SAFER
VEHICLE AND TRAFFIC SAFETY CENTRE AT CHALMERS

Annual report to Shareholders

Operative Year #4

April 1st, 2009 – March 31st 2010

Shareholders meeting 2009

SAFER
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Annual Report year 4

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EXECUTIVE SUMMARY

The SAFER agreement is signed 060401. SAFER was inaugurated on June 7th 2006 and started to materialize in September that year. The first Stage covered three years and ended 090331. SAFER had its first international evaluation in December 2008.

High-lights from year 4

- A new revised agreement for stage 2 was signed at the Shareholders meeting 2009
- The board dedicated the strategy meeting in August 2009 to the evaluation of Stage 1 and the outlines for Stage 2. A SWOT analysis was made and priorities for the coming years were decided.
- Chalmers was granted strategic research funding for Traffic safety and SAFER is part of the Chalmers area of advance Transport. Close to 40 senior researchers at Chalmers are engaged.
- Several new projects have been started in all four reference groups and the project portfolio is growing. In total 52 projects are on-going, of which 9 are funded by EU 7 FP. SAFER is participating as JRU SAFER in five EU projects. The national project SEVS – Safe Electric novel hybrid VehicleS – is done in collaboration with SHC Swedish Hybrid Centre. It explores research issues for vehicles beyond 2030. Projects in the area of Driving studies (SeMiFOT 1&2, Dreami etc) are attracting great international interest.
- A conference on Driver Distraction and Inattention was held in September 2009 with high international participation. This was in collaboration with INRETS, France. The response was enthusiastic and a new conference is planned for 2011
- SAFER is planning to move into a new office in August 2010 with higher functionality for open innovation and collaboration with the different activities in Lindholmen Science Park.
- The global link strategy project has been completed. The strategy is decided and new collaborations with Japan, France (MOVEO) and US are some of the results. A MoU has also been signed with the institute TRIPP in New Delhi.
- SAFER is active in EARPA and have several collaborative ideas for the up-coming calls in the 7th FP in EU.
- Several international researcher has visited and six of these spent longer research time at SAFER
- Three new competence areas have been added and the roles of competence area leader have been formalized.
- Chalmers has been selected preferred academic partner for Volvo regarding traffic safety
- An enhanced educational program “SAFER Insight” is being developed.
- Two dissertations and seven licentiate thesis have been completed

1. LONG-TERM VISION, MISSION AND STRATEGY

Vision

SAFER provides **excellent multi-disciplinary** research and **collaboration** to eliminate fatalities and serious injuries, making Swedish **society, academy and industry** a **world leader** in vehicle and traffic safety.

Mission

- Run collaborative research projects with excellent academic publications and high relevance to society and industry. Explore new research areas through pre-studies and participation in international networks.
- Combine the multi-disciplinary scientific competence available within SAFER to enhance scientific excellence as well as innovation capability
- Serve as an open innovation centre for partners and international researchers and provide the prerequisites for creative and productive research collaboration
- Develop world-class competence, including research tools and methods, in SAFER focus areas
- Inspire students, researchers and product developers to be devoted to the area of traffic safety.
- Disseminate results and knowledge to society.

Strategy

To reach the vision and become a well renowned international centre of excellence SAFER has to deliver results, build competence and create strong networks in selected areas.
The strategy is built on the pillars Excellent **competence**, **Multi-disciplinary research** and **Collaboration.** The strategic plan is to build long-term competence in defined Competence Areas necessary to achieve outstanding research and innovation in chosen Focus Areas. The Focus Areas together form a framework for project content and for development of competences and collaborations.

Presently the six Focus Areas are:

- **Incidents and accidents – priorities and effect analysis**
- **Driver state/action/reaction**
- **Prediction for accident prevention**

- **Methods for evaluation of safety systems**
- **(Safety for) Novel Electric Vehicles and Vehicle Combinations**
- **Human Models and Biomechanics**

The strategy also includes a common **work environment**, **seminars** and work **methods**, and a **uniting name** – SAFER. Multi-disciplinary research and collaboration is supported by the SAFER environment where researchers and project members can meet and work side by side. This is to create an atmosphere of true collaborative research and an ongoing dialogue involving many different actors within the safety area.

Values

SAFER is guided by its vision, strategy and values. The essence and ultimate purpose of SAFER is to create a setting where "World class expertise in traffic safety collaborates to save lives". The hallmark for SAFER should be values to support that. The atmosphere should express: Open minds, respect for each other, cooperative spirit, high aspirations, curiosity and joy.

Financing

According to the partner agreement for Stage 2, running from 090401 to 120331, SAFER has a funding for Stage 2 of KSEK 92 255. Vinnova is providing cash KSEK 30 000, Chalmers is responsible for KSEK 3000 in cash and the rest in-kind. All other partners' undertakings are in-kind. The follow-up is done through a so called "sign-off" procedure twice a year. SAFER is forecasting the total economy for stage 1+ Stage 2 at each board meeting. It is important to follow the economy from the start of SAFER as projects run over several years and the resources are booked as soon as a decision is taken.

Chalmers was granted strategic research funding for Traffic Safety. The amount of this grant is well in the order of Chalmers in-kind undertaking in SAFER and the research grants will play an important role for the development towards a world class research centre.

As SAFER grows the common costs are also growing and are now close to 50%. The ability to attract external funding for projects is increasingly important. The total yearly project portfolio is shown in picture 4.

2. ORGANISATION AND MANAGEMENT OF THE CENTRE

Partners and Shareholders meeting

All the partners from Stage 1 have continued with the renewed agreement for Stage 2. The partners are:
AB Volvo, Autoliv, Chalmers, Epsilon, Folksam, Imego, Lindholmen Science Park, Region Västra Götaland, Saab Automobile, Saab Microwave Systems, Scandinavian Automotive Suppliers, Scania, Swerea/Sicomp, SP Technical Research Institute of Sweden, Swedish Road Administration, Telia Sonera, University of Gothenburg, VINNOVA, Volvo Car Corporation, VTI Swedish National Road and Transport Research Institute, Viktoria Institute and TÖI – the Norwegian Institute of Transport Economics.

All partners hold a place in the Shareholders meeting. In 2009 the meeting took place at Lindholmen Science Park on April 21st. In the morning eight SAFER projects were presented in an open seminar. The Shareholders meeting discussed the results of the first Stage and expressed satisfaction with the achievements so far, agreed on the renewed agreement, including some changes and amendments, and elected the new board for Stage 2.

Board

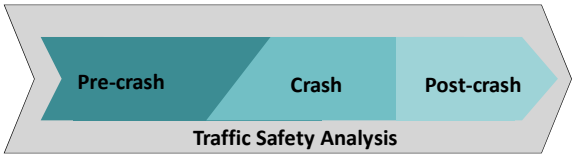
The board of SAFER consists of nine members: Jan Olsson Autoliv (Chairman), Hans Nyth, Volvo Cars, Per Lenhoff, Saab Automobile, Karin Svensson, AB Volvo, Pontus Matstoms, VTI Swedish National Road and Transport Research Institute, Claes Tingvall, Swedish Road administration and Anna Dubois, Per Lövsund and Jan Smith, Chalmers.

There has been 8 board meetings during the fourth year whereof two prior to the Shareholders meeting in April 2009.

Reference groups

The research at SAFER is conducted in four research programmes, each led by a research coordinator. Projects are initiated, discussed and recommended to the Board by reference groups for each programme. These groups include representatives from all SAFER partners and are the base for establishing world class competitive project portfolios. Each programme is host to a mix of projects: previously established by other parties, newly established and pre-studies for future projects.

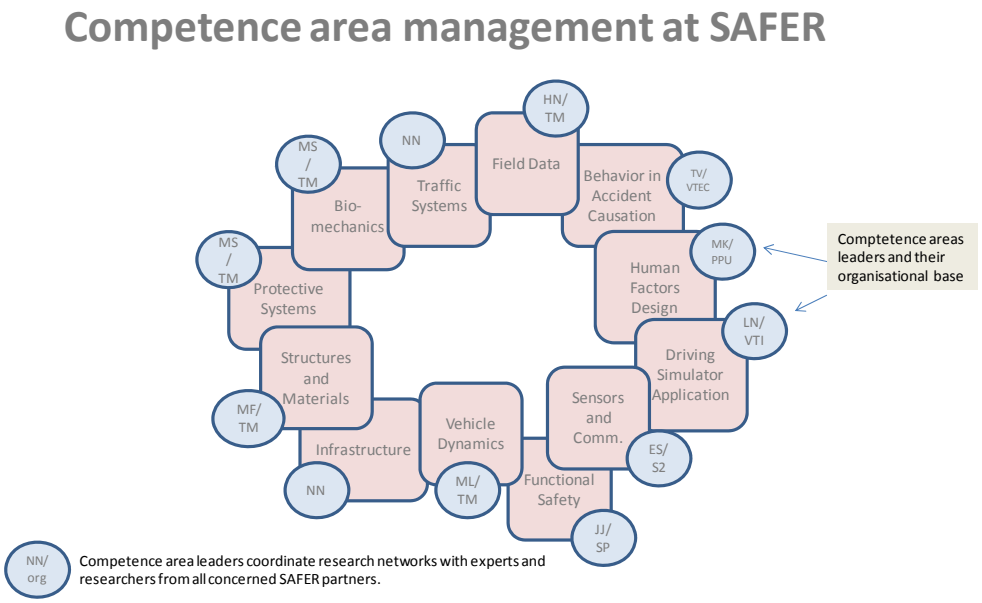
The four research programmes are: Pre-Crash which handles projects on accident avoidance, Crash handles projects concerning injury prevention, Post-Crash handles projects on mitigating consequences and Traffic Safety Analysis concerns projects aiming at understanding traffic and the causation and dynamics of accidents and injury occurrence.



Pic 1. The four research programmes

Competence areas

The competence areas have been strengthened during this year. In connection with Chalmers application for strategic research grants an overview of competences (existing and future needs) were made. This showed that twelve equal competence areas make up a suitable representation of traffic research. Thus SAFER moved from nine to twelve and the competence areas are: Field Data (Real Traffic), Behaviour in Accident Causation, Human Factors Design, Driving Simulator Application, Sensors and Communication, Functional Safety, Vehicle Dynamics, Infrastructure, Structures and Materials, Protective Systems, Biomechanics, and Traffic Systems.



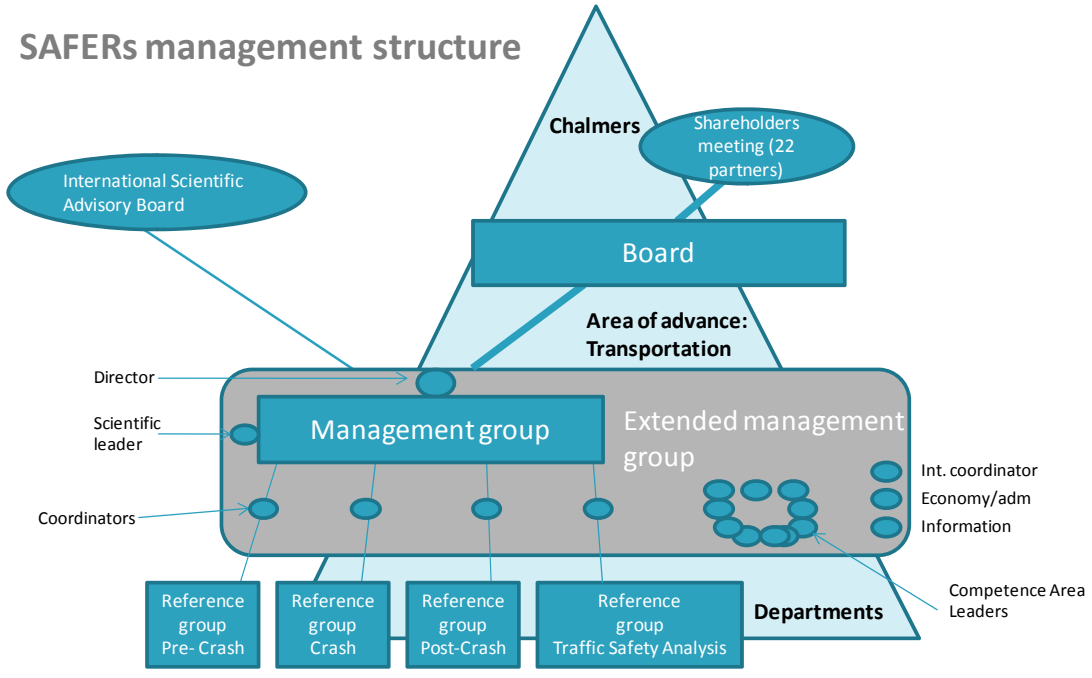
Pic 2. The twelve competence areas and their leaders

Each area is led by a competence area manager (CAL) who gathers key persons from SAFER partners with their main research interest in the competence area. . It is the responsibility of each competence area to know state-of-the art of global research and what's perceived as world-class research. Each should have a short and a long-term plan for competence development.

Resources for CAL work have been made available during the year.

Centre Director and Management group

SAFER has two management groups. The operative which consists of the Director and the Research Coordinators and the extended management group which also includes the Competence Area Leaders, the International coordinator, the Information officer and the Economy responsible. "Large project" leaders are also invited. Meetings for the operative group are held every other week and once a month for the extended. A scientific leader is responsible for the scientific board. The position is vacant.



Pic 3. The organisation of SAFER and relation to Chalmers

Chalmers is the host for SAFER and SAFER is the core of the research profile Traffic Safety within the Transport area of Advance at Chalmers (Styrkeområde Transport).

Scientific Advisory Board

The format for the scientific advisory board has been developed during the year by bench-marking other comparable centre set up. It is decided that the International Scientific Advisory Board (IAB) of SAFER is an advisory body to the SAFER Management and board. The IAB provides advice about the quality, relevance and organization of the research at SAFER in an international context. The advice concerns both the research carried out as well as future plans.

The IAB consists of leading independent scientists of high international reputation with complimentary expertise covering the SAFER research field. Initially the IAB will consist of 3 members. They will visit SAFER once a year. Prior to the visit all relevant information will be made available for review. During the visit there will be sufficient time to meet with PhD's and researchers from SAFER. IAB will compile a written report to be discussed with the SAFER management and board at the end of the visit.

The 3 IAB members will be invited after the Shareholders meeting in late May 2010 and a first Scientific board meeting is planned to be held in the autumn of 2010.

3. RESEARCH PROGRAMME

The research projects are placed in one of four project portfolios who together make up the research programme. The projects build the road maps for the six Focus Areas. Some projects fit into several Focus Areas and below are described how the project portfolios contribute to the goals for the Focus Areas.

Projects present at SAFER can be initiated at SAFER **or** be started by SAFER partners in another context and wish to be associated to the SAFER environment. SAFER initiated projects can be financed in several ways, by national /international funders or by SAFER and SAFER partners. Often there is a mixed financing, where SAFER finances a prestudy which evolves to a pre-project, partly SAFER financed, and eventually a full project with external financing.

SAFER keeps track of all projects and their progress and turn-over but takes the full project responsibility for projects with SAFER financing and for projects where SAFER is project manager towards an external funder. This is the case for instance when SAFER acts as JRU in EU programmes but also in several national projects. Projects, for which SAFER takes full responsibility, are named "own" while all other projects are named "associated". A list of all projects, own and associated, are continuously up-dated and presented to the SAFER board at each meeting.

Pre-Crash Safety

The main aim for pre-crash safety is to prevent accidents from happening. However, if an accident cannot be avoided, another aim for pre-crash safety is to mitigate the severity of the accident. Pre-crash safety covers traffic from normal driving, as well as driving with various risk situations up to the point when an accident may happen.

The Pre-Crash Safety Reference Group with its coordinator Adj. Prof. Dr. Yngve Håland has met 6 times during the year. A review and revision of four relevant focus areas have been done. These four Focus Areas are Driver State/Action/Reaction, Prediction for Accident Prevention, Methods for Evaluation of Vehicle and Traffic Safety, and Novel Electric Vehicles and Vehicle Combinations.

Driver state/action/reaction
Driver state/action/reaction content should cover permanent and temporary driver state (fitness for driving, risk taking, and risk compensation), reaction to and acceptance of warnings for pending dangerous situations, reaction to and acceptance of automatic interventions of safety systems, mathematical driver behavior models, and interaction with in-vehicle information systems and nomadic devices.

Prediction for accident prevention
Prediction for accident prevention should cover real-time wireless communication (V2V and V2I), sensing with signal/image processing and algorithms, functional safety of sensing, communication, and vehicle dynamics control systems, and vehicle dynamics during automatic intervention of crash avoidance safety systems.

Methods for evaluation of Vehicle and Traffic Safety
Methods for evaluation of vehicle and traffic safety should cover methods to be used in active safety test areas (e.g. ASTA), methods for driving simulators including human behavior simulation models, strategic pre-crash methods, methods for evaluation of various accident avoidance systems (vehicle as well as infra-structure based) in real traffic environments, and evaluation of in-vehicle information systems and nomadic devices.

Novel electric vehicles and vehicle combinations
Safety for novel electric vehicles and vehicle combinations (as far as pre-crash safety is concerned) should cover vehicle dynamics, and assessment tools (virtual testing).

The largest running SAFER projects in the pre-crash safety area are for the time being Systems for Roadway Departure Avoidance (3.5 MSEK), Analysis and Verification of Active Safety Functions (3.5 MSEK), System Safety through Combination of HMI and Dependable Systems (6.1 MSEK), Assessment of Integrated Vehicle Safety Systems for

Improved Vehicle Safety (ASSESS, an EU FP7 project) (4.1 MSEK from others), Scenario–Based Testing of Pre-Crash Systems (just finalized) (3.5 MSEK), Safety of an Aging Population (6.1 MSEK), Enhanced/Robust Stability Control (4.4 MSEK), Quantitative Driver Behavior Modeling for Active Safety Assessment (QUADRA) (2.4 MSEK + 20.5 MSEK from others)), and Physical Layer Techniques for Vehicle-to-Vehicle Communications (1.6 MSEK).

During the 4th operative year of SAFER new decided projects in the pre-crash safety area are Safety for an Aging Population (6.1 MSEK) (VCC, VTI, Chalmers), Quantitative Driver Behavior Modeling for Active Safety Assessment (QUADRA) (2.4 MSEK + 20.5 from others) (AB Volvo, VCC, VTI, Chalmers), Development of Targets for Rear-End Collision Tests (0.6 MSEK) (Autoliv, SP, VTI), and Functional Safety of Road Vehicles (0.5 MSEK) (SP, Viktoria Institute). A number of pre-studies (less than 0.1 MSEK each) have also been approved.

Crash Safety

The crash reference group coordinates the crash project portfolio and drives the research within the crash area. Crash safety aims at protection of people in traffic by minimizing injury risks when a crash occurs. Situations include drivers and passengers of all sizes and ages in passenger cars and heavy vehicles (trucks and busses) as well as vulnerable road users such as pedestrian and two-wheelers.

Thirteen partners are active within the Crash Safety Reference Group. During the year a total of 7 meetings were held, with its coordinator Adj. Prof. Dr. Lotta Jakobsson and secretary Dr. Stefan Thorn. A thorough review and revision of the focus areas were performed during the autumn. The focus areas mostly related to the crash area are Human Models and Biomechanics and Novel Electric Vehicles and Vehicle Combinations.

Human Models and Biomechanics
The focus area of Human Models and Biomechanics covers mechanical and mathematical occupant and pedestrian models, biomechanical responses and injury consequences as well as the protection principles including safety system usage.

Within the area of human modeling the objective is to build edge competence valuable to SAFER's partners by creating a strong network and a critical mass of researcher and PhD students. Thanks to the investments the previous year, SAFER now has a strong core group of activities in the area involving researchers in more than 5 projects, in a combination of EU and FFI sponsored projects and SAFER projects (Projects B7, B8 and B9) involving both academic and industrial PhD students. Several of these researchers have a common research tool, the adult THUMS human body model, investigating both

the human properties in low-g (such as pre-crash braking) and high-g situations both in passenger vehicles and trucks. The plan is to further strengthen the area by additional PhD students and projects also including more research in the area of child occupant modeling and for vulnerable road users, mainly pedestrians.

Within the area of Biomechanics, the overall aim is to guard and develop the world class reputation of SAFER researchers in the area of applied biomechanics and injury prevention. Extra high ambitions are stated within the area of whiplash research and child safety. Also, within thorax, shoulder and brain biomechanics the objective is to be an active part within a wider research community, developing a niche of fundamental research. The involvement in an EU project Thorax, the human body modeling projects (project B7) and a national brain project (project B11) are examples of this, with the ambition to further strengthen the areas. Within the area of pedestrian safety, the objective is to combine knowledge of human modeling, biomechanics, field data analysis, aiming at real world pedestrian safety knowledge. Some activities are ongoing; also an application is waiting for approval.

Within the project of Rear seat safety for small occupants (Project B5), additional funding from FFI enables the project to be expanded to an additional PhD student as a complement to the two industrial PhD students halfway through the project. This project is a good example of how joined efforts by four partners will help maintain Sweden and SAFER to be a main centre of excellence, contributing to external activities and setting the agenda in child safety and rear seat safety research. SAFER hosted the spring meeting 2009 of the ISO working group of Child Restraints and the project has direct connections to ISO activities as well as the ECE R44 update. The Rear seat safety for small occupants project (B5) hosted a visiting professor, Kristy Arbogast from Children's Hospital of Philadelphia, for a month during June 2009. This was followed by a one-day national seminar on Child Safety and a two-day project workshop in September together with six invited senior researchers from USA. During the year, regularly contacts have also been taken with research groups in Australia and USA regarding study set ups on naturalistic driving studies of rear seat occupants' behavior during driving.

Novel Electric Vehicles and Vehicle Combinations

The crash area focus of Novel Electric Vehicles and Vehicle Combination covers structural requirements (design guidelines) regarding crashworthiness (self and opponent protection) for new safety driven, lightweight designs, including protection of batteries / capacitors, development of design and assessment tools (mathematical models and virtual testing) and system design optimization for novel vehicles.

A first step towards the overall objective of creating strategies and develop edge competence for increased crashworthiness and safe vehicle dynamics by advance structures and novel propulsion and drivelines beyond 2030 is taken within the work of

SEVS (project B12). Within SEVS, scenarios, strategies and research topics are identified as well as taking steps in creating a multi-disciplinary collaborative research with Swedish Hybrid Centre (SHC) and possibly future European partners. SEVS will present the results of Phase 1 in June 2010.Applications for further project within the area are being prepared aiming at the overall goal of creating a critical mass of researchers and PhD students in the area of safe novel electric vehicles.

Post-Crash Safety

Postcrash aims at reducing the consequences of accidents and the main effort in the reference group has been towards issues concerning information from the accident scene and how this can adequately support the rescue management. A common opinion in Post-crash research is that the response and rescue time is of great importance and the Post-Crash reference group has decided to limit the scope to the immediate actions during the so called Golden Hour. This encompasses research on alarming (i.e. e-call), organization of response, rescue and extrication methods and the availability of vehicle and occupant information.

Eight partners are active within the Post-Crash Reference Group. During the year a total of 5 meetings were held, led by acting coordinator Dr. Anna Nilsson-Ehle. Two Focus Areas are relevant to Post-crash: Incidents and Accidents and Novel Electric Vehicles and Vehicle Combinations.

Incidents and Accidents
The focus area is described in more detail below in the section on Traffic Safety Analysis. It is relevant to Post-Crash as it deals with the understanding of real traffic situations and how to get correct information and communication real-time across to the relevant response (rescue) actors.

In 2008 SAFER, Security Arena and Viktoria started a pre-study on sensor-assisted situational awareness (E1). This was successful and has led to two consecutive projects, Liveresponse2 and Liveresponse3 (E3 and E4, totaling KSEK 697). In short LiveResponse is about live video capabilities for emergency response work. The different response actors, like ambulance and rescue staff, share the same information that is broad-casted via mobile phone by the team “first-on-scene”. Thus the understanding of the actual situation is improved and actions can be discussed and prepared in interaction with someone present at the accident. This project has been highly appreciated and the solution is being implemented. It has created international interest. One company has been started in connection to this technology.

Nov 2-5 2009 SAFER was visited by Dr M. Varghese, traumatologist from TRIPP (The Transportation Research and Injury Prevention Programme at the Indian Institute of Technology) in New Delhi. A project idea was outlined and in early 2010 a MoU between SAFER and TRIPP was signed covering this project (E5). The project will compare long-term outcome for people injured by accidents in two different cases: “high-tech ambulance service“ and “brought to hospital by any transport”. The project name is ”SAFER - TRIPP study on emergency care of trauma patients”. Responsible at SAFER is Dr Per Örtenwall, GU/VGR. Each party bears its own cost. SAFER part will be financed by in-kind from GU/VGR. The first project follow-up will take place during autumn 2010.

Astrid Linder, VTI, will represent SAFER in a European network to discuss needs of rescue research. Preparation for a workshop in autumn 2010 is ongoing. Stakeholders will be interviewed about their key interests by Ants Silberberg, Chalmers, Jonas Landgren, Viktoria, and Christer Karlsson, SP.

Novel Electric Vehicles and Vehicle Combinations
The Focus Area Novel Electric Vehicles and Vehicle Combination covers structural requirements (design guidelines) regarding crashworthiness (self and opponent protection) for new safety driven, lightweight designs, including protection of batteries / capacitors, development of design and assessment tools (mathematical models and virtual testing) and system design optimization for novel vehicles.

Postcrash aspects on these designs are important. New challenges to the rescue situation are introduced due to, for instance, high-strength materials and to high-voltage electricity on-board. During the year it has been decided that the Crash reference group will cover also these aspects as the solving of the problem is integrated in the crash protection design process.

Traffic Safety Analysis (TSA)

Traffic Safety Analysis (TSA) aims at developing knowledge and methods within the area of field data, where activities for collection, data storage, data analysis, and effect analyses are in focus, mainly dealing with accident investigation (statistical, in-depth) and driving studies (field operational tests, naturalistic driving studies). The reference group coordinates the research within the area and develops the project portfolio.

Twelve partners are active within the Traffic Safety Analysis Reference Group. During the past year a total of 8 meetings were held, with its coordinator Associate Prof. Dr. Hans Norin and secretary Dr. Ines Heinig. During the autumn 2009 there was a thorough review and revision of the SAFER focus areas. The focus area mostly related to the reference group is Incidents and accidents – priorities and effect analysis.

Incidents and accidents – priorities and effect analysis
Driving studies
The area of driving studies covers activities within field operational tests and naturalistic driving studies. Data from normal driving in real traffic with vehicles equipped with different types of sensors, cameras etc will help understanding causes of incidents and accidents, including driver behavior characteristics as driver action/reaction, and adaptation to new vehicle systems.
This area has develop significantly during the last years within SAFER and has given SAFER a prominent position in the international cooperation within the area.

As a base for strategic planning of the development of the area the project BasFOT has been ongoing and finished 2009. The need for a continuation of this project was identified and was decided by the SAFER board. Project BasFOT2 started in the beginning of 2010 and will continue throughout 2010, with a possible extension to 2012. During the past year some extensive projects have been ongoing. EuroFOT (C2) – a European large-scale Field Operational Tests on vehicle systems, will continue to the mid of 2011. SeMiFOT (C3) – Sweden Michigan Naturalistic Field Operational Test has finished recently, and a presentation of project results is planned for May 2010. A new project SeMiFOT2 (C12) has started in April 2010 and will continue to the mid of 2011. The ongoing project FOTNet (C6), which is essentially a project for networking, will continue to the end of 2010. A possible continuation of this project FOTNet2 is being planned.

Incidents and accidents – priorities and effect analysis
Accident investigation
The area of accident investigation has been of high priority for many years, and several of the SAFER partners have a long tradition and deep knowledge in the field. The goal is to maintain a leading position in the area and continue to be an internationally attractive partner.

During the past year some extensive projects have been ongoing. INTACT is a project with Swedish partners from the industry, Chalmers, and the Road Safety Administration. The project has been ongoing since 2007, and will finish in June 2010. The project has focused on development of methods to collect, store and analyze in-depth data from accidents. There has been an extensive and successful cooperation between the partners. A database has also been developed.
An underlying purpose of the project was to prepare for a continuous collection of accident data on in-depth level. In the end of 2009, a screening of the project was carried out, to clarify whether a continuation of the project was desirable and possible for the involved SAFER partner. The result from this screening was positive for the continuation of the project, why SAFER board ordered a pre-study to prepare a proposal

on a future project. The proposal was presented to the board in April 2010 and all partners were positive to continue the project. An application will now be prepared. Another ongoing project is DaCoTa (C5), which started 2009 and will finish 2011. This is an EU-project, which is a preparatory project for a possible future European data collection activity.

The project FICA2 includes two PhD-students who received their Licentiate degrees during 2009. This project is focusing development of methods for evaluation and verification of principles/systems within active safety. The project Field data acquisition and analysis methods for car safety development (C8), has one PhD-student. The project started 2008 and will finish 2013. The Project Analysis of accidents and dangerous incidents in transport: Method development and opportunities for learning (C7), where Transportøkonomisk Institutt, in Norway, and Chalmers have been active, finished in April 2010 and was presented at the reference group meeting April 28, 2010.

During 2009 the project “Japanese pre-study collaboration regarding analysis of traffic data” (CA4) was finished. During the spring 2009 a project trip to Japan was conducted, followed up with a workshop after the summer, where several Japanese representatives were invited. As a result of these activities there has been and is planned to be visits from Japan. One project DREAMi (C13) has started in March 2010, which will be a parallel project to a project within Japan Accident Research Institute (JARI).

The reference group TSA has a close connection to the SAFER competence group “Field data”, where competences within the focus area “Incidents and Accidents” are identified. The competence group had a workshop in March 2010, where competence needs and available competences was presented and discussed among the SAFER partners.

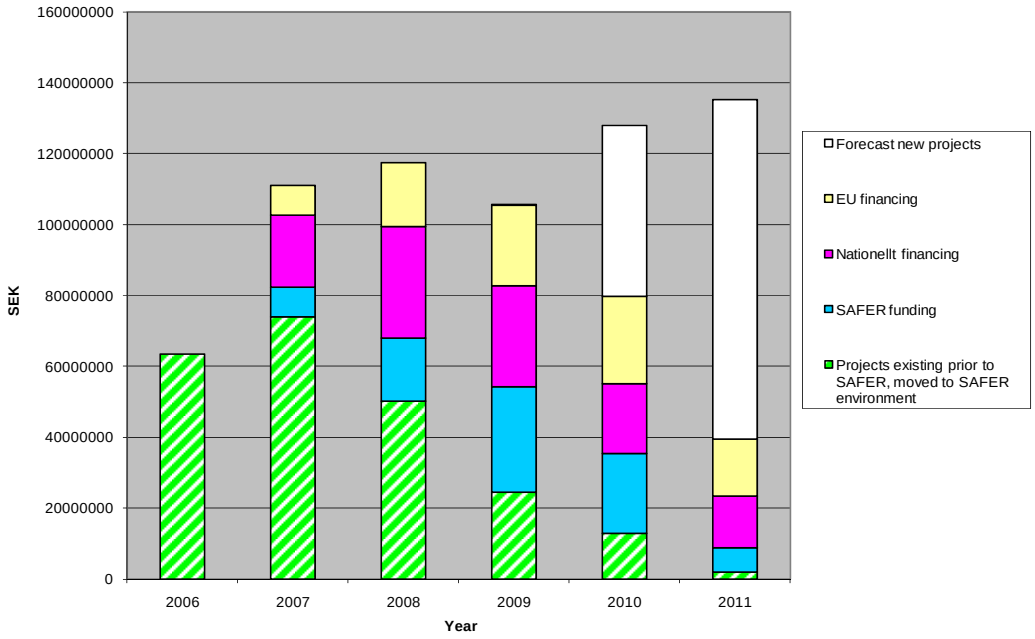
Other projects

Some SAFER projects are not addressed to any specific research area but reported directly to the management group. These are mostly competence projects aimed at developing the competence areas and preparing SAFER for up-coming projects.

Project economy

SAFER own projects are controlled according to SAFER economy and project routines. Since the start of SAFER 78, 8 MSEK of the resources have been allocated to projects, whereof 36, 1 MSEK is cash and 42, 7 is in-kind. Approximately 40% has been used to date.

The total project turnover, including all projects, own and associated, in the SAFER environment is monitored year by year. The goal for SAFER is to reach an annual project portfolio turnover of 200 MSEK by year 2016. The forecast for 2010 is in the order of 130 MSEK.



Pic. 4. Total project portfolio, factual 2006 – 2009, forecast 2010-2011
(green=present before SAFER, blue= SAFER financed, Pink= national funding, Yellow= international funding, White= applications and forecast)

4. THE RESEARCH ENVIRONMENT, OPEN INNOVATION AND INTERNATIONAL CO-OPERATION

The research environment
SAFER has a physical work area of 1000 sqm situated on the 5th floor in the main building, Navet, in Lindholmen Science Park. The space is a mix of workplaces (approx 65), small meeting/dialogue rooms, conference rooms and project areas.45 persons have this as their permanent work place while all other SAFER people use the facilities temporarily. Reference group meetings and project meetings are taking place within the facility as well as informal lunch seminars.

In August 2010 SAFER will move to a bigger and more functional office in the new Lindholmen Science Park building, Lindholmspiren 3, and be placed on the second floor connecting to other open innovation activities such as Security Arena, Open Arena Lindholmen and TSS. During the past year a lot of effort has been spent on planning in order to improve the present weaknesses without losing the strengths.

SAFER people
Each person belonging to SAFER is employed by a partner. Persons who need access to SAFER environment on a more regular basis may get a key to the facilities. Presently SAFER has 165 Key people. Of this 67 are employed by Chalmers, and 98 are from other partners. Of these "key-holders" 20 are academic PhD students and 19 are industrial PhD students thus making the PhD students close to 24 percent of the total staff. One third of the key people are women.

Open innovation
SAFER is more and more seen as an Open Innovation centre and this is supported by the findings of the research project "Management of Open Innovation". This project is running from 2008 – 2012 and is conducted by three senior researchers and one full time PhD student. It presently consists of the following elements

- "Managing open innovation" Longitudinal interview study (13) of Anna Nilsson-Ehle, Director at SAFER
- "Open innovation in practice" project observation "Electric Vehicles " (5 project meetings)
- "Initiating open innovation" interviews with board and management team at SAFER
- "Leveraging on open innovation" 5 interviews with specific partner organizations

- "Participation in an open innovation arena" 27 interviews with all partner organizations (except 2)
- " Managing and organizing distributed creativity" PhD project (Anna Y)
- Master thesis literature review on Open innovation part 2 (2010)
- Master thesis on creative climate at SAFER (2009)
- Master thesis literature review on Open innovation (2009)

A first presentation of findings has been given to SAFER board at the April 2010 meeting.

Global link strategy
SAFER has been involved in the Vinnova project Global Links 2009. The outcome of the project is a strategy for creating global links for SAFER, including an action plan for the first phase of the execution of the strategy. During the project study tours have been conducted and collaboration has been established with research environments in US, Japan and EU. This has led to two collaborative projects with MOVEO, France and one with Jari, Japan.

The aim of the strategy is to create strong links to world class research environments, an inflow of international researchers and a high rate of exchange of young researchers. It also aims at achieving a reputation as a highly innovative melting pot where collaboration between industry and academy is outstanding. This will also make it possible to influence the international research agenda.

In order to achieve these goals the board has decided that SAFER will appoint an international coordinator and give regular attention to international issues at the management meetings to reach the goals:

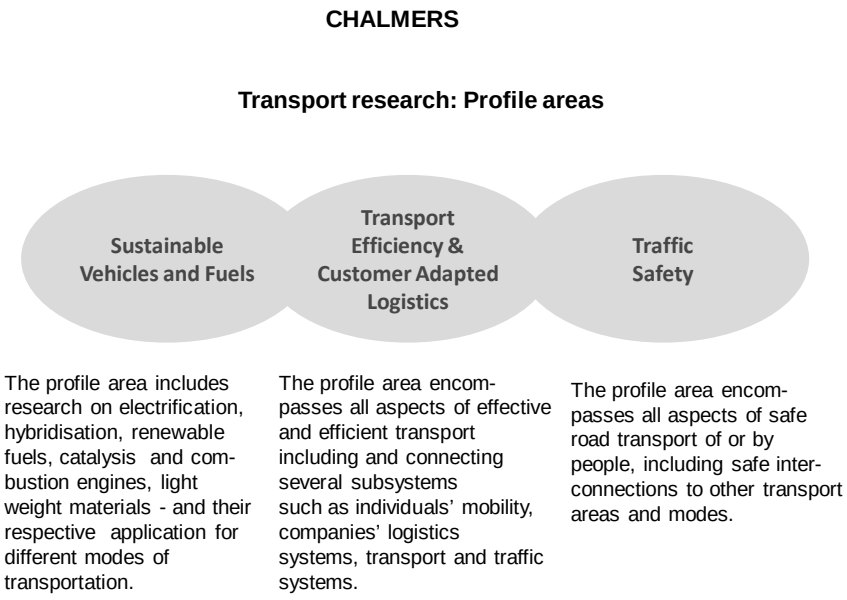
• Have MoU agreement with 8 well renowned organizations in 2016
• Be represented in Brussels at least 10 times a year *e.g.* in EARPA meetings.
• Organize at least 1 international conference each year
• Have at least 10 guest researchers visiting SAFER for at least a week each year
• Have at least 5 researchers from SAFER visiting an organization abroad for at least a week.
• Organize 1-2 international delegation trips each year

EU networking
SAFER is active in EARPA, both in the Safety group and in the board via prof. Per Lövsund. The Director of SAFER has participated in the ETRAC working group for Road Safety Research beyond 2030. She has also been a member of the Swedish project Transport 2030.

5. EDUCATION, COURSES, SEMINARS and CONFERENCES

SAFER researchers are involved in teaching at all levels within Chalmers. However to strengthen the education in the safety area Chalmers has granted SAFER resources to develop a more complete programme, presently named SAFER Insight. The idea is to start from the existing courses and develop a complementary program so that all SAFER Focus Areas are supported by education. The courses shall be available for both students and practioners and support the need of industry, society and academy. It will be connected to the Chalmers Automotive and Transport Academy.

SAFER is part of the Chalmers Transport area of advance and the director is part of the Transport management team. The active research fields within the profile Traffic Safety are very close to the Focus Areas and the Chalmers researchers within traffic safety are encouraged to contribute to these fields. Presently 38 senior researchers at Chalmers are active within Traffic Safety and get strategic research funding and all together more than 130 researchers and PhD students at least eight departments engage in traffic safety related research.



Pic 5. Overview of Transport Area of Advance at Chalmers

Guest researchers

During SAFER's forth year, we have had several guest researchers visitors from all over the world; USA, India, Japan, Europe. Most of these researches have given an open SAFER seminar (listed below), which is excellent knowledge sharing.

Jac Wismans is continuously a guest professor and active within biomechanics and novel electric vehicles. Adjunct professor Michael Regan from INRETS has been highly involved in the Driver Distraction Conference and active within the road user behavior area. Kristy Arbogast from Children's Hospital of Philadelphia (CHOP) visited SAFER yet another time and had fruitful discussions within the child safety project.

Professor Tim Gordon, UMTRI, spent two months as visiting researcher in the area of Vehicle Dynamics.

Pongsathorn Raksincharoensak from Tokyo University of Agriculture and Technology (TUAT) visited SAFER in December 2010. Discussions in the F.O.T. and Active Safety area with researchers in the SAFER network were conducted successfully.

Professor Obinata from Nagoya University visited SAFER in late March 2010.

Seminars

Internal
SAFER has established weekly lunch seminars for internal cross-fertilization of knowledge and ideas. 25 seminars with 36 speakers have been conducted during the fourth year.

External
External SAFER seminars during the past year include: Ken Campbell - The role of driver performance and behavior in traffic safety; Tim Gordon – "Stable Control in Lane Keeping - What is Normal and What are the Limits?" Dinesh Mohan – "Vulnerable road users and traffic safety (3 seminars)"; Paul Green – "Driver workload"; Dominic Cesari - "Research in vehicle safety at INRETS".

SAFER Project Day is a new phenomenon. To show SAFER's broad competence within vehicle- and traffic safety, we set together a half day seminar in conjunction with Shareholders Meeting in April 2009, were we chose some representative SAFER projects which had started during SAFER's first three years. These 8 presentations were valued and thus a new SAFER Project Day is planned for 2010.

On September 15th, SAFER arranged a Sweden - North American seminar on Child Safety: "Child Occupant Protection: Current knowledge and future opportunities". Together with six invited senior researchers from USA, Swedish researchers gave presentations about the broad competence we have within the area. The seminar was highly appreciated and gathered 80 participants.

An external SAFER seminar"Vision based sensor systems for active safety" took take place on November 5th. This was the last in a series of seminars about various pre-crash sensing technologies.

The project "SEVS - Safe, Electric and Hybrid novel VehicleS has had a row of workshops and one open seminar on "Surrounding World Aspects".

Conferences

In 28-29 September 2009, SAFER in collaboration with INRETS (the French national institute for transport and safety research), arranged a conference on driver distraction and inattention at Lindholmen Science Park, Gothenburg. "The 1st International Conference on Driver Distraction and Inattention 2009" gathered during the two days over 150 participants in total, with 45% of the visitors coming from outside of Sweden. The delegates came from nearly 20 countries; e.g. Australia, USA, UK, Germany, France, Canada, South Africa, Spain.

Nearly 60 Oral Presentations were given, and the congenial venue facilitated lots of informal discussion during the conference and the three Keynote Speakers; Peter Hancock, University of Central Florida, USA, Michael Perel, National Highway Traffic Safety Administration (NHTSA), USA (Retired), and Claes Tingvall, Swedish Road Administration, Sweden, were informative, provocative, entertaining and well received. The Dinner Speaker Carl Johan Almqvist, Volvo Trucks, was entertaining as well.

The conference was widely covered in the media - newspapers, radio and television. Next conference on DDI is planned to take place in the autumn of 2011 based on the very encouraging feedback from the participants:

"It was truly one of the best meetings I have attended in the past decade, focused and yet sufficiently broad to really get a grasp on the issue"

"The papers presented were so forward thinking that they no doubt will inspire new thinking and technological insights in the enhancement of driver safety…"

SAFER had a session at the conference “Transportforum” in Linköping in January 2010. The session”Insamling och analys av verklig trafikdata” was moderated by Anna Nilsson-Ehle and several SAFER projects were presented.

SAFER participated also in a Western Sweden exhibition booth at the very large “ITS 2009 Conference” in Stockholm in September. The same exhibition was then again used at a high level EU meeting about ”Future Road Transport” in the end of October in Gothenburg. SAFER (Autoliv and VTI) demonstrated for the participants a typical road crossing accident scenario. The demonstration was performed with one balloon car and one car with a driving robot. The demonstration was well appreciated and gave SAFER a good international exposure. The exhibition was used also at Västsvenska miljö- och trafiksäkerhetsdagen.

In June 2009, SAFER had a booth at the exhibition area at the 21st International Technical Conference on the Enhanced Safety of Vehicles (ESV) in Stuttgart, Germany.

In the beginning of November, SAFER took part in a workshop in Brussels which Lindholmen Science Park AB arranged. The theme was “Cluster Collaboration for Sustainable Development - Challenges and Possibilities for the Future Transport Industry“and SAFER was one of seven demo-stations. Representatives from the EU parliament and other important actors attended.

6. PUBLICATIONS AND REPORTS

Research reports: Dissertation and licentiate theses

During SAFER's operative year # 4, the following PhD Students working in the SAFER environment have written their dissertation thesis:

Jianfeng Yao, Department of Applied Mechanics, Chalmers: "Head Injuries in Car-to-Pedestrian Accidents - Investigation of Head Impact Dynamics, Injury Mechanisms and Countermeasures" (2010). No. 105180

Anders Lindgren, Department of Computer Science and Engineering, Chalmers: "Driving Safe in the Future - HMI for Integrated Advanced Driver Assistance Systems" (2009). No. 63680

During SAFER's operative year # 4, the following PhD Students working in the SAFER environment have written their licentiate thesis:

Anna Carlsson, Department of Applied Mechanics, Chalmers: "Initial Studies of Dynamic Responses of Female and Male Volunteers in Rear Impact Tests" (2010). No. 112353

Kristian Holmqvist, Department of Applied Mechanics, Chalmers: "Chest Injuries in Heavy Vehicle Frontal Collisions- Evaluation and Adaptation of the Hybrid III Dummy Instrumentation and Injury Reference Values by Means of Human Body Modeling" (2009). No. 102526

Mattias Brännström, Department of Signals and Systems, Chalmers: "On Threat Assessment and Decision-Making for Avoiding Automotive Vehicle Collisions" (2009). No. 101840

Azra Habibovic, Department of Applied Mechanics, Chalmers: "Reduction of Vulnerable Road User accidents in urban intersections: Needs and challenges in designing Advanced Driver Assistance Systems" (2009). No. 101895

Aleksandra Krusper, Department of Applied Mechanics, Chalmers: "Crash Compatibility between Heavy Goods Vehicles and Passenger Cars; Influence of Vehicles Structural Interaction on crash Performance" (2009). No. 95865

Mikael Ljung Aust, Department of Applied Mechanics, Chalmers: "Developing Theoretical and Empirical Definitions of Safety Problems in Driving Suitable for Active Safety Function Evaluation"(2009). No. 94074

Anna Bjelkemyr, Department of Applied Mechanics, Chalmers: "A model of Driver Perception and Action in Intersections" (2009). No. 92236

7. FURTHER INFORMATION

SAFER in the media

SAFER has been written about in several partner magazines such as VINNOVA Nytt, Vägverkstidningen, Chalmers magasin, Lindholmen Science Parks newsletter, VTI Aktuellt. Other papers in which SAFER has been mentioned include Göteborgs-Posten (several times), Dagens Nyheter, Automotive Sweden, Aftonbladet, Promotive.

SAFER researchers have also been interviewed in Swedish radio in June and in conjunction with the Driver Distraction Conference in September. The Driver Distraction Conference also resulted in broadcast in Swedish TV news. Furthermore, SAFER researchers were interviewed in Swedish radio in conjunction with the Child seminar in September.

The SAFER web site is still on the Chalmers portal. The website includes calendar, news & events related to vehicle and traffic safety, vacancies, research reports, press releases etc.

During autumn 2009, a film about SAFER was produced. The film is now published on YouTube and printed on DVDs for distribution to guests, partners, exhibitions and external activities.

Vision Zero Initiative and Academy
The Swedish initiative to set up a Vision Zero academy at Lindholmen will be a valuable contribution to SAFERs ability as well.