SAFESPOT INTEGRATED PROJECT - IST-4-026963-IP

DELIVERABLE

SP8 – HOLA – Horizontal Activities

SAFESPOT Interaction Plan

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EXECUTIVE SUMMARY

The complexity of an integrated project (IP) such as SAFESPOT requires the definition of a proper strategy that regulates the key interactions both within the project and with the external world. The SAFESPOT consortium consists of 51 partners and is structured into eight interconnected sub-projects. It is also part of the wide-ranging e-safety programme supported by the European Commission and therefore has close relations with a large number of other European projects.

Specifically, plans for the following interactions are presented in this document:

- Interactions between the IP management and Core Group with the European Commission for a continuous update of the project status and an early identification of potential problems.
- Interactions among the SAFESPOT Subprojects (SPs) with the aim of developing effective cooperation between the interconnected project activities.
- Interactions between SAFESPOT and all related projects regarding Cooperative Systems currently running at national and at European level.
- Interactions with the projects which are part of the EUCAR Integrated Safety Programme.
- Interactions with all other related projects concerned with road safety and/or the application of Information and Communications Technologies (ICT) to Transport.

This report concerns tasks 8.4.1 (Sub-projects Integration activities) and 8.4.2 (Clustering activities). The purpose of the document is to describe the tools and the methods planned to ensure the effective liaison and coordination of the different activities in the framework of the SAFESPOT IP.

The preliminary version of the Interaction Plan is submitted to the European Commission as planned in the Technical Annex. It should be noted that this document is to be considered a working document that will be constantly updated throughout the project in relation to the details of the different interaction activities.

1. Introduction

1.1. SAFESPOT General Objectives

As described in the SAFESPOT Technical Annex, the SAFESPOT Integrated Project investigates how intelligent vehicles and intelligent roads can cooperate to produce a breakthrough for road safety. The aim is to develop prototype systems which will make it possible to prevent road accidents by developing a "Safety Margin Assistant" that detects in advance potentially dangerous situations and extends "in space and time" drivers' awareness of the surrounding environment.

The Safety Margin Assistant will be an Intelligent Cooperative System based on Vehicle to Vehicle (V2V) and Vehicle to Infrastructure (V2I) communication

1.2. SAFESPOT Workplan

The integration of the cooperative systems for innovating the in-vehicle safety related application represents a complex issue and requires a huge number of research activities.

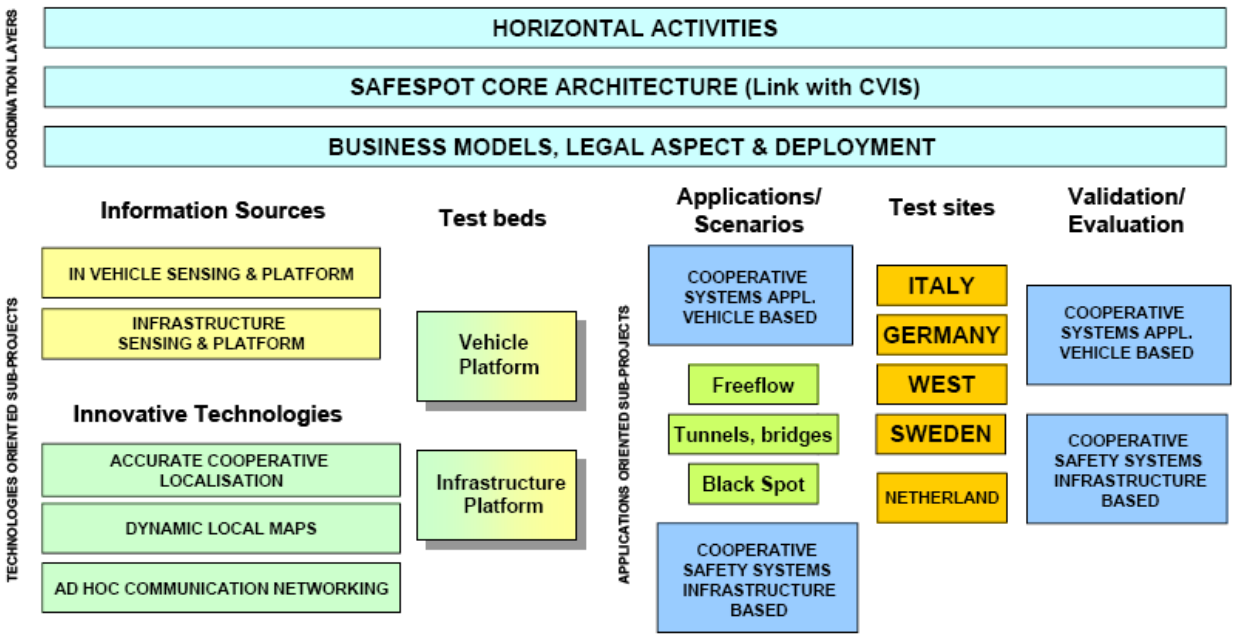

Figure 1: SAFESPOT activity approach

The integration of the cooperative system needs to be done in a context which considers the entire core system architecture characterised by the in-vehicle platform and the roadside infrastructure. Some of the components belonging to the architecture will require a specific study and in particular those related to the innovative technologies; SAFESPOT focuses on the accurate relative vehicle positioning, on dynamic local digital maps and on “ad hoc” communication network. The studies and the implementation activities are performed on the platforms and innovative technologies need to be tested and validated through test beds which will be developed specifically by SAFESPOT, or, if already available from other initiative, adapted for implementing the specification of this integrated project. The test beds will allow the technical evaluation of single components and prepare the base for the integration of the system architecture based on the cooperative systems. The system architecture needs to be validated on real test site through application based on V2V or V2I communication system.

SAFESPOT has also foreseen demonstration activities of the different application will be developed within the project. Test demonstration will allow the customer and the consortium to disseminate the results of the project. The integrated project will be also aware of the deployment of the project results by the different actors involved from car makers to road operator, of the legal aspect related for instance to the applicability of the wireless technologies used by the cooperative systems and of the business model could be applied for a large scale application of the systems. The approach used for the project development is mainly based on the integration of the existing system and technologies trying to innovate the actual application related to the driver safety.

The overall structure of the SAFESPOT subprojects is the following:

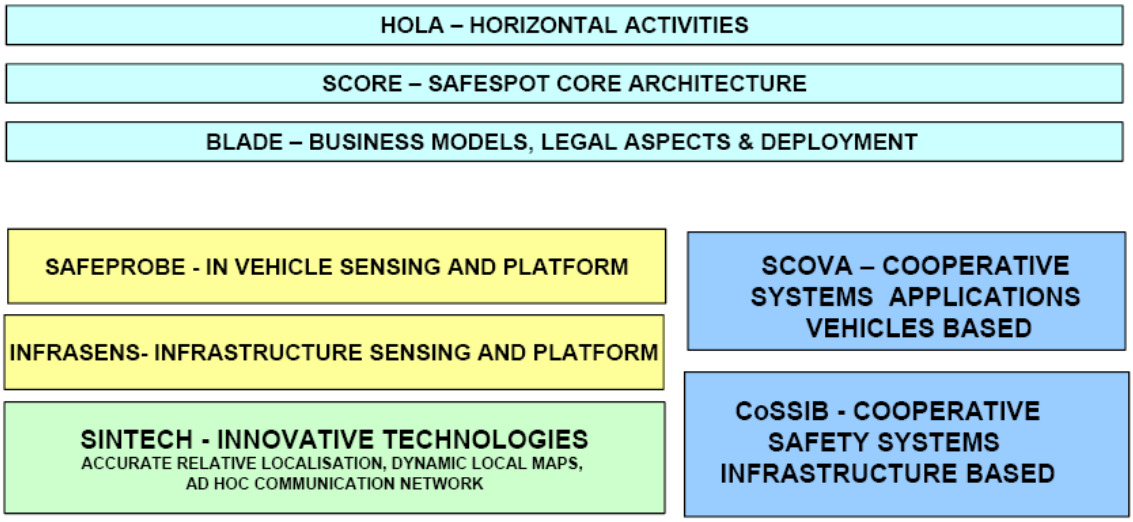

Figure 2: SAFESPOT Sub-project structure

1.3. Integration activities within SAFESPOT

The SAFESPOT project as shown above is strongly interdisciplinary by nature, and has partners with widely different backgrounds and competencies. The Interaction Plan describes the approach proposed for implementing the activities whose purpose is to create a common understanding and integrated work across the different interrelated SPs. The key purpose of the Interaction Plan is to ensure that all activities in the project are aimed towards the same general goal; a further objective is to optimise the efficiency of the work by avoiding duplication and exploiting synergies in different activities. Another goal is to reach consensus on key concepts and to continuously update the European Commission on project status.

The necessary interactions within the SAFESPOT IP will be facilitated in a number of ways including mechanisms which will provide for:

- overall supervision and monitoring (to provide a high level strategic view)
- improved awareness of developments in other areas of the project
- setting up of ad hoc groups to work collaboratively in specific areas
- Good practice (ways of promoting regular exchange of information).

The types of activity which are foreseen include:

1. IP-level technical coordination: the main objective of this work is to keep track of the scientific and technical progress in the project and identify potential synergies, conflicts and opportunities for potential interaction.

2. Active participation of SP leaders in meetings of other SPs: while the role of the IP-level technical coordination is a supervisory one, there is also a need for ways of improving the awareness of activities in other areas of the project as a basis for concrete interaction to be implemented.

3. Creation of Work Groups/Task Forces

4. Recommended practice: this includes the promotion for example of the use of instruments such as the shared ‘Work Space’ which all partners access to deliverables and working documents

1.4. Clustering activities

The Integrated (IP) and Specific Targeted Research (STREP) Projects under the leadership and strong involvement of the EUCAR (the European association for collaborative automotive research) members have been organized into three Programs; “Fuels and Powertrain”, “Manufacturing and Materials” and “Integrated Safety”. The SAFESPOT IP belongs to the Integrated Safety Program (ISP), which so far consisted of the following projects: PReVENT AIDE, GST APROSYS, EASIS, SAFESPOT, WATCH-OVER, TRACE.

SAFESPOT joined the Integrated Safety Programme (ISP) task force that has been formed with the general goal to create a common understanding of the role of each project and relations among them within the integrated safety framework. During 2005, the task force has met regularly at common events such as the general ISP meeting (January), AIDE User Forum (March), the PReVENT General Assembly (May), the IST Europe Congress June), and the EASIS Open Workshop (July). A common work space has been established in Projectplace, an internet based project management platform.

The task force currently focuses mainly on the definition of a common use case and on the agreement on a high-level architecture. The common use case will be described with the purpose to show how the technologies developed by the Integrated Safety Program projects can be integrated in future vehicles to solve real problems. To date, a draft story has been produced, which is currently being revised in the task force. The high-level architecture will provide a functional component view of a future integrated safety system, identifying its main components and their mutual relations. The main purpose of this is to ensure general compatibility between the technologies developed in the different projects.

The long term objective of the interactions implemented between the ISP projects is to establish a general consensus and compatibility of technologies already during the research phase. To this end, a task force, consisting of representatives from the projects' coordination and core groups plus experts on the relevant topics (mainly architecture), has been formed in order to further harmonize the projects on a more technical level.

In this report the activities of the ISP task force and the detailed interactions between SAFESPOT and the other ISP projects will be described.

2. Interaction the IP management and the Core Group with the European Commission

2.1. Topics & Needs

The management of a complex project like SAFESPOT that includes 51 partners and is structured in eight sub-projects, needs a continuous support from the European Commission to anticipate and to resolve critical situations. To this aim, a continuous update of the project status and activities is planned. This supervisory process involves the IP project coordinator, the SP leaders and the Core Group requiring various formal and informal activities.

2.2. Means for realising the interaction

The IP coordinator, in agreement with the Core Group and with the SAFESPOT project officers, establishes periodic phone conference among the project officers, the IP coordinator and the SP leaders or members of the Core Group.

Whenever possible, short meetings are held. Periodicity should not exceed 1-2 months and all meetings (either physical or conference calls) are to be considered informal. This type of interaction has already been put in opera in the AIDE Integrated Project and it is fruitfully working.

3. Interactions between Sub-projects

3.1. Topics and needs

The need for interaction among sub-projects has been identified and planned since the early project proposal preparation phase. It is a fact, already proven by previous experience in other integrated projects of this kind that a very strong commitment is required among the different and interrelated activities to guarantee that coherent results are achieved while making best use of the resources. The SAFESPOT project itself has been conceived as a "one structure project" as shown in the following figure:

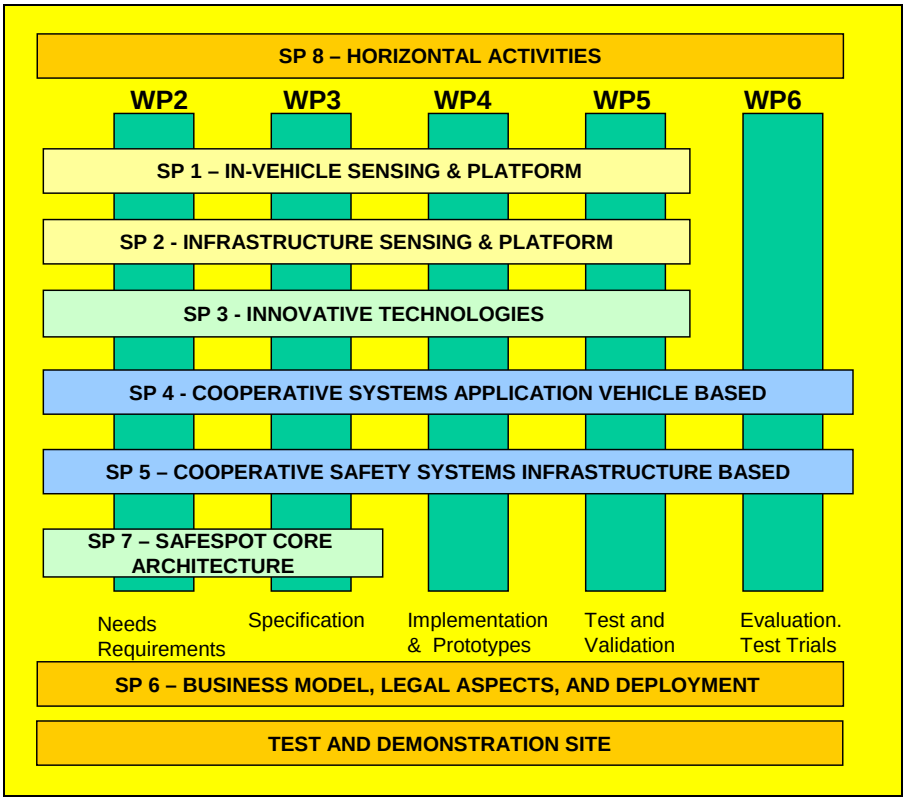

Figure 3: The SAFESPOT project structure

Figure 2 clearly shows how all sub-projects are transversal to the core activities, namely the SAFESPOT IP workpackages:

- Needs and Requirements
- Specification

- Implementation and prototypes
- Test and Validation
- Evaluation and test trials

Needs and requirements

This work package takes in charge the collection of needs and requirements related to the specific topic that are addressed by each sub-project. In particular this work package requires the knowledge of the application to collect the appropriate needs and translate the needs in requirements.

For the needs and requirements activities the intra-SPs working team is composed by the respective Workpackage leader and major contributors as follows:

SP1 – SAFEPROBE (BOSCH, CRF, VOLVO, ICCS)

SP2 – INFRASENS (MIZAR, HIT, CRF)

SP3 – SINTECH (DC, MIRA)

SP4 – SCOVA (CRF,VOLVO)

SP5 – COSSIB (COFIROUTE)

SP7 – SCORE (CRF)

Specification

Starting from the requirements the aim of this work package is represented by the definition of the specification related to the topics that are addressed by each sub-project. The specification of the architecture components, in terms of algorithm, protocol, software or application will anticipate the implementation phase. A picture of the SAFESPOT architecture and of the contribution of the different SPs to create is presented hereafter:

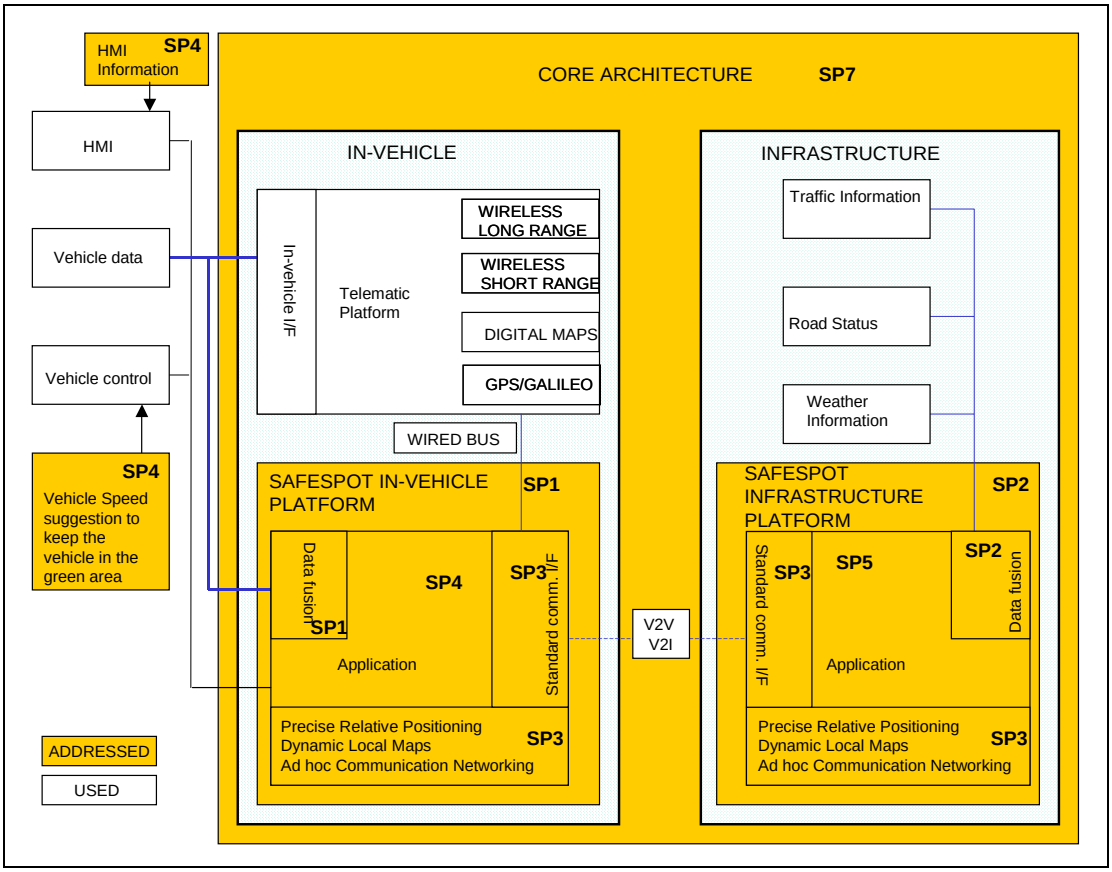

Figure 4: the SAFESPOT overall architecture

For the specification activities the intra-SPs working team is composed by the respective Workpackage leader and major contributors as follows:

SP1 – SAFEPROBE (BOSCH)

SP2 – INFRASENS (MIZAR, VTT)

SP3 – SINTECH (DC, TUC)

SP4 – SCOVA (CRF, VOLVO, CONTINENTAL THEVES)

SP5 – COSSIB (COFIROUTE, SODIT)

SP7 – SCORE (RENAULT, MIZAR)

Implementation and prototypes

This work package allows the implementation of the system and of the different applications based on cooperative systems. The implementation and prototyping of the architecture system components and functions concerns the platform and the innovative technologies.

For the implementation and prototyping activities the intra-SPs working team is composed by the respective Workpackage leader and major contributors as follows:

SP1 – SAFEPROBE (BOSCH, VOLVO)

SP2 – INFRASENS (MIZAR)

SP3 – SINTECH (DC, TELE ATLAS)

SP4 – SCOVA (CRF, VOLVO)

SP5 – COSSIB (DIBE)

SP7 – SCORE (RENAULT)

Test and validation

Test and validation activities are concerned to the platforms and to the innovative technologies. This will be performed on the test bed that will be realised ad hoc for the integrated project. The aim of this workpackage is to prepare the basic architecture components that will be adopted for the realisation of the application.

For the test and validation activities the intra-SPs working team is composed by the respective Workpackage leader and major contributors as follows:

SP1 – SAFEPROBE (BOSCH, ICCS)

SP2 – INFRASENS (MIZAR, LCPC)

SP3 – SINTECH (DC, CRF)

SP4 – SCOVA (CRF, VOLVO, USTUTT)

SP5 – COSSIB (COFIROUTE, TNO)

Evaluation test trials

The applications will be tested on the real scenario represented by the different test sites. The evaluation will be done on specific functionalities and scenario of the application on the basis of an evaluation methodology. Expert and subjects will be involved for evaluating the different application on the different test sites.

For the evaluation test trials activities the intra-SPs working team is composed by the respective Workpackage leader and major contributors as follows:

SP4 – SCOVA (CRF, TNO)

SP5 – COSSIB (COFIROUTE, TUM)

The activities will be harmonised in direct cooperation with the Test Site leaders:

Italy (ANAS), Sweden (Volvo), the Netherlands (TNO), Germany (SIEMENS), France-Spain (COFIROUTE), the leader of all Test Sites is CRF.

3.2. Means for realising SP interactions

The interactions within the SAFESPOT IP will be facilitated by a number of means:

- **IP-level technical coordination**: The main objective of this work is to keep track of the scientific and technical progress in the project and identify potential synergies, conflicts and potential interaction points. In concrete terms, this includes, for example, reading all project deliverables, participating to key SP meetings and following up the present interaction plan.
- **Active participation of SP representatives to meetings of other SP**s: While the role of the IP-level technical coordination is a supervisory one (i.e. identifying the general needs and opportunities for interactions and monitoring of the actual interactions), the concrete interactions must be implemented directly between the SPs. Thus, the active participation of SP representatives in the working meetings of other SPs is a key means for establishing efficient SP interactions. This tool has been used already from the first year of the project.
- **Bilateral meetings** between SPs for specific working issues that come up during the lifetime of the sub-projects. This tool is being widely used from the first year of the project. An example is the “data exchange” meeting between SP1 and SP2, where the attendees discussed the definition of messages – content, timing … - to be exchanged between the on-board and the infrastructure platform. Representatives of SP3 attended the meeting as well. This has led to the definition of concept of Core Data which must be described in certain given terms. It has also led to the production of a special paper which presents the concept of the Client Agent and defines more clearly the relationship between the platforms, the LDM and the Applications.
- Identification of the “SAFESPOT **networking matrix**” in which all items transversal to the IP (at Workpackage, at task, at deliverable level) are combined. The “SAFESPOT networking matrix has been identified in the previous paragraph, however this document has to be considered a working document that can be modified and further detailed at each project stage. Per each item, specific working teams are created, as indicated in the previous paragraph, that are regularly meeting in phone calls or physical meetings to design and carry on the activities in common.
- The **Harmonisation Meetings** are the key reference moments of assessment and integration of the common activities. The core activities of these groups are concrete working level on the different interaction points, concrete specification of the content and timing of the key interaction

points. The first Harmonisation Meeting on Needs and Requirements was held mid November 2006. These points are also identifiable, as indicated in Technical Annex, as follows:

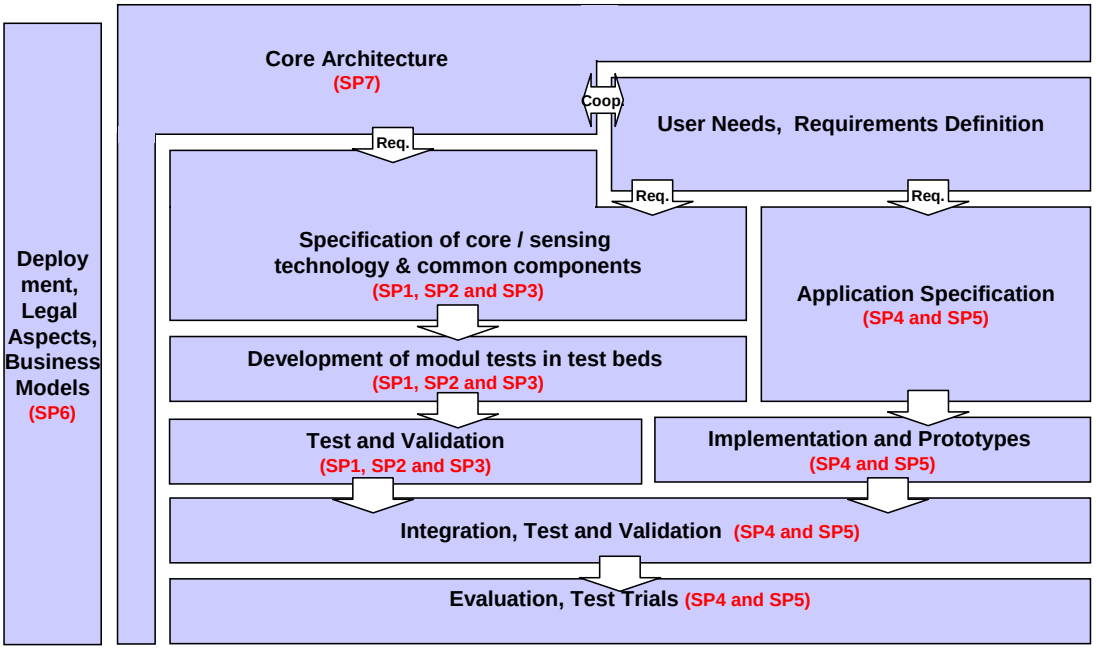

Figure 5: The SAFESPOT integration process

This picture shows the process used by the SAFESPOT integrated project for the development of the different project activities. Starting from the collection of the requirements and the specification of the core system architecture, the project continues with the development of the enabling technologies and the respective platforms. In SP5 and SP6 cooperative applications are being investigated, developed and tested in different test sites in Europe. CORE SP tracks the whole development chain so as to maintain a consistent and modular architecture according to the requirements and international standards.

The BLADE SP is responsible for creating the proper organizational architecture based on the specifications of the applications.

Each developed system will be technically evaluated through the test bed. In parallel starting from the requirements, the application based on the cooperative system will be specified and implemented. Both platform and application will be integrated for their evaluation and demonstration in a number of test sites. A parallel task will be followed by the activities devoted to the deployment of the project results, to the analysis of the legal aspects and to the development of the business model.

Additionally to the Harmonisation Meetings, a good way to promote interactions is through the organization of inter- SP workshops were the different partners

and especially WP leaders can assess the parallel and the interconnected developments in the different SPs and needs and requirements can be exchanged and discussed in details.

4. Interaction between Cooperative System projects (Clustering activities)

4.1. General clustering activities

As shown in Fig. 6, several projects in the Strategic Objective “eSafety” and in the 6th Framework Programme in general are addressing issues related to those carried out in the SAFESPOT project. For this reason the consortium and its representatives committed themselves to participate to clustering activities, aiming at exchanging information and exploiting potential synergies among these projects and developing a common interoperable architectural approach.

Already in the SAFESPOT integrated project negotiation phase, the Core Group defined the matrix of interactions with the other running related projects, indicating the SAFESPOT sub-projects that are directly connected to the other different projects. Additionally in the SAFESPOT Consortium Agreement a number of projects (indicated with a red box in figure 6) have been listed with the commitment that, under approval of the Core group, specific confidential material and documentation can be exchanged among different projects.

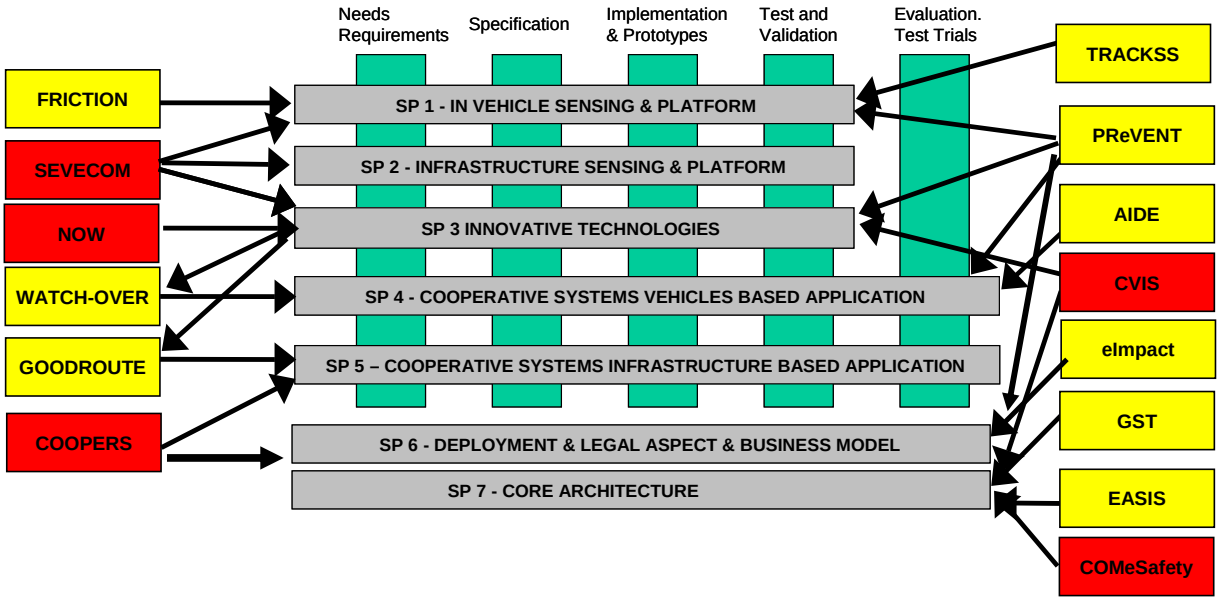

Figure 6– The SAFESPOT Matrix of cooperation with other related current projects (projects with which SAFESPOT has stipulated agreement to facilitate exchange of confidential material are indicated in red).

Interactions are planned in a number of layers which include:

- Exchange of requirements and specifications
- Harmonisation of use cases
- Harmonisation of architecture at least on high level
- Harmonisation of Glossaries
- Technical interactions of specific working items
- Common dissemination events and technical workshops

The major items of cooperation among the related projects and the different SAFESPOT sub-projects are as follows:

- **CVIS-SP3**: enabling technologies for relative positioning, local dynamic maps, ad hoc dynamic communication network for vehicle to vehicle and to infrastructure communication;
- **CVIS – SP6**: Responsibility mapping and risk analysis work shops;
- **CVIS-SP7**: communication architecture, SAFESPOT is committed to implement a local high speed ad hoc network as defined by C2C-CC. This network, based on the IEEE.802.11p protocol, will be shared by safety and mobility applications and is expected to be integrated with the CALM architecture. The integration in an overall architecture will enable also the use of different communication bearers for non safety-critical applications (e.g. DSRC, infrared, GSM, etc.).

- **COOPERS-SP5**: the applications infrastructure to vehicles that are expected to be developed in COOPERS and the SAFEPOT vehicle to infrastructure applications should be interoperable;
- **COOPERS - SP6**: Risk analysis and business models

- **NOW-SP3**: ad hoc dynamic communication network, the solutions developed in NOW and in SAFESPOT should be interoperable.

- **SAVECOM-SP3** the SEVECOM project is working on all different aspects of security related to communication technologies and this is a very important input to the development of the enabling technologies in SAFESPOT SP3.

- **COMeSafety-SP7** the COMeSafety specific support action has been designed at the Concertation meeting of July 06 as the project that is supporting the European Commission in the coordination of the task forces for the different Concertation activities;

- **AIDE-SP4** the AIDE project is developing an adaptive integrated HMI for advanced driver assistance systems and for Telematics, SAFESPOT will evaluate the extent to which the AIDE project outcomes are usable for cooperative systems;

- **PReVENT-SP1** the sensing technologies and the sensor data fusion framework (ProFusion functional framework) that are under development into the PReVENT project will be considered among the candidate technologies
- **PReVENT-SP4** the SAFESPOT cooperative applications will follow the clustering of PReVENT (e.g. lateral, longitudinal, intersection, etc.)
- **PReVENT/RESPONSE3 – SP6:** Deployment program

- **GST-SP7** SAFESPOT SP7 will evaluate in joint cooperation with the CVIS project the integrability of the GST open Telematics architecture with the architecture that is under definition for cooperative systems.

- **EASIS-SP7-SP1** The activities that the EASIS project is completing on the on vehicle architecture will be a supportive material to the activities of SP1 and SP7 both for the on vehicle platform and on the architecture for cooperative systems. The discussion will be held in the architecture group organised by EUCAR Integrated Safety Programme and at the architecture team defined at the Concertation Meeting of July 06.

- **WATCH-OVER-SP4** SP4 and WATCH-OVER are evaluating together the possibility to apply the sensor based application to one of the SP4 demonstrator so to be able to demonstrate the propagation of the information on vulnerable users also to other vehicles in the ad hoc network and to the infrastructure.

- **E-Impact-SP6** e-Impact is working on the development of a Socio-economic Impact Assessment of stand-alone and co-operative intelligent vehicle safety systems in Europe, the SP6 subproject will benefit from the e-Impact outcomes and the cooperation is guaranteed by the fact that e-Impact and SAFESPOT SP6 is coordinated by the same company (TNO).

- **TRACKSS-SP1-SP2** the sensing technologies under development in the TRACKSS project (for remote sensing, for road infrastructure and on board sensing) will be taken into account as potential sensor technologies to be demonstrated also in the SAFESPOT test sites, the possibility for a common demonstration will be discussed in the team for test sites defined already in the Concertation Meeting organised by the EC in July 06.

- **FRICTION-SP1** is developing an on board tyre-road friction, SAFESPOT SP1 team will discuss together with FRICTION team about the possibility to integrated the FRICTION sensor into the SP1 on vehicle platform.

- **GOODROUTE-SP5** is developing a system for dangerous goods monitoring, the two projects will evaluate together the interoperability of the solutions and the possibility to have common testing and

demonstrations, the latter will be discussed in the team for test sites defined in the Concertation Meeting of July 06.

The means of cooperation are already running at different levels:

Concertation activities (organised by the European Commission with the support of the COMeSafety specific support action)

The following table shows the action list for the follow-up of the Concertation Meeting held on 5-6 July 2006 in the area ICT for Transport, this list summarizes all actions decided during the Concertation meeting.

Area	Action needed	Deadline	For whom
Communication architecture	Continue co-ordination on communication architecture with other projects - inform COMeSafety on these efforts - inform your project officer on these efforts	Ongoing action	All projects
	First outline for the description of a common European communications architecture for co-operative systems	ASAP	COMeSafety
	Input to first outline	ASAP	All projects
	Stable draft of the description of a common European communications architecture for co-operative systems	London ITS congress 8 – 12 October	COMeSafety
	Communicate your ideas about the organisational model that could be used for the organisation "owning" and promoting the common architecture and your willingness to participate	End of August	All projects

Reference Standardisation	Nominate one person responsible within your project as a standards champion	End of August	All projects
	Provide a list of those partners involved in standardisation bodies, working groups etc.	End of August	All projects
Task force to build a Common simulator to test co-operative systems	Nominate persons interested to participate	End of July	All projects
	Find a leader for the simulation task force	ASAP	All projects
	Start working on a task list		All projects concerned
Task force on Field Tests	Nominate a contact person in your consortium	End of August	All projects concerned
	Send detailed table on field tests in order to facilitate the identification of possible synergies / sharing of facilities and structures,	End of August	All projects concerned
Task force on Communication technologies	Send corrections / additions concerning your project in the table of Francisco Ferreira	End of August	All projects concerned

As indicated in this table a number of task forces have been settled among the different project, the next Concertation meeting is going to be held at the end of November 06. These task forces are then expected to have specific meetings on the different topics with the overall aim of harmonising the activities and to create and put in opera all possible synergies in the design, development, integration and testing phases.

4.2. CVIS and SAFESPOT interaction

The closest level of interaction is foreseen with the CVIS IP. For the technological and architectural issues, requirements will be different as the two

projects address different type of applications, with different constraints. But a convergence work will be done for the requirement collection phase in order to ensure that all shared technologies or interfaces are developed commonly, taken into account that both CVIS and SAFESPOT results could be potentially merged to support all type of C2C and C2I applications. A common Milestone on month 7 has been identified to study and work out the convergence of the high level requirements. CVIS and SAFESPOT projects have a different approach to define the Core Architecture. This point of divergence has been identified, and following the joint effort on requirements, both will structure the architecture so that SAFESPOT and CVIS platforms could be potentially integrated.

This joint effort should lead to the definition of an interface, compatible with both architectures. A common milestone on month 17 has been identified to study and work out the convergence of the core architectures Those 2 common milestones will help to structure the co-operation in time. But in order to detail the process for technological co-operation – to share expertise, to share technological innovative components such as 802.11p chipset, to agree on a common interface for integration…, 3 coordination groups have been identified:

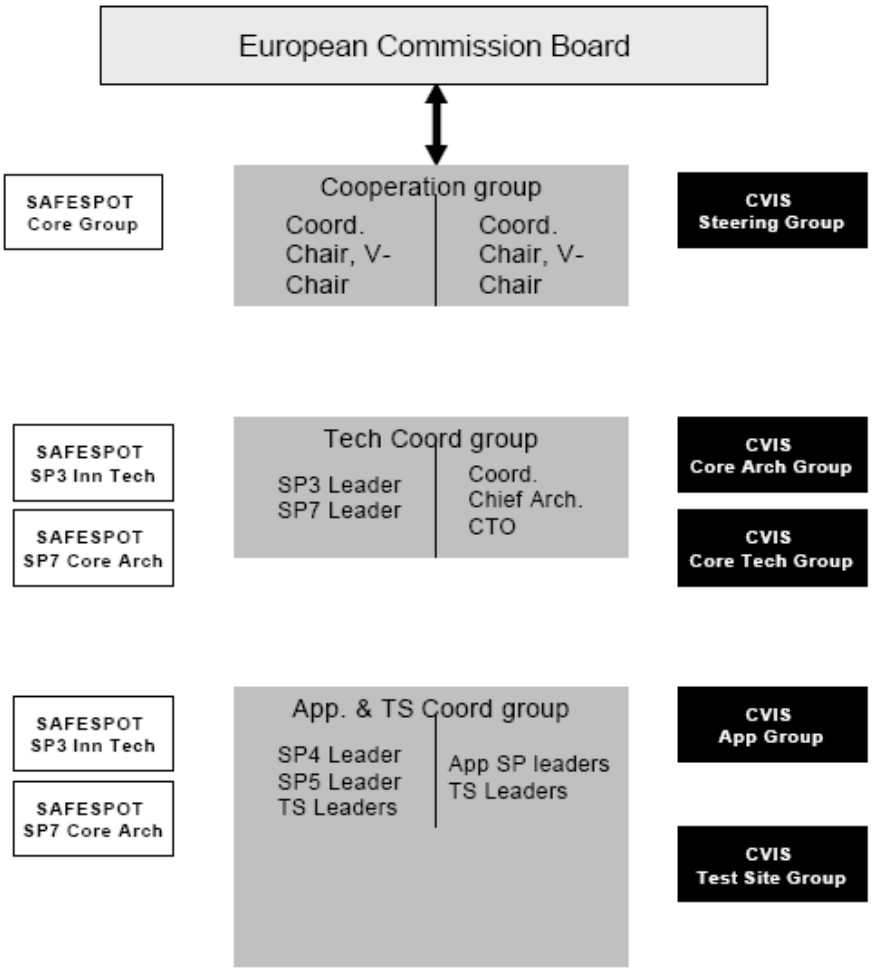

Figure 7: Cooperation between CVIS and SAFESPOT

The Technical Co-ordination group will define the detailed methodology to establish a reliable and efficient technical co-operation between the two projects. This group will identify the experts on both sides and establish co-operation group, with detailed objectives in a given timeframe. The Application and Test Site Coordination group will define the detailed methodology to improve the efficiency of Test Sites through the CVIS – SAFESPOT co-operation, and will work out the coherence and the complementarities of the applications.

5. References

SAFESPOT Annex of Work