSafety activities the main tasks of the group of experts are amongst others

- the dialogue to the C2C Communication Consortium,

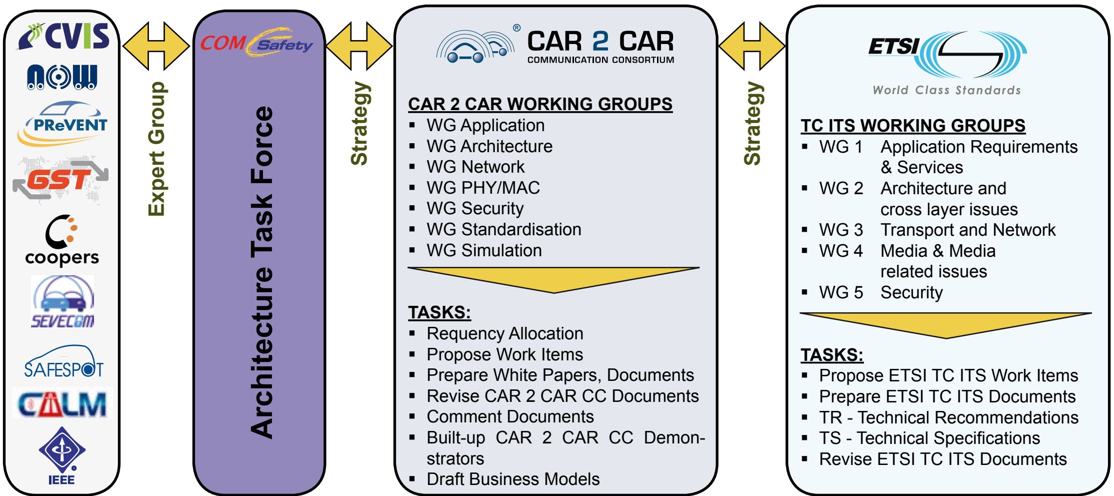

Figure 2: New Process – Actors and Tasks ©2008-COMeSafety

Figure 3: COMeSafety Process for Collaboration, Consolidation, Harmonisation and Standardisation ©2008-COMeSafety

News

15th World Congress on Intelligent Transport Systems

Date: 16-20 November 2008
Location: New York City, USA

4th International Workshop on Vehicle Communications
New York – 21st November 2008

Date: 21 November 2008
Location: Sheraton Hotel, New York City, USA

Session 1: Safety Application
Session 2: Vehicle Communications and Technology
Session 3: Deployment Scenarios
Session 4: Vehicle Communications Coordination and Cooperative R&D

Latest News

News from the COMeSafety Architecture Task Force
(by Dr. Ilse Kulp BMW Research and Technology)

The COMeSafety Architecture Task Force is creating a common architecture document. The goal of this document is to enable and facilitate conceptualization and specification of flexible, interoperable cooperative traffic and safety solutions based on agreed standards.
The document will have three major parts: Overall Architectural Framework, Specifications and Standards, Proof of Concept. The appendix provides a common terminology for communication technology for European cooperative systems and many additional information and documents to the particular chapters.
In order to achieve a common understanding of a basic Car2X architecture the document is intended to be read, discussed, updated and maintained by all members of the task force, the related projects as well as the COMeSafety Project Officer of the European Commission and subsequent projects.
The document may be a basis for the developer work of stakeholders in the safety solutions area (e.g. OEMs, authorities, telecommunication industries) as well as for IT-architects and developers of related research projects and the standardisation bodies.
The common architecture document shall be released and available in the second half of 2008.

COMeSafety's contribution to standardisation

(by Dr. Ilse Kulp, BMW Research and Technology)

- the contact to the European and world wide standardisation bodies and
- the compensation of specifications and requirements between the involved European projects.

The group of experts can be seen as an information exchange and control centre between the involved European projects and standardisation bodies on one side and the COMeSafety and C2C Communication Consortium on the other side. Figure 4 illustrates the role of the group of experts.

COMeSafety itself has named so-called liaison managers for the 5 working groups in ETSI as well as for ISO CALM and IEEE 802.11p, 1609.2 and 1609.4. Figure 4 shows the assignment of the COMeSafety liaison managers. A guideline has been developed to define the work of the liaison managers.
In doing so, the process of consolidation and standardisation has been set up and is constantly improved. Everybody can sense it in the European frequency allocation process which so far has led to CEPT decision and recommendation and the collaboration for a common architecture blueprint, which is going to be published in 2008.

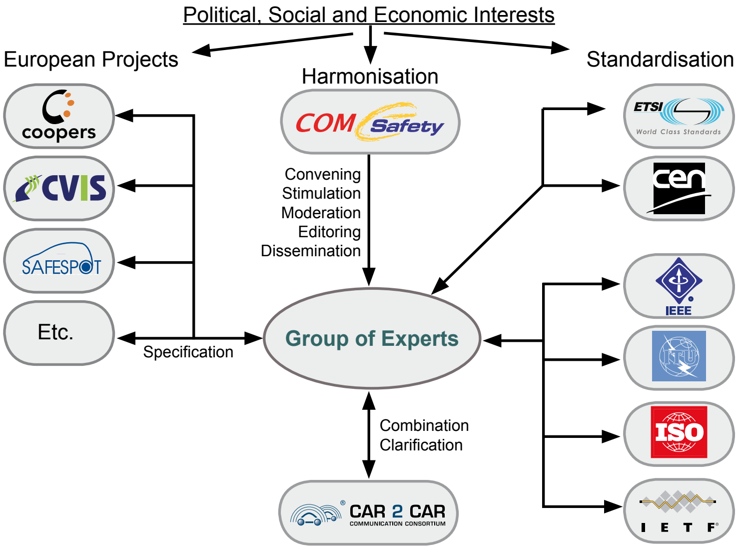

Figure 4: Role of the Group of Experts ©2008-COMeSafety

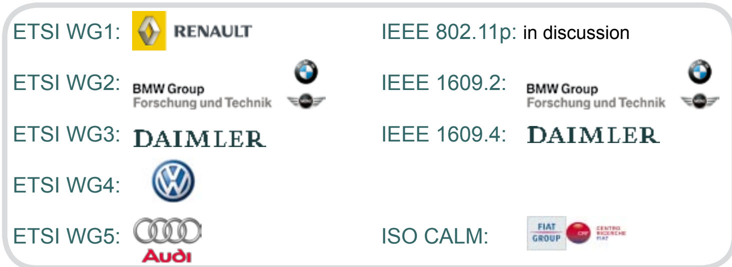

Figure 5: Liaison Managers of COMeSafety

PRE-DRIVE C2X

(by Matthias Schulze, Daimler)

A consortium under the lead of Daimler AG, that consists to the bigger part of CAR 2 CAR CC members had proposed the PRE-DRIVE C2X (PREparation for DRIVing implementation and evaluation of C2X communication technology) project in the 2nd call for proposals by DG INfSo of the European Commission for the 7th Framework Programme. The proposal was accepted and within the next two years the consortium will develop a detailed system specification and a functionally verified prototype of the common European architecture for an Inter-Vehicle and Vehicle 2 Infrastructure communication system defined by COMeSafety. Furthermore, PRE-DRIVE C2X will develop an integrated simulation model for cooperative systems, which, for the first time, enables a holistic approach for estimation of the expected benefits in terms of safety, efficiency and environment. This work will be topped by the development of tools and methods necessary for functional verification and testing of cooperative systems in laboratory environment, on test tracks and on real roads in the framework of a field operational test. Last but not least extensive dissemination activities are planned to communicate the benefits of cooperative systems technology to the public and to address all relevant European stakeholders.
PRE-DRIVE C2X will start on July 01, 2008 and has an overall budget of about 10 MEuro of which 50% will be contributed by the European Commission.

Summary: eIMPACT

(by Kerry Malone, TNO)

eIMPACT

IVSS are seen as having tremendous potential for reducing road fatalities, which were over 40,000 in 2005 in the EU. The eIMPACT project, "Socio-economic Impact Assessment of Stand-alone and Co-operative Intelligent Vehicle Safety Systems (IVSS) in Europe", assessed the socio-economic effects of Intelligent Vehicle Safety Systems (IVSS) and their impact on traffic, safety and efficiency. eIMPACT is part of the EU's Sixth Framework Programme for Information Society Technologies and Media.

The project carried out impact assessments of twelve stand-alone and cooperative systems at the EU level, for 2010 and 2020. For each of these two future years, a scenario with a low penetration rate, reflecting no incentives to accelerate deployment, and a high penetration rate, including policy incentives for system deployment, was analysed. Outputs include safety impacts in terms of reductions in fatalities, injuries and accidents, traffic effects in terms of direct (traffic flow) and indirect (reduction in congestion) effects, and the cost-benefit analysis (CBA) for the twelve systems. The CBA was extended by a stakeholder analysis, examining the costs and benefits incurred by users, industry and public authorities. Finally, policy options and strategies were explored for deployment strategies of IVSS.

eIMPACT produced an integrated set of quantitative impacts that can inform decision making on strategic orientation, innovation, investment, awareness, promotion and deployment activities by stakeholders. The exploration of possible policy options and strategies provides insight into what elements form a successful deployment strategy. Thus, eIMPACT supports the three pillars of the EC's Intelligent Car Initiative (ICI), addressing stakeholders, research, and awareness-raising.

On June 26, 2008, eIMPACT and the EU project TRACE will hold their joint final conference in Paris, France. All results will be presented. See www.eimpact.eu for information about the final conference and to register.

Summary: eIMPACT (by Kerry Malone, TNO)

Systems Analysed in eIMPACT

Twelve promising systems were selected for analysis in eIMPACT (in brackets: the 3-letter abbreviation used in figures):

1. Electronic Stability Control (ESC)
2. Full Speed Range ACC (FSR)
3. Emergency Braking (EBR)
4. Pre-Crash Protection of Vulnerable Road Users (PCV)
5. Lane Change Assistant (Warning) (LCA)
6. Lane Keeping Support (LKS)
7. NightVisionWarn (NIW)
8. Driver Drowsiness Monitoring and Warning (DDM)
9. eCall (one-way communication) (ECA)
10. Intersection Safety (INS)
11. Wireless Local Danger Warning (WLD)
12. SpeedAlert (SPE)

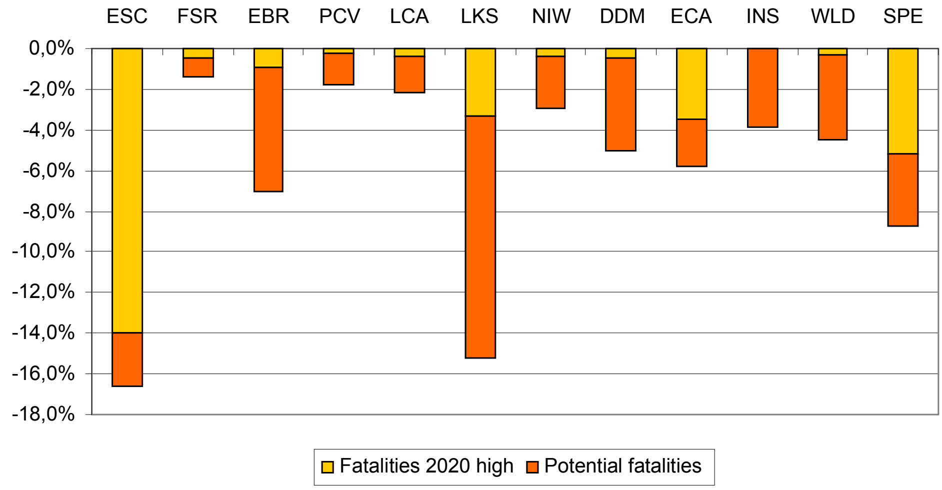

Figure 1: Percentage reduction in fatalities in the 2020 high scenario (yellow) and at 100% penetration rate (yellow and orange combined)

Highlights from the results:

All the IVSS investigated in eIMPACT show a great safety potential. Figure 1 shows the expected reduction in fatalities in the high penetration rate scenario in 2020, as well as the potential reduction if all vehicles and roads would be equipped. This figure shows that few systems are close to achieving their potential; most are not. As a benchmark, each percentage reduction in fatalities represents approximately 230 fatalities. In the case of ESC in the 2020 high scenario, 3,253 fatalities would be avoided at the penetration rate of about 75%.

Figure 1 also shows that no single system reduces the number of fatalities to zero at 100% penetration rate. In order to achieve the goal of "zero fatalities", it is not a matter of choosing either one system or the other. Rather, it is a combination of systems that will lead to the goal of zero fatalities.

Cost-Benefit Analysis

On the basis of the benefit-cost ratios (BCR), the clear majority of the IVSS investigated in eIMPACT is distinctly profitable form the society point of view.

For the year 2010, all systems already introduced – except Night Vision Warn which is close to 1 – are fairly above the BC-threshold of 1 which indicates the profitability of a system from the society point of view. *Electronic Stability Control* and *Lane Change Assistant* are the two systems which achieve BCR's of more than 3. In the year 2020 all twelve systems are available on the market. Again, the clear majority of the systems proves their profitability from the society point of view. The highest scoring system in terms of BCR is *Emergency Braking* which has a benefit-cost ratio of above 3. *Lane Change Assistant* and *Electronic Stability Control* have a BCR above 2 in all scenarios.

Hidenets: Highly dependable IP-based networks and services (by Björn Könning, CARMEQ – Christian Wewetzer, VW)

HIDENETS (www.hidenets.aau.dk) is a Specific Targeted Research Project (STREP) in the European 6th Framework Program, which runs for 3 years until the end of 2008. Its objective is to develop and analyse end-to-end resilience solutions for distributed applications and mobility-aware services in Car 2 Car Communication scenarios with infrastructure service support. Thereby, the HIDENETS solutions go beyond the classical notion of fault tolerance to be able to cope with system evolution and unanticipated conditions. Development and analysis of such resilient solutions requires a holistic approach combining aspects of communications, middleware, service deployment and access. Hence HIDENETS combines forces from automotive domain, engineering community, and from leading research teams on resilient distributed systems.

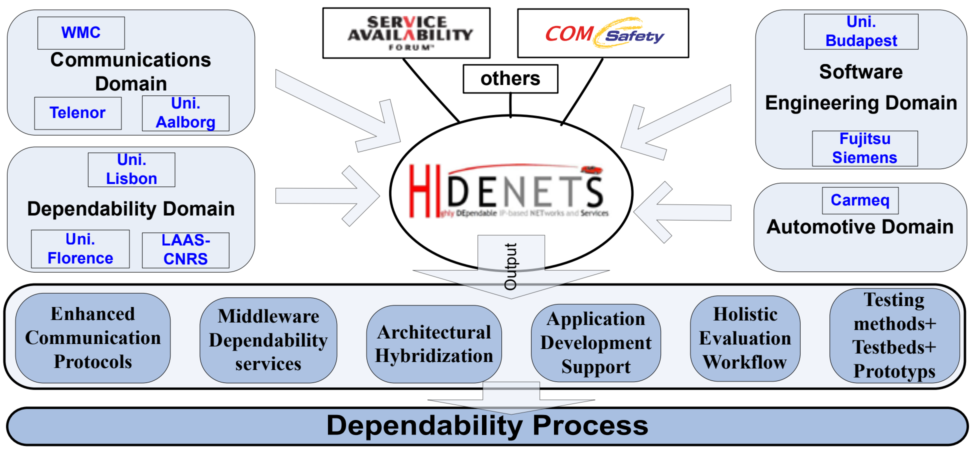

Figure 1: HIDENETS overview

HIDENETS develops appropriate fault-prevention and fault-tolerance mechanisms at the middleware and communication layers, as well as methodologies to support the design, development, evaluation, and testing of dependable solutions using such mechanisms.

The main HIDENETS outcomes are:

- **Middleware dependability services:** These functions enable fault-prevention and fault-tolerance for application programs. Functionalities include data replication and efficient access to distributed fault-tolerant storage, error detection and fault diagnosis, as well as recovery actions for different fault scenarios. Standardised interfaces from the SA-forum (see www.saforum.org) are utilised and extended to meet the additional requirements of the ad-hoc communication domain.
- **Enhanced communication protocols:** Resilient communication in HIDENETS is achieved via extensions of the Link and Network Layer functionality, including multiple radio/channel management, robust routing mechanisms, new reliable broadcasting schemes, and traffic differentiation.
- **Architectural hybridisation:** As critical functionalities should remain unaffected by the most frequent fault cases, HIDENETS employs architectural hybridisation, which separates these functionalities. Furthermore, stronger timeliness and security properties can be assured via this architectural split.
- **Holistic evaluation workflow:** HIDENETS develops a new holistic evaluation workflow/framework to quantitatively analyse the developed solutions, utilising analytic models, simulations and experimental approaches. This holistic evaluation is essential for the dependability analysis of comprehensive end-to-end systems.
- **Testbeds and prototypes:** HIDENETS solutions are implemented in testbeds. Assurance of timeliness properties and timely reactions has been demonstrated by prototypes in the context of a safety-critical platooning use case.
- **Application development support and testing methodologies:** From HIDENETS perspective, providing development support for its applications is a necessity, as dependability arises mainly from stage of development.

HIDENETS solutions are capable to contribute to a user perception of trustworthiness of future wireless services, as this perception is strongly impacted by dependability aspects. Therefore, the HIDENETS solutions are essential for the deployment of future business-critical applications. Under further investigations, in accord with C2C-CC, these solutions will run into C2C-CC standardisation.

See www.hidenets.aau.dk for more details.

An overview of the SAFESPOT integrated project

(by Roberto Brignolo, Centro Ricerche FIAT)

SAFESPOT is an integrated project aimed at improving road safety adopting cooperative systems based on V2V and V2I communications. The project was promoted by EUCAR, started in Feb 2006, will end on January 2010 and has an overall budget of about 38 Million of Euros (20.5 of which funded by the European Commission).
The main technical objectives of SAFESPOT are the following:

- To develop or improve and assess the key enabling technologies:
  - Communication through ad-hoc dynamic networks whose nodes are vehicles and road side units.
  - An accurate relative positioning
  - Local dynamic maps.
  - Wireless sensor networks to be used at infrastructure level.
- To develop the Safety Margin Assistant, that is an integrated application framework using the safety-related information provided by the network properly fused with the on board sensor and able to advise or warn the driver.
- To define in commonality with other EC projects an open, flexible and modular architecture for cooperative systems.

Moreover a dedicated Subproject (BLADE) is dealing with legal , business and deployment organizational aspects.

The basic concept of SAFESPOT is the extension of the driver awareness through communication.
Typical scenarios are reported in fig. 1. Some vehicles are equipped with the SAFESPOT devices and some have enhanced sensing capabilities (e.g.

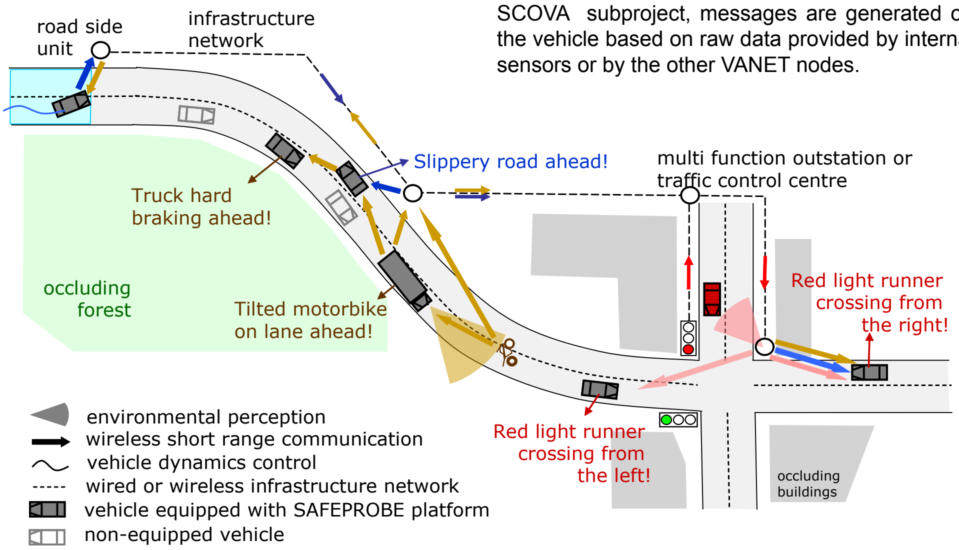

Figure 1: Typical SAFESPOT scenarios

a radar). The equipped vehicles are communicating among themselves and with the Infrastructure nodes (Road Side Units -RSU).

The RSUs may operates as a repeater or, having on board intelligence, may manage infrastructure sensors and run complex applications (e.g.intersection management).
In the figure the role of RSU is to extend and store the information. The figure reports different situations (sliding road, tilted motorbike, Red light runner) and the corresponding data flow.
Fig. 2 shows the internal architecture of a SAFEPSOT node with the main blocks.

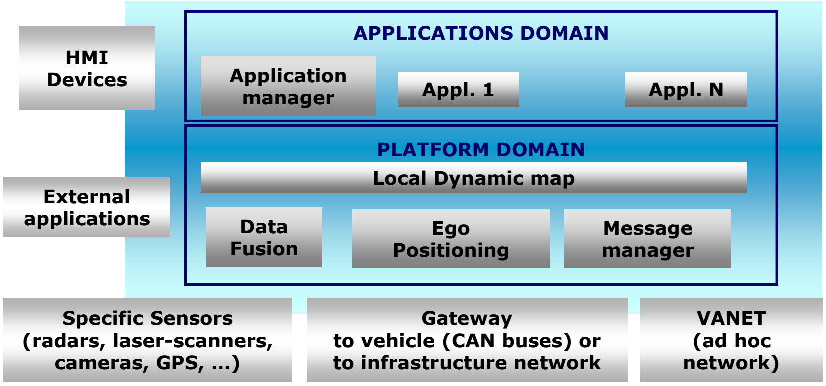

Figure 2: The SAFESPOT architecture

It should be underlined that the logical architecture is the same for vehicle and RSU.The platform domain is the core of the SAFESPOT system. It contains the Local dynamic map (LDM), a multilayered data base containing all the relevant information (Static and dynamic) in the surrounding of the node.
The other two key blocks are the Application Manager and the Message Manager which manage respectively the applications which define the warnings and the application content to be sent on the Vehicle ad hoc network (VANET). VANET is based on 802.11p and support multi-hop geo-broadcasting. The final protocol is a main topic of discussion of C2C-CC, an ETSI working group and the COMeSAFETY architecture Task Force. SAFESPOT is contributing to all these working groups.
SAFESPOT applications are classified as V2V or V2I depending on where the warning strategy is implemented. In V2V applications, developed by the SCOVA subproject, messages are generated on the vehicle based on raw data provided by internal sensors or by the other VANET nodes.

In V2I application, developed by the COSSIB subproject, the warning is defined by the infrastructure nodes and then sent to the vehicles which are running a common client able to interpret and display the message on the vehicle HMI.
The project entered the third year of activity. In the first two years requirements, specifications, technological choices and system architecture were defined. As well the implementation of demonstrators started. The technological development is planned to finish in 2008 and applications will be ready in the first quarter 2009.
Then the test site activities, carried over in six countries (France, Germany, Italy, Netherland, Spain and Sweden), are expected to validate and evaluate the system.
In the BLADE subproject a number of deliverable were produced including a preliminary organizational architecture and business model, risk analysis and mitigation strategies, analysis of legal aspects. In the remaining period the analysis will be assessed and a complete cost/benefit analysis will be made.
More information about SAFESPOT may be found on the project web site www.safespot-eu.org where it is possible to download the public deliverables.

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