



ANNUAL REPORT

OPERATIVE YEAR 12
APRIL 1ST, 2017 – MARCH 31ST, 2018



SAFER

VEHICLE AND TRAFFIC SAFETY CENTRE AT CHALMERS



SAFER Vehicle and Traffic Safety Centre at Chalmers is a competence centre where 30 partners from the Swedish automotive industry, academia and authorities cooperate to make a centre of excellence within the field of vehicle and traffic safety.

Research at SAFER spans a broad base, covering several disciplines and encompassing both safe mobility and vehicle safety in real environments. The centre's activities engage the very elite in the field of safe transport solutions, and the results contribute to increasing the competitive advantages of the centre's partner companies and organisations.

Chalmers University of Technology hosts the centre. By using the multi-disciplinary scientific competence available within the centre, we will make it a hub for excellent research and innovation.

SAFER conducts borderless research to save lives!

CONTENTS

Director's page	3
Chair's page	4
Vision, mission and strategy	5
Identity and values	6
Organisation and management of the centre	6
The research environment and infrastructure	8
Financing	9
The project portfolio	10
Contribution to targets year 12	11
Research outreach and communications	13
SAFER's global collaborations	15
A multidisciplinary approach to safe automation	16
Increased safety awareness for people in traffic	19
Care and rescue after a traffic accident	21
Safety for the little ones	23
Continued success of the SAFER composite cluster	24
Appendix:	
SAFER Partners	25
SAFER Board	26
SAFER Management group	26
Competence areas at SAFER	27
List of projects at SAFER	29
Dissertations and Licentiate seminars	33
Seminars and conferences	36
SAFER's global collaborations	37

DIRECTORS PAGE

When I started at SAFER in August 2017, I thought traffic safety would be fun and exciting. Now, almost nine months later, I have re-evaluated; working with vehicle and traffic safety is perhaps the most stimulating you can do. Being part of this development and being the director of the SAFER Vehicle and Traffic Safety Centre – Sweden's hub of traffic safety research – is incredibly inspiring.

SAFER is a critical enabler to achieve the UN's Global Sustainable Development Goals in terms of road safety. In this context, SAFER is aiming to contribute with knowledge in the urge for sustainable mobility for both humans and goods. To clarify SAFER's contribution to the major societal challenges, we have developed a mission to cover our research; **Safe transport door to door**, with special focus on:

- The long and winding road towards driverless vehicles
- Urbanization, rural areas and long distance traffic
- New types of vehicles and cooperative systems

The aim is that, with the link to the societal challenges, we can even better prioritize and focus on the research that provides the best impact for society. Also, connectivity and digitalisation rapidly conquers virtually everything in the modern society and these trends will help to us meet the global challenges.

SAFER is a unique organization well positioned to conduct collaborative research that is of great value for national and international stakeholders as well as its industrial partners. This is the base for forming the fifth stage of SAFER, starting in April 2019. The SAFER Board and management team have now full focus to prepare necessary directions for the set-up of the next stage. We have a strong commitment for a continuation of SAFER and a strategic plan to work out details is now being developed.

The understanding of SAFER's added value and assets has become more profound as more than 300 finalised projects show successful results and international



visibility. During operational year 12, 32 projects with external funding have been added to the project portfolio, adding up to a total of 73 projects that have been ongoing during the year resulting in a positive trend in the number of projects at SAFER. SAFER partners and researchers have further strengthened the international position and the role as spider in the global web, e.g. in collection and analysis of driving data, child safety and human body models. Research related to different levels of automated driving is rapidly growing and SAFER is active through direct projects and by participating in different national and international groups, see more information about the ongoing projects on page 16.

The high momentum in year 12 continues with projects, strategic work, and events. 2018 is thus full of new initiatives and in October SAFER will arrange the 6th International Conference on Driver Distraction and Inattention. Vehicle and traffic safety will be in the spotlight with top international researchers presenting their latest findings. We hope to see you there, or even better, in the SAFER research environment before then!

April 2018,
Magnus Granström, Director

CHAIR'S PAGE

Two years of stage four have now passed and I am still highly confident that the research conducted at SAFER makes a difference and contributes to a safe and more sustainable transport system. Project results have been delivered, contacts established, major international projects led by SAFER, and our ties to other important international organisations strengthened. The list of what has been accomplished within SAFER during the year goes on and on!

Over the past year, the Board worked to develop a clearer strategy for which focus areas SAFER will conduct research in. Automation and digitalisation are fast-growing areas where SAFER plays an important role in increasing safety knowledge and where cooperation between different disciplines is important. The networks and expertise available within SAFER are completely unique, and we need to ensure that both society and our partners can benefit from these both now and in the future.

We have also implemented more efficient working practices to conduct operations. Examples of these include a more efficient structure in relation to calls and applications, a new and simplified project working process and publication of news. Our researchers are also continuing to deliver results where SAFER's multidisciplinary platform is a factor for success. The fact that we have been given the honour of running several prestigious EU projects is clear evidence of our expertise and that we have a good reputation internationally.

The funding issue remains high on the Board's agenda, and we have begun several activities to secure future funding of our research centre. For example, positive dialogues are currently in progress with Region



Västra Götaland and Vinnova. Stage 5, which starts 1 April 2019, is fast approaching, and the Board has also begun planning for how this stage should take shape. I really look forward to continuing this exciting work.

Magnus Granström stepped into the role of Director of SAFER in August, and it is pleasing to see how things are developing. Magnus' vast experience in international collaborations, EU projects and external funding in both academia and industry are key competencies that will be put to good use in SAFER's operations.

I am pleased to continue having the honour of serving as Board Chair, and look forward to a new operational year with a focus on innovation, knowledge and really fun and rewarding collaborations.

Kind regards,
Karin Svensson, Board Chair



VISION, MISSION AND STRATEGY

Our mission: To enhance traffic safety

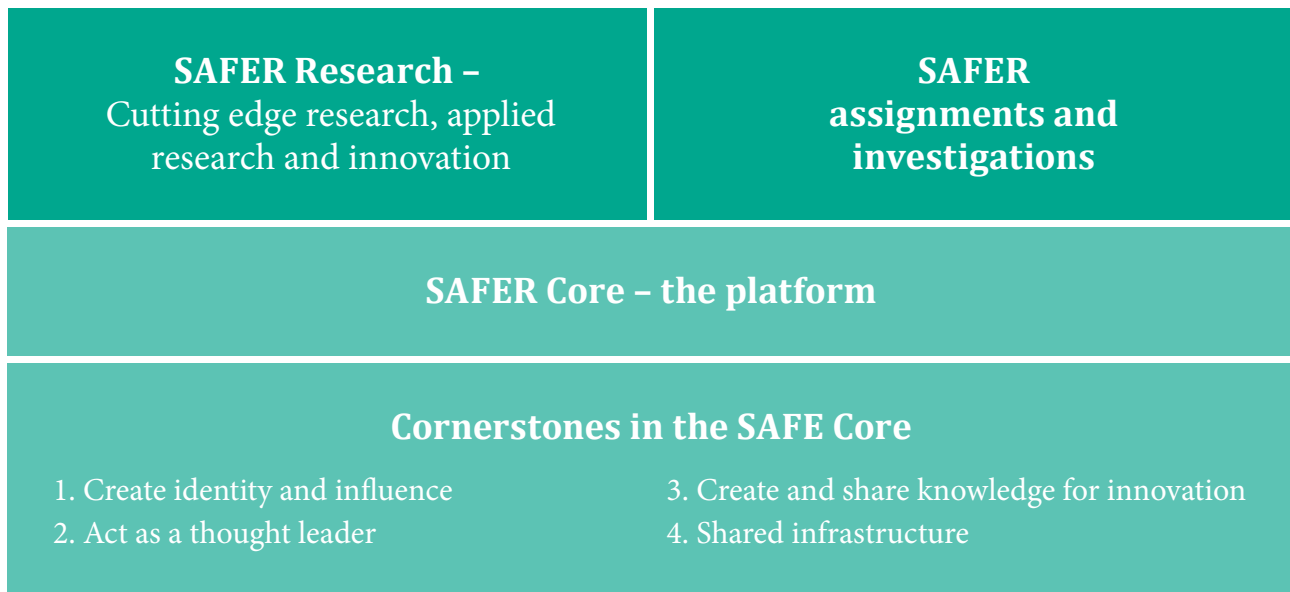


Fig. 1: SAFER's three conceptual parts and four cornerstones.

The details of our cornerstones are described on our website: <https://www.saferresearch.com/about#-block-aboutcornerstones>

Strategy

To significantly contribute to the vision and mission as well as become a renowned international centre of excellence, SAFER will deliver results, build competence and create strong networks in selected areas. Furthermore, SAFER shall create value for the partners beyond what a single partner can achieve on its own.

SAFER consists of three different conceptual parts – *SAFER Core*, *SAFER Research* and project portfolio and

SAFER Assignments and investigations, see figure 1. SAFER Core is the name for the driving function of SAFER with its secretariat including communication and support systems, research areas and their reference groups, the infrastructures, networks and the physical working environment. To realise our vision of becoming a world leader in traffic safety, our strategy is based on four interlinked corner stones that direct our actions.



IDENTITY & VALUES

SAFER has developed a unique identity with clear values such as openness, respect for each other, curiosity and joy of discovery. We are passionate to make a difference, contribute to society, find new innovative solutions and we understand the benefits from

interdisciplinary expertise and talents. Creativity is a hallmark and thrives on diversity in all aspects and borderless networks seeking and attracting expertise where it is to be found.

ORGANISATION AND MANAGEMENT OF THE CENTRE

Partners

Safe mobility can only be realized when talented and dedicated people work together with a clear vision, shoulder by shoulder. The development of knowledge in traffic safety is essential, and by applying collaborative innovation the SAFER partners create visible and measurable results in practice. The partners access – and contributes to – a unique competence and research infrastructure.

During SAFER's 12th operational year, in total 30 partners and members representing stakeholders within the automotive industry, the academia and the authorities were part of SAFER. This includes 20 full partners and 10 members (often referred to as associated partners), see the complete list in appendix 1. Together, they create new knowledge and research findings that enable people and goods to be transported safe, efficient and sustainable.

When entering the operational year, one new partner joined SAFER; Combitech, and three members; MediaMobile, Uniti, and Zenuity. New partners will be invited during the final part of stage four to continue to connect all relevant competences.

Management Group

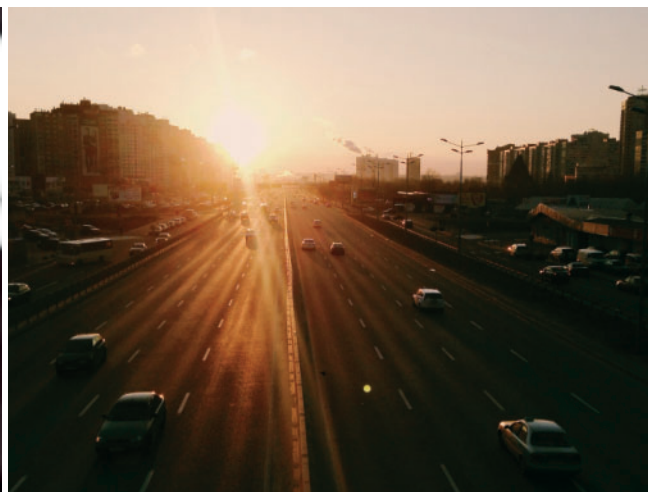
SAFER's daily operation and strategic development is led by a Management group with a director and 12 members representing SAFER's research areas, the infrastructures, bridging functions and various operative functions. In August 2017, Magnus Granström started as SAFER's new director after Anna Nilsson-Ehle, who retired in April 2017. Acting director in the period in between was Anders Marby. Matteo Rizzi from the Swedish Transport Administration joined as member for the Vision Zero academy platform as of October 2017, replacing Johan Strandroth. The complete list of management group members is listed in appendix 2.

SAFER Board

The SAFER Board consists of representatives from the large (level 1) partners, see appendix 3. Johan Karlsson, Chalmers, replaced Jan Smith, Gothenburg University and Per Lövsund, Chalmers, in April 2017.

SAFER Research areas

SAFER's research is conducted in five areas. Each research area is governed by a reference group, led by a Research area director. The reference groups





Care & rescue



Systems for accident prevention and automated driving



Human body protection



Road user behaviour



Safety performance evaluation

include one representative from each SAFER partner and representatives from SAFER's competence areas. Most projects are initiated by SAFER's researchers, presented to and discussed at the Research area meetings and recommended to SAFER's Management group and Board.

Our five research areas represent world-class, multi-disciplinary research – all with the single-minded vision to save lives, prevent injuries and enable safe mobility. They are also the open innovation arenas where our partners meet and identify key issues to initiate new research based on real-world needs.

Systems for accident prevention and automated driving

How can active systems and automation predict and prevent collisions? This research area covers the development of automated functions that help the driver to avoid hazardous situations. This is a fast-growing research area that includes active safety systems, semi-autonomous and fully autonomous vehicles and connected traffic systems where infrastructure, vehicles and vulnerable road users interact to enhance safety.

Road user behaviour

How do people behave in traffic and how can we support them to act safer? Taking a deep, wide approach in the area of human behaviour, this research area is about developing scientific methods and tools to create prerequisites for safe driving. For example, by research in autonomous driving support as well as risk management and driver education.

Human body protection

How do we best protect people in a crash? SAFER continuously develops this research area with the aim to understand and develop principles for countermeasures to prevent injuries in accidents. Driven by current human body protection needs and future challenges in the area of sustainable transportation systems, our research comprises a wide range of

subjects – from biomechanical injury mechanisms and principles for protection, to mechanical and mathematical road user and car occupant models for complete crash sequence. SAFER is also a world leader in developing modelling and simulation tools for understanding how composite structures act in crashes.

Care and Rescue

What actions after a traffic accident are the most efficient in reducing mortality and injury severity? This research area addresses challenges for all road users related to what happens after a traffic accident is a fact. Covering a cross-disciplinary research approach, Care and Rescue focuses on improved incident detection and assessment, improved on-scene care and rescue and reducing secondary long-term effects of traffic accidents.

Safety performance evaluation

How do we develop the best methods for predicting and assessing real-world vehicle and traffic safety? In this research area we focus on the development of innovative methods to collect, manage and analyse field data and assessment procedures for safety performance using data from both real and virtual environments. Our main priorities are within areas that are critical for providing trust in new safety systems to enable market introduction, such as our unique databases within Naturalistic Driving Data (NDD) and the FOT-Net Data Sharing Framework.

Competence areas

It takes more than one single competence to solve the complex challenges related to traffic safety. Within SAFER, there are 12 different competence areas containing a plethora of knowledge and know-how. The competence areas are also key for the vital, cross-disciplinary research conducted at SAFER. The academia is at the core for each competence area, with important contributions from all SAFER partner researchers. See appendix 4 for more information about the competence areas and their leaders.

THE RESEARCH ENVIRONMENT AND INFRASTRUCTURE

Strong assets for real-world traffic safety research

All partners have access to SAFER's open innovation arena and, through relevant projects, research infrastructure. This unique infrastructure includes full-scale road traffic safety test environments, simulators and a research lab for active safety and autonomous driving. SAFER also provides physical work areas as well as a world-class naturalistic driving data platform. Together, these resources allow borderless research with outstanding opportunities of real-world testing and validation.

Revere research lab for active safety and autonomous driving

Revere (Resource for Vehicle Research) is a research facility with a focus on autonomous driving, active safety and vehicle dynamics. It contains a research lab with resources such as technical equipment, test vehicles (light and heavy) and supporting personnel. In November 2017, Revere celebrated its two year's anniversary and the research lab is now fully booked with customers from different disciplines. In September 2017, Sweden's King Carl XVI Gustaf visited AstaZero to learn more about the unique test facility and to experience demonstrations of automated vehicles where Revere provided part of the content. Many projects in SAFER's portfolio are connected to Revere, see autonomous driving projects on page 16.

SAFER Naturalistic Driving Data Platform

The SAFER Naturalistic Driving Data platform is a secure, world-class platform for handling data from naturalistic driving data collection. Providing state-of-the-art data management, several large datasets and a leading research competence regarding naturalistic driving data, this platform gives unique access to naturalistic data derived from 5 million driving kilometers. The SAFER partner researchers also have access to the in-depth crash database INTACT. During 2017 the high-profile European project UDRIVE was finalised. In this project a huge amount of naturalistic driving data was collected and the storage and future use for SAFER's partners have been secured.

SAFER open innovation arena

All SAFER partners have access to our facilities at Lindholmen Science Park in Gothenburg. The SAFER office is a meeting place with a 1,300 sqm working area including 70 workplaces, 15 small meeting rooms, conference facilities and project areas. As an open innovation arena, we enable our partners to join collaborative research across the disciplines in a way that makes them more competitive and able to contribute to a safer traffic environment. SAFER is also connected to other open innovation activities such as Drive Sweden, Prehospital ICT arena and CLOSER.

AstaZero real-world proving ground

AstaZero (Active Safety Test Area Zero) is the world's first full-scale test environment for a safe, sustainable and connected automated road traffic future. Different traffic environments make it possible to test advanced safety systems and their functions for all kinds of traffic and traffic situations – in city environments as well as on rural, multi-lane and high-speed roads. This enables a broad range of research, development and validation. AstaZero also serves as an international testing area open for stakeholders within the industry, the society and the academia. AstaZero is owned by RISE Research Institutes of Sweden and Chalmers University of Technology. SAFER is responsible for the coordination of calls for open academic research.

Simulator Sim IV

Sim IV at the Swedish National Road and Transport Research Institute has an advanced motion platform system and permits significant linear movement along both x and y axes. It is useful when simultaneous longitudinal and lateral acceleration is important or if a wide field of vision is prioritised. Cabs and passenger compartments can be exchanged quickly. The simulator's imaging system has a camera-based calibration system, making it easy to switch between different driver positions. The simulator is a valuable tool in many SAFER projects.



FINANCING

SAFER has two main types of financing, one being SAFER Core which is the base for the core activities in terms of the secretariat, the office and open innovation area and base funding for the seminar and dissemination activities, the other being the project financing for research and innovation activities.

SAFER Core is financed from funding from Västra Götalandsregionen (VGR) and partner contributions according to the overall partner agreement for the fourth stage of SAFER, as agreed in the beginning of 2016. The current status of the SAFER Core finances can be seen in the table below, and as is shown there, follows the overall plan. Please note that at the time of writing this annual report, the complete financial result including part of the contribution from Västra Götalandsregionen is not available as an effect of reporting periods. However, the result for year 12 follows the overall plan for SAFER stage 4. A number of investments were done during this year, for instance in the new web site, communication platforms and office rearrangements to facilitate for a smaller and more efficient office area. Also, as can be seen to the far right, the budget for the complete phase is balanced. The SAFER Board continuously monitors this

budget and decides on changes in expenditure if required.

The project financing comes from a variety of sources, primarily national programmes such as the FFI programme (Strategic Vehicle Research and Innovation), different strategic innovation programmes funded through Vinnova, Stiftelsen för Strategisk Forskning (SSF) and others, but also internationally through EU's Horizon 2020 programme and similar sources. In addition to this, internal funding and inkind contribution such as man hours and equipment from all partners play an important role, whether it's academic, institute or industry partners. The project portfolio is described in the next section, and at the time of writing, the overall budget for the projects in the portfolio sums up to over 400 million SEK. Even though the full budget of each and every project may not be relevant to the SAFER research it clearly shows the benefit for the partners to join in the SAFER projects that generally has a high hit rate in the competitive programmes. Also, the leveraging factor of collaboration projects is clear, especially when accessing the knowledge and financing power on the European arena.

	YEAR 11	YEAR 12 - preliminary	YEAR 13 - prognosis	COMPLETE STAGE 4 (YEAR 11-13)
EXPENSES				
Personnel	3142	3883	4084	11109
Offices	1589	2004	2066	5659
Other costs	205	1742	1360	3307
Sum	4936	7629	7510	20075
INCOME				
Partners	3463	3638	4600	11701
Ass. Partner	70	70	70	210
New partners		260	340	600
Other			50	50
VGR	969	2901	3630	7500
Sum	4502	6869	8690	20061
Result	-434	-760	1180	-14

Fig 2: SAFER Core finances.

SAFER'S PROJECT PORTFOLIO

SAFER welcomes projects that help to build up its competences, environment and network and reaching its vision. Projects at SAFER cover a wide range of vehicle and traffic safety research. Each project belongs to one of the five research areas that form an open innovation arena where partners meet and identify key issues to initiate new research based on real-world needs. Projects that cover multiple research areas or focus on general questions are called 'competence projects'.

Projects that are funded by SAFER or projects where SAFER is responsible towards an external funding organization are called 'own' projects. All projects that have started as SAFER funded (own) projects or pre-studies but successfully gained external funding (e.g. by VINNOVA or EU) are 'associated' at SAFER, as are other projects relevant to the SAFER research areas and with a participation from SAFER partners.

During operation year 12, 32 projects with external funding have been added to the project portfolio adding up to a total of 73 projects that have been ongoing during the year resulting in a positive trend in the number of projects at SAFER. 55 of them belonged to one of the five research areas (complete list in appendix 5) whereas 18 projects were competence projects. Many of the projects have been successfully finalized during the year and SAFER will enter its year 13 with 43 ongoing projects. Additionally, four projects are already planned to be associated. Two of them are large EU projects within human body modelling.

SAFER has during year 12 agreed on an updated and simplified project working process. This guide document provides all processes and support related to project application, follow-up, dissemination, and reporting. It is applicable for all SAFER projects regardless if externally or SAFER funded.

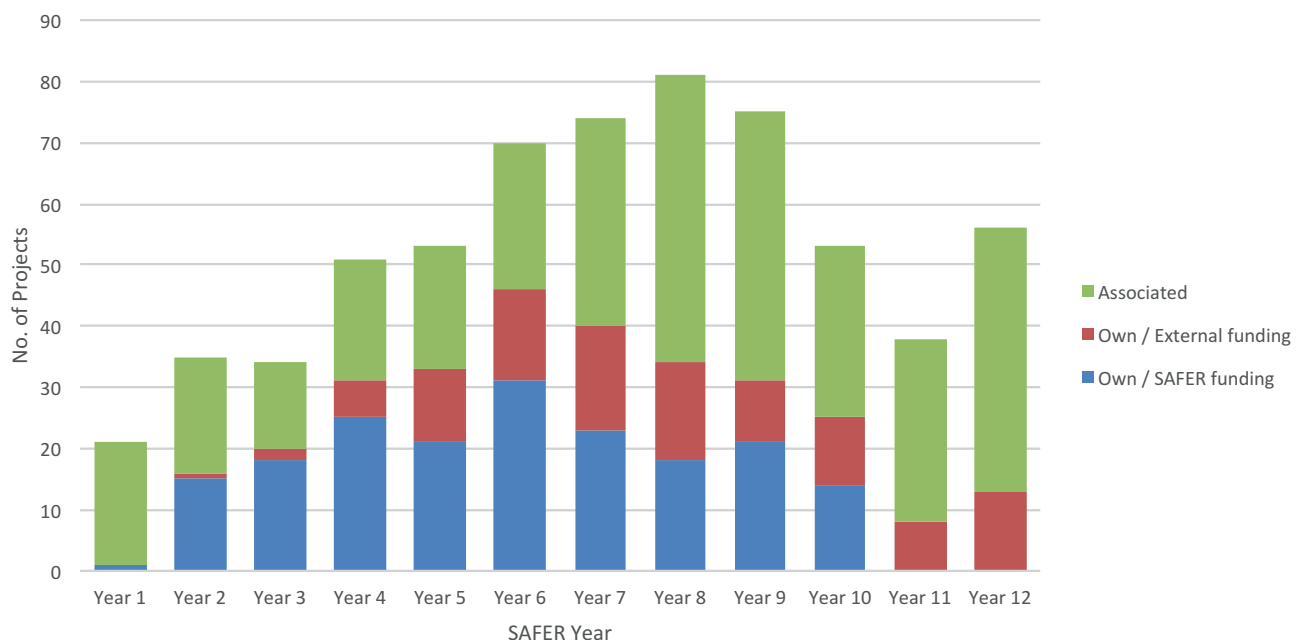


Fig 3: Number of projects in SAFER's project portfolio.

NOTE: A lot of own projects have both SAFER and external funding. This figure only consider the main funding.

CONTRIBUTION TO TARGETS YEAR 12

Since 2012 SAFER has aimed at a wanted position, consisting of five statements:

1. Visible and measurable results in practice.
2. Hub for Swedish traffic safety research.
3. Acknowledged as a world leader in traffic safety.
4. A broad set of partners and collaborations in order to ensure the strategy and explore new needs and countermeasures.
5. A balanced project portfolio and a long-term financing of the core operations.

SAFER's Wanted positions are evaluated regularly. On the following pages you can read more about our main achievements. Many activities and results have bearing on a number of targets, but to simplify the presentation, they occur only once.

1. Visible and measurable results in practice

Visibility of the results is for a competence centre as SAFER a key activity, done in collaboration with the partners but also activity on a centre level. There are many examples of how this is done, for instance arranging and supporting dissemination events. The capability to host high quality, well-attended scientific conferences is yet another sign of a well-respected community with high impact in this field. As a token of credibility, SAFER is trusted with arranging the 6th International Conference on Driver Distraction and Inattention in Gothenburg, in October 2018. SAFER has also been engaged in an international round table discussion dialogue about cycling safety at the International Transport Forum in Paris in January 2018. Five PhD students working in the SAFER environment have defended their doctoral theses during the operational year 12 and seven students have presented their licentiate theses, see appendix 6.

2. Hub for Swedish traffic safety research

Being the natural meeting place for Swedish researchers in the traffic safety area has been one of the main tasks for the SAFER organization from the start, and this is what we see today with a strong portfolio of projects, for instance in the Swedish FFI program (Vehicle strategic research and innovation) where the joint efforts from SAFER partners have resulted in successful proposals. SAFER is also hosting the Vinnova funded platform TS Europe, influencing the European framework programmes to ensure that they support continuous research on traffic and vehicle safety, as well as coordinating the Swedish efforts in creating and joining successful consortia within the current Horizon 2020 program. TS Europe and related activities by SAFER and its partners are also crucial when influencing the next framework programme in Europe, starting in 2021.

3. Acknowledged as a world leader in traffic safety

SAFER researchers continuously get invited to speak at well-renowned conferences, showing the high quality of the research being conducted. Also, a multitude of delegations visit SAFER each year, eager to learn about our way of working and how we manage this kind of collaboration platform with the full triple helix represented and active. In June 2017, the SAFER researchers Magdalena Lindman and Ola Boström were awarded the US Government's award for Safety Engineering Excellence. Per Lenhoff, also one of SAFER's researchers, received the NHTSA's Special Award of Appreciation. A publication from the SAFER environment has attracted great international attention in the very prestigious scientific journal *Physiological Measurement*. The article was selected into PMEA's Highlights of 2017 Edition as one of the very best research articles which featured cutting-edge areas of biomedical engineering and was one of the most influential research published in PMEA in 2017.



4. A broad set of partners and collaborations in order to ensure the strategy and explore new needs and countermeasures

The partner constellation within SAFER is continuously developing, while at the same time keeping a strong set of core partners. This is definitely one of the keys to success, being able to have a continuous development of research areas and projects, while also managing changes in the surrounding environment. Many of SAFER's partners are also active in related activities, such as DriveSweden, CLOSER and VICTA (Vehicle ICT Arena). During operational year 12, about 15 potential new partners have been in contact with SAFER, wanting to understand the benefits of the setup. For several of these, final approval of membership is expected at the 2018 Shareholders' meeting.

5. A balanced project portfolio and a long-term financing of the core operations

It is a continuous task for the Research area directors and management group to ensure the balance between the areas according to the needs, as well as the balance between projects at different technology readiness levels. Concerning the core financing, this is one of the major levels for the SAFER Board and the director, ensuring a suitable financing of the fifth stage of SAFER, beginning in the spring of 2019. In terms of the research funding, a more pro-active approach has been launched where upcoming calls are identified and evaluated for relevance at an early stage.



RESEARCH OUTREACH AND COMMUNICATIONS



Knowledge sharing can help save lives

One important part of the SAFER mission is research outreach; to disseminate results and knowledge to the society and be a well renowned international research centre of excellence. The open collaboration with research partners from the industry, the academia and the society is the key enabler for success. Hence, inspiring activities that facilitate networking and knowledge sharing within the community has been of priority. These have been organized with the purpose of creating information and experience exchange and collaboration between network members, either generally or with a stated goal.

During the past year, a new brand platform and an updated graphic profile for SAFER have been developed. In addition, a new communication strategy has evolved and a brand new website has been launched. The dissemination platform and process has been updated to further secure that partners get access to research results. The aim has been to strengthen

SAFER's brand, thus increasing the attractiveness of the center for new partners and funding.



Malin Persson, responsible for SAFER's communication comments: "On SAFER's new website, we will focus on communicating our research findings and presenting all our projects and their publications.

In our Knowledge library you can find the results of our researchers' work and you can also read our news and keep up-to-date with our seminars and other activities and events in our calendar. Our partners and research areas, infrastructure and competence areas are presented and our unique collaborative working method is explained. We also hope that the website will inspire more partners to join SAFER. The more knowledge we can get in how to develop a safe and sustainable transport environment, the more lives we can save", Malin concludes.



SAFER's presence in social media has increased during the year and LinkedIn is a new, important communication channel as well as Mynewsdesk, Sweden's leading PR tool, aiming to get in touch with media interested in traffic safety, sustainable innovations and research. Several SAFER projects have got media publicity, e.g. the female crash test dummy was broadcasted in Swedish television and the some on-going projects about automated driving carried out at Revere was picked up by several influential national media outlets. SAFER is currently active on the following social media platforms:

- Facebook: safercentre
- Twitter: @safercentre
- You Tube: Saferresearch
- LinkedIn: <https://www.linkedin.com/company/11284446>

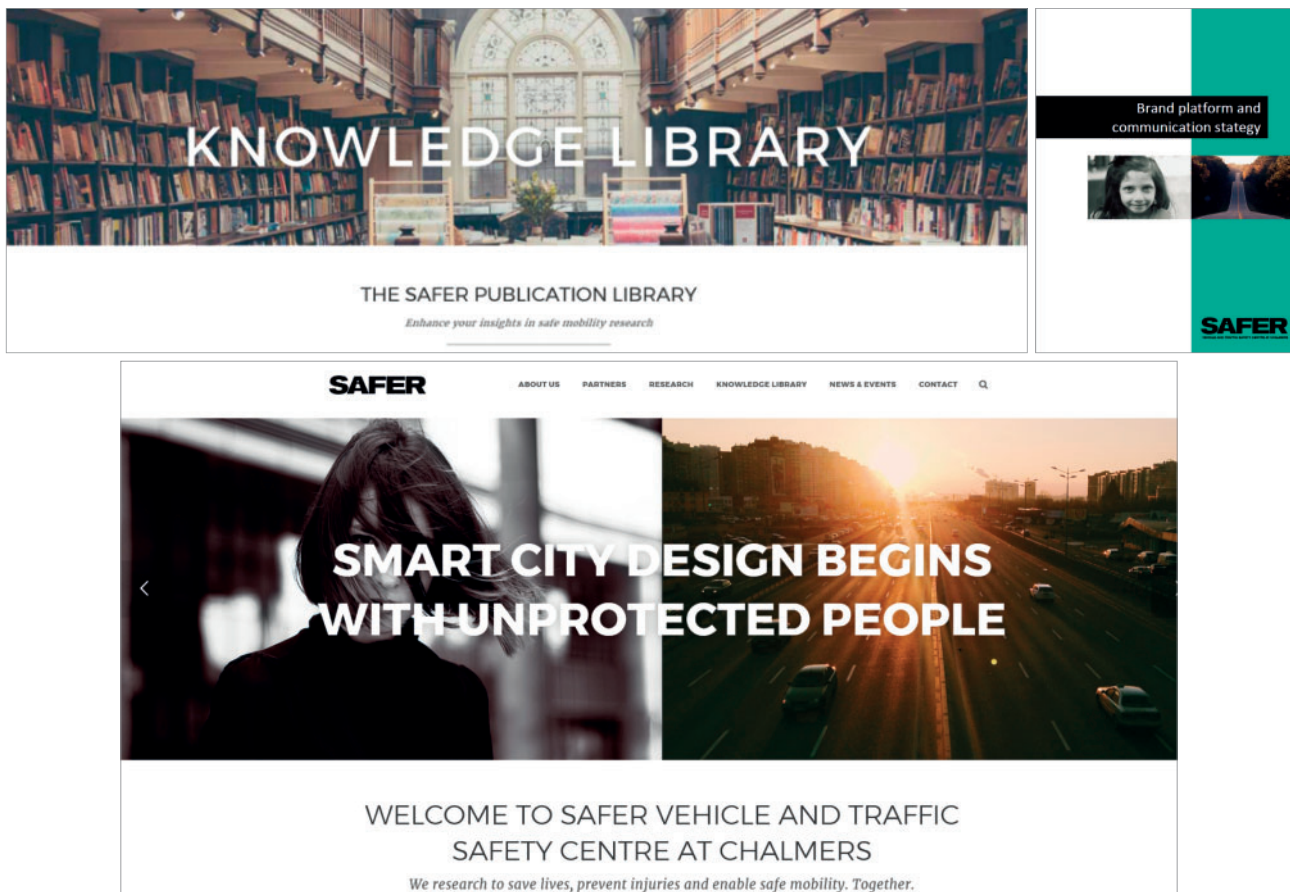
Successful seminars, workshops and conferences

SAFER organises a large number of seminars and workshops. They are appreciated as an efficient mean to enhance knowledge and offer a great opportunity to network. SAFER is acknowledged as a meeting place for competence and knowledge and serves as a

centre for sharing competence, but also as a professional host for large international conferences.

SAFER has arranged Thursday seminars every week during February to May and September to November, primarily for internal and external cross-fertilization and exchange of knowledge and ideas. The SAFER Competence area leaders, Research area directors and Infrastructure leaders are responsible for the content. Examples of successful seminars are a child safety seminar with close to 70 leading researchers in September 2017, and in March 2018, a well-attended seminar on how to make heavy transports more safe was arranged together with NTF. Also, SAFER's participation in ESV in Detroit in June 2017 was appreciated. In October 2018 the 6th International conference on Driver Distraction and Inattention – the premiere international event designed to bring participants from government, industry and academia up-to-date on current and recent developments and trends in the field of inattention and distraction in driving – will be arranged. The planning phase is currently being carried out successfully.

A list of conducted seminars and conferences can be found in appendix 7.



SAFER'S GLOBAL COLLABORATIONS



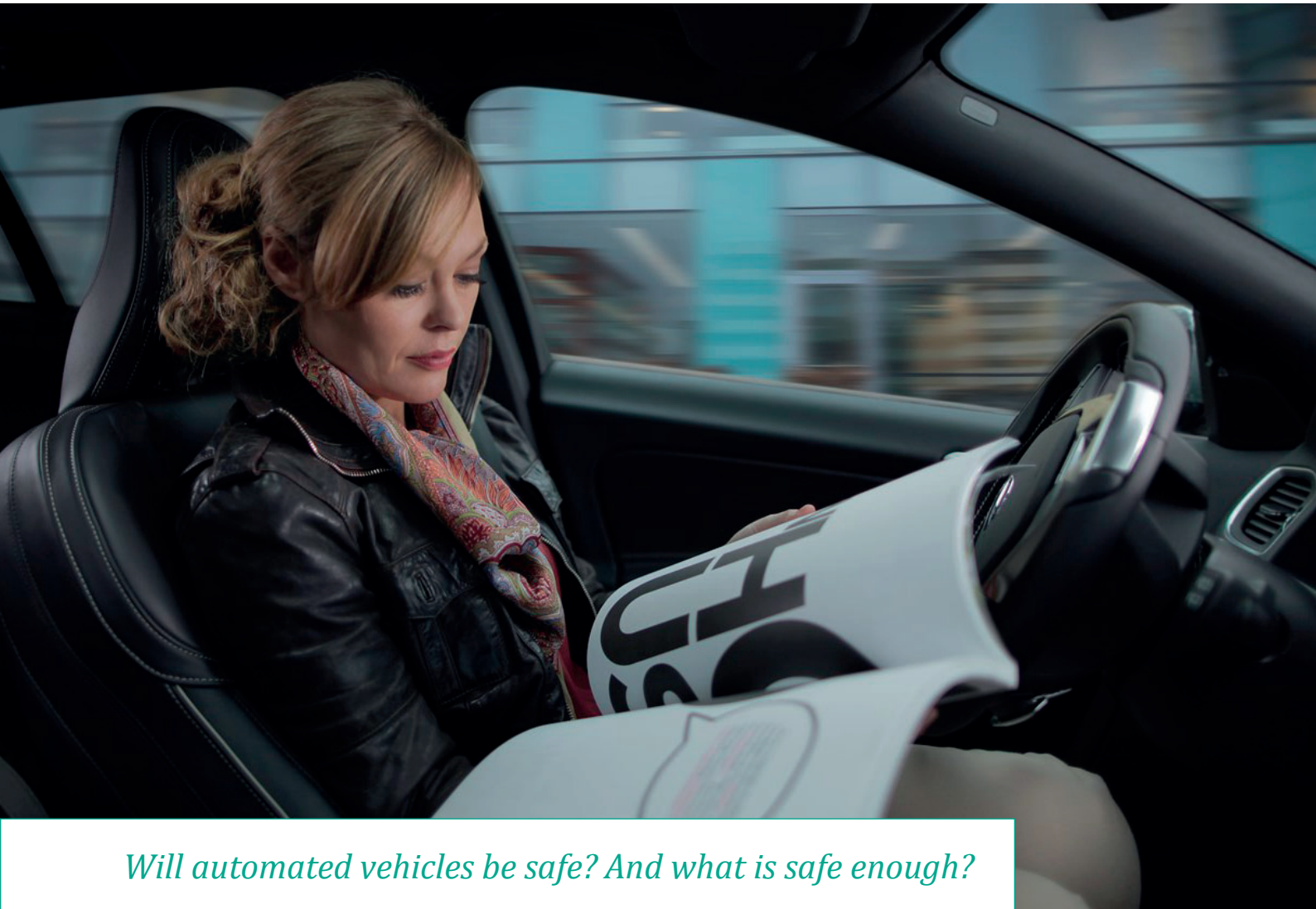
The hub for traffic safety research, in Sweden and elsewhere

SAFER may be based in Sweden but has a truly global mindset. Our international commitment is wide, with vital partnerships with universities and traffic safety research communities all over the world. By initiating and participating in global collaborative research structures, we strongly influence the political traffic safety agenda and contribute to the development of sustainable, safe mobility – in Sweden, and elsewhere. SAFER works with institutes and academia as well as other collaborative organisations and research programs. The complete list of organisations is presented in appendix 8.

When it comes to collaboration activities this has to be done on multiple levels. There is obviously a large amount of collaborations on research and research group level, as is expected from an academic environ-

ment. Also, all SAFER partners have a global collaboration network, whether it can be on a commercial level or on a pre-competitive level. However, we also see that there is a clear and strong need for certain activities on centre level, focusing primarily on organisations with a similar task or setup, and actors with a strong position to fund research or influence upcoming programs. There is an overlap between these activities, which also ensures a consistency in the message conveyed from SAFER and its partners, as well as a basis for a continuous exchange of information, aiming at avoiding double work or conflicting messages. This is a continuous task for the SAFER management team and Board, ensuring an efficient use of resources, enabling the partners to represent SAFER in different contexts.

A MULTIDISCIPLINARY APPROACH TO SAFE AUTOMATION



Will automated vehicles be safe? And what is safe enough?

SAFER takes on the safety perspective in the technology development

These are important questions that need to be solved before self-driving vehicles can be implemented at a larger scale. At SAFER, these are core research questions and the work to help implementation of safe automated vehicles that will contribute to a safe and sustainable transport system is being carried out in the reference groups.

Development and implementation of automated vehicles is an enormous task and the partners in SAFER are interested in working with matters that a multidisciplinary research platform can contribute with. Examples of areas are validation, verification, method development and field operational tests. Projects within automation and autonomous driving are growing in number and in the text below some examples are

presented. For a complete presentation of all projects related to autonomous driving, please see <https://www.saferresearch.com/projects>

COPPLAR

The COPPLAR project (Campus Shuttle Cooperative Perception and Planning Platform) aims to take the first step towards the vision of an autonomous vehicle that can handle city traffic and challenging weather conditions. The goal of the project is to build a prototype and a research platform. During the year a major upgrade of the test vehicle – the XC90 “Snowfox” have been carried out. A great step has been taken regarding development of functions, e.g. in situation awareness and integration of functionality for cooperative perception. The project has developed as anticipated and the final results will be presented in 2019.

Autofreight – automated trucks between Gothenburg and Viared

The overall objective with the project is to create conditions for self-driving trucks along highway 40 between Gothenburg harbor and Viared, a distance of about 75 kilometers. The vision is that the driver will drive the truck manually from the port to highway 40 and then activate the autonomous mode. The project will also review existing legislation for high level automation.

L3Pilot



L3Pilot is a common European venture to evaluate the potential of 23 different features of self-driving cars, as well as investigating the drivers', and drivers in surrounding vehicles, attitudes towards these cars. Helena Gellerman, project leader at SAFER explains: "L3Pilot aims to demonstrate how self driving cars work in realistic environments, identify remaining technology gaps, affect different relevant policies and raise awareness about the technologies' potential to different stakeholders. The result, and the processes developed as a result of the project, will help support the introduction of self-driving vehicles".

11 countries, 100 vehicles and 1000 drivers are involved in the study. SAFER's responsibility is analysis of naturalistic driving data, which is one of the key tasks in this exciting project.



RealSIM for AD

One of the main problems when developing autonomous vehicles is the availability of real-life driving data and testing of the new functions. Therefore, in SAFER's new project "RealSIM for AD", tools for simulation, based on SAFER's unique databases with real-life driving data, will be developed. The challenge is to make simulation tools look similar to the reality, and here are SAFER's databases, which contain more than 5 million kilometers of data, an important asset.

Idolly – self-driving trailers without drivers on public roads

Half an hour's drive on the highway east of Gothenburg Viared Industrial Park is located. Within soon,

self-driving trailers will drive from the transshipment terminal to the various companies in the industry park. The semi-trailer will be transported without a driver by means of a so-called dolly. A dolly can be connected to the front of a trailer and hence give the trailer a front axle. In this case, the dolly is equipped with its own electric motor, steering, different types of sensors and an advanced control system. This allows the dolly-trailer combination to drive autonomously, without a human driver.



Drive Sweden Test Site Automated Highway III

SAFER is leading this new project to accelerate the implementation of autonomous vehicles and digitized transports. The purpose is to create test beds for the development, evaluation and demonstration of autonomous and digitalized transports, focusing on rural roads and highways. The project will help improve visibility and coordination between actors and between projects that demonstrate and test autonomous regional and long-distance transport of goods and people.

Auto pilot site to plant

The purpose of the project is to build a safe and efficient fully automated transport system that is capable of operating in narrow spaces, such as a mine, and on public roads. The material from the mine will thus be transported without a driver in the vehicle all the way from the mining area to the enrichment plant. The system should be able to work both with and without support from various infrastructure systems, such as GPS, WiFi and 4G.

Drive Me

Drive Me is one of the world's first full-scale pilot projects with autonomous cars, real customers and testing on public roads. SAFER is represented in the Drive Me project management and as the academic partner in Drive Me. This will strengthen the project's scientific dimension, which includes independent research and programmes for educating new experts.

In December 2017, the first two families, the Hains and the Simonovskis, received their Drive Me cars. The families will test its cars on the public roads of Gothenburg and support the research project with driving data and information about their everyday use and interaction with the cars.



ESPLANADE

One of the key issues investigated in the project is how the communication between the car and the driver will be set up, for example, by clarifying who is responsible for conveying the vehicle in different situations. The ESPLANDE project aims at providing a methodology that can be applied to increasingly complex tasks in order to ensure a safe introduction of more and more advanced self-driving vehicles.

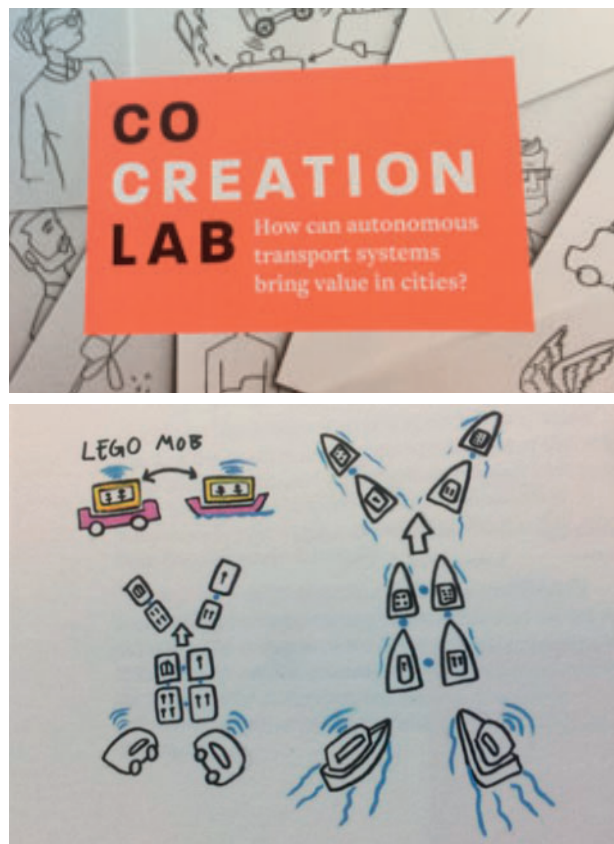
VICTIg

The successful SAFER project VICTIg – Vehicle ICT Innovation Methodology – has now been finalised after five years of research. The project has been aiming to find methods for efficient development and test of the software intense ICT functions that enable active safety functions for automated and assisted vehicles. Three conference papers, one journal paper, and one licentiate thesis have been published in the project.

Co-creation lab

How can autonomous transport systems bring value in cities? So far, discussions and projects concerning autonomous vehicles have mainly been related to technology, technical systems, internet services and legislation. There is very little material on how autonomous vehicles affect the city's infrastructure, traffic, environment, city life and people's everyday lives. Stakeholders from various professions and backgrounds gathered in these co-creation workshops, where they through creative exercises developed new ideas and

concepts related to autonomous transport systems in specific urban contexts. The purpose was not to create ideas for implementation, but to explore hidden values and identify the competence gaps to free them.



SAFER Human Body Model 9.0 has been launched

Work within the Human body protection Research area has resulted in world-leading HBM-functionality. During 2017 the 9th version of SAFER's Human Body Model was launched and well received. The project partners now have a competitive advantage of a unique tool to evaluate occupant protection in a crash. The human model combines research results from several of SAFER's HBM projects and is world-leading in its functionality. As far as we know, this is the only model, even the only tool or crash test dummy, that manages to recreate the movement during a turn or brake manoeuvre with a subsequent collision (in the same sequence). The research efforts has resulted in numerous publications and several PhD students. This is an example of prominent research and benefits unique to SAFER partners, as well as a successful combination of results from several projects. In addition, in the HBM area, SAFER partners have recently received funding for two major EU projects. SAFER's HBM efforts have most likely contributed to this.

INCREASED SAFETY AWARENESS AMONG PEOPLE IN TRAFFIC



How do people behave in traffic and how can we support them to act safer? SAFER's Research area Road user behaviour look into this matter in depth.

A relatively new research area at SAFER is Road user behaviour. The working group was formed in early 2017 and the activities are now in full swing. Three important projects are presented below, the complete project portfolio is available to read on <https://www.saferresearch.com/projects>



FFI Cycle – kick starting safer cycling

The fact that increased cycling can contribute to more sustainable mobility is beyond doubt. But how to make biking safer is more complicated. Therefore, SAFER was commissioned to kick-start research in the field. The aim of the project was to stimulate project ideas within academia, industry and society. The project was rewarding and a total of seven projects went on for review for funding and project implementation. The conclusions were also linked to the ITS-plan for Vulnerable road users drawn up in the spring 2016, as well as the Swedish Transport Agency's (GNS) work on updating the Swedish cycling strategy. This project is a good example of how a multidisciplinary research arena such as SAFER can contribute to cooperation and innovation over traditional boundaries as well as supporting Sweden's overall sustainability targets.



MeBeSafe – a Nobel Prize winner's theory is being tested at SAFER

MeBeSafe (Measures for Behaving Safely in Traffic) aims at reducing the number and severity of road accidents by directly changing our habitual traffic behaviour. Various nudging and coaching measures will be used to get tired drivers to take a break and cyclists to reduce their speed in intersections, for example. A nudge means a friendly, little push towards a behavioural change. The nudging concept relates to subconsciously pushing humans to make a desired choice, without being prohibitive against alternative choices of action. By preserving our freedom of action and giving us choice, nudging measures are less intrusive and can be provided earlier in a chain of events that might lead to a critical situation.

The Nobel Prize 2017 was awarded to Richard H. Thaler, University of Chicago, IL, USA "for his contributions to behavioural economics". And the same theory – nudging – is now being tested at SAFER.

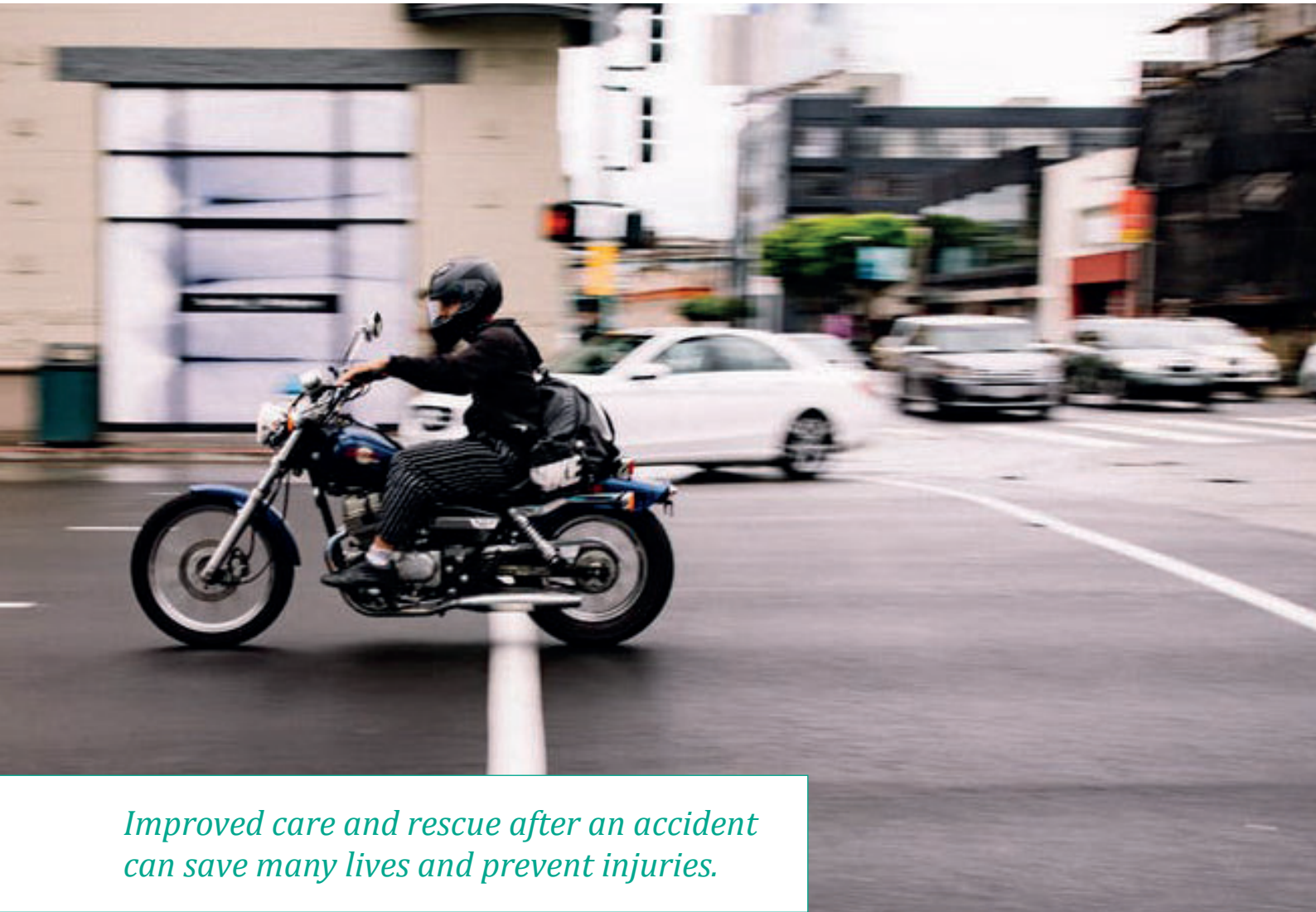


ADAS & Me

ADAS&Me is the acronym for "Adaptive ADAS to support incapacitated drivers Mitigate Effectively risks through tailor made HMI under automation". This EU project will develop adaptive HMI to automatically hand over different levels of automation and thus ensure safer and more efficient road usage for all vehicle types.



CARE AND RESCUE AFTER A TRAFFIC ACCIDENT



Improved care and rescue after an accident can save many lives and prevent injuries.

The SAFER research area Care and Rescue has focused its work on expanding the research portfolio into areas not previously addressed and involving new stakeholders. Examples are rescue services and MSB (Myndigheten för Samhällsskydd och Beredskap/ Swedish Civil Contingencies Agency). New areas addressed for research are for instance extrication, post-crash fires, safety for rescue personnel at scene and long-time effects of injuries. All these are good examples of areas that can contribute significantly to reduce mortality and injuries in the phase following a traffic accident. As part of the “expanding the research portfolio” strategy dialogue with insurance companies and potential new partners, especially start-up and innovation intense smaller companies, have also been carried out.

Publicity in prestigious journals and innovative products with its origin at SAFER

Several pre-studies earlier carried out at SAFER have taken off to the next phase and developed into successful projects and products. Publications from the SAFER environment have attracted great international attention and received awards, e.g. SAFER researchers Rubén Buendia, Stefan Candefjord and Bengt Arne Sjöqvist was published in the very prestigious scientific journal Physiological Measurement. The title of the paper is Bioimpedance technology for detection of thoracic injury and gives in depth scientific information on how prehospital care can save lives, e.g. after a traffic accident. The article was selected into PMEA's Highlights of 2017 Edition as one of the very best research articles which featured

some of the most cutting-edge areas of biomedical engineering, and was one of the most influential research published in PMEA in 2017.

The invention Jalp!, developed to save lives of cyclists and All-terrain vehicle-drivers, and originated from SAFER, is now further developed for MC at Chalmers Ventures Entrepreneurship School under the name Detecht. Jalp! can shorten the time it takes until the injured person can be given care and thus save lives and reduce injuries. Jalp! uses built-in sensors to collect data on how the bike is moving. If an accident occurs, the sensors will detect this and start to vibrate and send out an audible signal. SOS alarm can also be contacted. Another app, LogYard, collects real-time data using sensors in any smartphone and stores it in a cloud-solution. The data can be used for various purposes, for instance when designing crash detection algorithms or analyze movements.



Conclusions from researchers: One third of the fatalities can be prevented



Many fatalities in traffic could be avoided if the injured in a traffic accident get faster and proper care. In January 2018 SAFER held a session at Transportforum session on this important topic. As a starting point

international research was presented showing that up to 30% of traffic accident victims could be saved if proper care and rescue was implemented. Bengt Arne Sjöqvist, SAFER's research area director for Care & Rescue, says:

"This research says that two thirds of the fatalities occur within 1 hour after the accident is a fact and that one third could actually be prevented. One key measure is to save time in every part of the rescue and care chain – from incident detection to final care destination. Another key measure is to increase precision in all decisions being made in the chain – and here valid and correct information is the key. One example is to decide what rescue and care resources to send out, another example when deciding where to transport a patient to provide optimal care. Transport to the closest one may not always be the best".

Microwave helmet can support rescue personnel



A project initiated from SAFER has produced groundbreaking research on how a microwave helmet can yield fast and safe evaluation of head injuries (intra-cranial bleedings). The project has passed its first clinical study and the second is now running.

Another successful project is "Prehospital Diagnostics for Traumatic Thoracic Injuries". Traumatic injuries cause about six million deaths per year worldwide, and many survivors suffer life-long disabilities. Traffic accidents are a common cause. Thoracic (related to chest) account for over a quarter of fatal and severe injuries. Two common thoracic severe injuries are presence of air and blood in the pleural space (between the membranes surrounding the lungs). These conditions can be life threatening and diagnostic tool in the prehospital setting, i.e. in road and air ambulances can save lives. In this project the intent has been to evaluate the use of microwave technology combined with electrical bioimpedance to diagnose and monitor presence of air and blood in the pleural space. Initial tests with promising results have been carried out in animals together with among others the University of Stavanger, Norway.

Development of test lab for prehospital care

The interaction with PICTA (Prehospital ICT Arena) at Lindholmen Science Park has developed positively and provided SAFER access to the prehospital care community in Sweden and some Nordic countries. Already today, SAFER has access to a virtual test bed where important simulations of the complete care chain can be implemented. Lead by Borås University a project has now been initiated to develop this into a permanent prehospital lab for research, development and business analysis. Such a lab will of course be a great asset to SAFER.

Finally, several projects have been associated and added to the project portfolio, see complete list on www.saferrresearch.com/projects, and continuous research and new knowledge in these areas may result in new partners joining SAFER and new research projects in the year to come.

SAFETY FOR THE LITTLE ONES



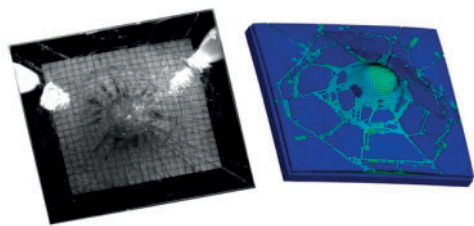
Important real-world needs for children in cars identified by SAFER's researchers.

Child safety is a prioritised research area at SAFER and one successful project that was finalized in 2017 was “Småfolk”. The overall objectives was to reduce the number and severity of injuries of forward facing children, from 3-4 years old up to small adults, in the rear seat of passenger vehicles. The focus was real-world aspects of child safety, comprising the whole context of the vehicle and child restraints, and a variety of crash situations, including pre-crash events. International multidisciplinary workshops were held and concluded, among other things, that future advancements need to be data driven and incorporate multiple disciplines. The results from this project contribute to identification and quantification of important real-world needs, as well as evaluation and development of countermeasures.

Also, a well-attended child safety seminar Child safety protection was conducted with about 70 international researchers from all around the globe. The seminar was very appreciated and this illustrates that we put SAFER and Sweden – still – on the map as a forefront of child safety. SAFER are constantly introducing new areas and expanding the research needs with the aim of protecting children in real-life traffic.



CONTINUED SUCCESS OF THE SAFER COMPOSITE CLUSTER



New materials require new knowledge and tools.

Within the composite area, there is still full activity and during the year there has been a focus on running the three major projects that started in early 2017; CompMethGlass, FFI – Crash2 and Ductile Composite. Within these projects, three PhD students have been employed, who add great knowledge in composite and crash.

CompMethGlass II (Computational Method for laminated Glass in crashes) aims to develop material models for both PVB and adhesive joints and also to develop a methodology for predicting failure in the area of adhesive material in the glass to car body connection. FFI Crash2 is part of a cluster of projects that together build CAE skills for composite and safety development. This project also holds the role of con-

tinuing to build coordinated national development in the area. The project Fiber Composites with Ductile Properties aims to create and validate material models for the 3D-reinforced composite (developed by Biteam) under mechanical stress.

In order to further strengthen the international network, a major workshop on this topic will be held in Gothenburg, September 2018. Research results have been presented and received great international attention at the 21st International Conference on Composite Materials in Xian, China and at ECCOMAS Composites. The Volvo-owned Polestar brand announced in October 2017 that they will present a car built in composite in 2019. This will be a strong driving force for further research within this area.

Appendix 1: SAFER Partners

The following partners and members have been engaged in SAFER during operational year #12:

Partners

- Autoliv Development
- Chalmers University of Technology
- City of Gothenburg
- Combitech
- Cycleurope
- Folksam
- Halmstad University
- If Insurance
- Institute of Transport Economics (TØI)
- KTH Royal Institute of Technology
- Lindholmen Science Park AB
- RISE (including former partners Acreo Swedish ICT, AstaZero, Viktoria Swedish ICT, Swerea IVF, SP Technical Research Institute of Sweden, Swerea Sicomp AB)
- Scandinavian Automotive Suppliers (FKG)
- Swedish National Road and Transport Research Institute (VTI)
- Swedish Transport Administration
- Swedish Transport Agency
- University of Gothenburg
- Volvo Car Corporation
- Volvo Group

Members (associated partners)

- Malmeken AB
- Mälardalen University
- Trivector
- Uniti
- University of Borås
- University of Skövde
- University of Umeå
- V-Traffic
- Zenuity
- ÅF

Appendix 2: SAFER Board

The following members have been part of SAFER Board during the operational year:

- Autoliv: Cecilia Sunnevång
- Chalmers: Sinisa Krajnovic and Johan Karlsson (who also represents University of Gothenburg)
- RISE: Jan Jacobson
- Swedish Transport Administration: Maria Krafft
- Volvo Car Corporation: Malin Ekholm
- Volvo Group: Magnus Rilbe
- VTI: Jonas Jansson
- Independent chairperson: Karin Svensson
- Hans Fogelberg (Region Västra Götaland) and Eric Wallgren (Vinnova) join the board as observers

Appendix 3: SAFER Management group

The following members have been part of SAFER's management group during the operational year:

- Anders Marby, Director (April 1-August 13, 2017)
- Bengt Arne Sjöqvist, Research area director Care and Rescue
- Christian Grante, Research area director Systems for accident prevention and automated driving
- Fredrik Von Corswant, Infrastructure leader Revere
- Helena Gellerman, Infrastructure leader Naturalistic driving data
- Ines Heinig, Project coordinator
- Johan Strandroth, Vision Zero academy (until May 2017)
- Kristina Lindblom, Controller
- Lotta Jakobsson, Research area director Human body protection
- Magnus Granström, Director (as of August 14, 2017)
- Malin Persson, Communications and partnerships
- Mats Svensson, Chalmers profile director traffic safety
- Matteo Rizzo, Vision Zero Academy (as of November, 2017)
- Tania Dukic Willstrand, Research area director Road user behaviour
- Torbjörn Andersson, Research area director Safety performance evaluation

Appendix 4: Competence areas at SAFER

Behaviour in Accident Causation

By applying an interdisciplinary approach, the scope of this competence area is to quantify the role that human behaviour plays in causing accidents and derive safety priorities from this knowledge.

Competence area leader: Trent Victor

Biomechanics & Protective Systems

This competence area spans the entire injury prevention field including fundamental biomechanics of for instance brain, neck and thorax, as well as human body modelling, child safety and unprotected road users' safety.

Competence area leader: Mats Svensson

Driving Simulator Applications

Driving simulator applications concern the use and development of these research tools. Simulators offer several benefits, such as the possibility to study concepts and prototypes in the early phases of development and risk free testing of systems for accident prevention.

Competence area leader: Lena Nilsson (until December 2017), Alexander Eriksson

Field Data

Field data includes the competences involved in the whole chain from collection of data, analyses (case analyses and aggregated), data storage and management to effect analyses.

Competence area leader: Vacant

Functional Safety

Functional safety is the absence of unreasonable risk due to hazards caused by mal-functioning behaviour of electrical or electronic systems. The challenges are high for the systems used in active safety and automated driving. Also, security issues will influence the functional safety of connected road vehicles.

Competence area leader: Jan Jacobson

Human Factors Design

Human factors design is about the interplay between humans and technical systems in different contexts; how technical systems should be designed to achieve efficient and safe interaction with the users.

Competence area leader: MariAnne Karlsson

Human Monitoring

Human monitoring focuses on methods to measure, record and analyse human vital signs and physiological information in all areas such as Care and Rescue situations and field or simulator studies on human behaviour.

Competence area leader: Bengt Arne Sjöqvist (until August 1, 2017)

Road Infrastructure

Road infrastructure covers the competences needed for the design of roads and road way structures including infrastructure for communication.

Competence area leader: Nicole Kringos

Sensors & Communication

Sensors and communication enable technologies for a plethora of safety systems. The scope of this group is to create and share research ideas around vehicular communications, sensors systems, and signal processing.

Competence area leader: Erik Ström

Structures & Materials

The purpose of this competence area is to gather researchers concerned with vehicle architectures and lightweight materials suitable for future efficient vehicles with new powertrains.

Competence area leader: Martin Fagerström (until December 31, 2017)

Vehicle Dynamics

Vehicle dynamics is creating a collaborative arena connecting vehicle dynamics research carried out in academia/institutes and the corresponding advanced engineering activities in the automotive industry.

Competence area leader: Bengt Jacobson

Appendix 5: List of projects at SAFER

Project	Project leader	Start	End	Funder	Partner
SYSTEMS FOR ACCIDENT PREVENTION AND AUTOMATED DRIVING					
Revere Lab Build up 2	Fredrik von Corswant	2016-04-01	2017-12-31	VGR	Chalmers, VCC, AB Volvo, VGR
AutoFreight	Fredrik von Corswant	2017-04-01	2019-12-31	VINNOVA	AB Volvo, Combitech, City of Borås (incl. companies at Viared industrial area), Chalmers
DriveSweden TestSite Automated Highway III	Fredrik von Corswant	2017-11-01	2018-10-31	VINNOVA	Chalmers
Active Converter Dolly testing	Manjurul Islam	2016-01-01	2018-06-30	FFI	Chalmers, Volvo GTT, Parator
ASP - Autopilot Site to Plant		2017-09-01	2019-03-31	FFI	AB Volvo, Combitech, Boldien, Chalmers
Automated Safe and Efficient Transport System	Johan Tofeldt	2015-01-14	2018-09-30	FFI	AB Volvo, Chalmers, Boliden Mineral AB, Combitech AB och Renova Miljö AB
C2VC	Leo Laine	2017-03-01	2018-12-31	VINNOVA	AB Volvo (coordinator), Chalmers TM (and S2 and Computer Science)
Chronos	Niklas Lundin	2016-09-01	2018-03-31	FFI	AstaZero, VCC, AB Volvo, Autoliv, Ericsson, Sentient+, Berge, Fengco, Vinga Lab, HiQ, Chalmers, SP
Esplanade	Fredrik Warg	2017-01-01	2019-12-31	VINNOVA / FFI	Autoliv, Comentor, Delphi, KTH, RISE, Semcon, Systemite, VCC, AB Volvo, Qamcom, Zenuity
iDolly	Per Larsson	2017-10-26	2020-08-31	FFI	Volvo Technology AB, Chalmers, VBG Group Truck Equipment AB

DriveSweden TestSite AutomatedHighway I+II	Fredrik von Corswant	2016-11- 01	2017-10- 31	VINNOVA	Chalmers
RealSIM	Niklas Lundin	2017-11- 01	2019-12- 31	FFI	AstaZero, Chalmers, Data Intelligence, Wiretronic, Volvo Technology
SERET (Safe Road Trains for Efficient transport)	Stefan Bergquist	2012-12- 01	2017-12- 31	FFI	Scania, Volvo, Royal Institute of Technology, SICS Swedish ICT, Schenker AB, and Trafikverket
Sweden4Platooning	Stefan Bergquist	2017-01- 01	2019-12- 31	FFI	Scania, Volvo, Royal Institute of Technology, SICS Swedish ICT, Schenker AB, and Trafikverket
ROAD USER BEHAVIOUR					
Adaptive - Automated Driving Applications and Tech	Martin Sanfridson	2014-01- 01	2017-06- 30	EU	AB Volvo, VCC, Chalmers, Uni Lund, plus European project partners
ADAS&Me	Anna Anund	2016-09- 01	2020-03- 31	EU H2020	SAFER partners Autoliv, VTI
AIMMIT	Annie Rydström	2014-01- 01	2017-03- 31	FFI	VCC, Viktoria Swedish ICT, Chalmers PPU, Semcon Caran AB
AUX (Automotive User Experience)	Annie Rydström	2013-01- 01	2017-12- 31	FFI	VCC, InUse Experience AB, Viktoria Swedish ICT, Chalmers PPU+ITIT, HiQ
BikeModel	Marco Dozza	2015-06- 01	2017-03- 31	TV	Chalmers
FFI Cykel	Tania Dukic	2017-03- 01	2017-12- 31	FFI	Chalmers, IF, Autoliv, AB Volvo, VCC, VTI, CYCLEUROPE AB, Statens väg- och transportforsknin gsinstitut
MeBeSafe	MariAnne Karlsson	2017-05- 01	2020-10- 31	EU 2020	SAFER JRU (Chalmers, Trafikverket),

					VCC, other EU Partner
HATric (HMI for autonomous vehicles in Traffic)	Annie Rydström	2014-08-01	2017-06-30	FFI	VCC, VTI, Chalmers PPU
HF Auto	Jan Andersson	2013-12-01	2017-12-31	Marie Curie ITN	VTI, Chalmers, Volvo AB
PROSPECT - Proactive Safety for Pedestrians and Cyclists	Jordanka Kovaceva	2015-05-01	2018-10-31	EU	Chalmers, VTI, VCC
QUADRAE - Quantitative Driver Behaviour Modelling	Mats Petersson	2016-01-01	2019-12-31	FFI	VCC, AB Volvo, Autoliv, VTI, Chalmers
TRUST-ME, Time-efficient RobUSt verification of au	Jonas Nilsson	2014-05-01	2017-12-31	FFI	VCC, Chalmers
HUMAN BODY PROTECTION					
Adipose Tissue	Håkan Johansson	2014-01-01	2019-12-31	VR	Chalmers
A-HBM, step 3	Lotta Jakobsson	2014-10-01	2017-12-31	FFI	VCC, Autoliv, Chalmers
Fluid structure interaction in HBM	Håkan Nilsson	2013-01-01	2017-12-31	SAFER (AoA)	Chalmers
Compcrash 2	Robin Olsson	2016-01-01	2019-12-31	Energimyndigheten	Swerea SICOMP, Gestamp, VCC, Volvo Trucks, Chalmers TM
CompMethGlass II	Kjell Mattiasson	2017-11-01	2019-02-28	FFI	Chalmers, VCC, Dynamore Nordic
Ductile composite	Martin Fagerström	2016-12-06	2019-12-31	Energimyndigheten	Chalmers, KTH och Biteam + VCC
Female whiplash injury mechanisms, FusakoSato/JARI	Mats Svensson	2016-01-01	2019-12-31		JARI, Chalmers
FFI- Crash2	Martin Fagerström	2017-01-01	2020-03-31	FFI	Chalmers, SICOMP, Gestamp, VCC, AB Volvo, ÅF, Escenda, FS Dynamics, NEVS, DynaMore och MSC Software
ICONIC	Robin Olsson	2016-10-01	2020-09-30	EU	Swerea SICOMP + non-Swedish full partners (8) and partner organisations (5)

Injury HBM, step 3	Bengt Pipkorn	2016-02-01	2018-12-31	FFI	Autoliv, VCC, Chalmers, Umeå Univ, SU
Long Term Consequences	Bengt Pipkorn	2017-10-01	2020-09-30	FFI	Autoliv, VCC, KTH, POC, MIPS
Passenger Safety	Lotta Jakobsson	2017-06-15	2020-08-31	FFI	VCC, Autoliv & Chalmers
SENIORS	Bengt Pipkorn	2015-06-01	2018-05-31	EU	Autoliv (+ BAST, Fiat, Ford, Humanetics, IDIADA, TRL, LMU)
Skadekriterier Whiplash	Johan Davidsson	2016-01-01	2017-12-31	Folksam	Chalmers, Folksam
Småfolk Part 2	Lotta Jakobsson	2013-01-01	2017-09-30	FFI	VCC, Chalmers, Autoliv
ViVA II	Astrid Linder	2017-04-01	2019-09-30	VINNOVA	VTI, Chalmers, Folksam och VCC
CARE AND RESCUE					
Computerized Clinical Decision Support	Ruben Buendia	2016-01-01	2017-12-31	Prehospital ICT Arena (PICTA)/Lindholmen Science Park	PICTA, Univ. of Borås, SU/Ambulance
Detecting Chronic Subdural Hematoma with Microwave	Stefan Candefjord	2016-01-01	2017-12-31	VR (Vetenskaprådet/Swedish Research Council)	Sahlgrenska Academy, Sahlgrenska Univ. Hospital
Detecting Traumatic Intracranial Haemorrhage	Stefan Candefjord	2016-01-01	2017-12-31	VR	Sahlgrenska Academy, Sahlgrenska Univ. Hospital
Microwaves&Electrical bio-impedance - part 2	Stefan Candefjord	2017-01-01	2017-12-31	Chalmers/Medtech West	Sahlgrenska Academy, Sahlgrenska Univ. Hospital, Univ. of Stavanger (Norway)
OSISP Algorithm Improvement Using Data Science	Stefan Candefjord	2016-01-01	2017-12-31	Chalmers AoA Data Science	
Prehospital transportation decisions	Stefan Candefjord	2016-01-01	2017-12-31	Chalmers/Medtech West	Sahlgrenska Academy, Sahlgrenska Univ. Hospital

SAFETY PERFORMANCE EVALUATION					
UDRIVE	Jonas Bärghman	2012-10-01	2017-06-30	EU	SAFER JRU (Chalmers, Epsilon, VTI, TÖI, VCC), AB Volvo
SafetyCube	Robert Thomson	2015-05-01	2018-04-30	EU 2020	SAFER JRU (Chalmers, VTI), TÖI
CARTRE	Helena Gellerman	2016-10-01	2018-09-30	EU 2020	SAFER JRU (Chalmers/LSP, VCC), AB Volvo
L3Pilot	Helena Gellerman	2017-09-01	2021-08-31	EU 2020	SAFER JRU (Chalmers), VCC, Autoliv, other EU Partner
UDRIVE Data User Group (UUG)	Helena Gellerman	2017-07-01	2017-12-31	Consortium financed	SAFER, DLR, IFSTTAR, LAB, SWOV, University of Leeds
Handbook of Road Safety Measures	Alena Høye	2013-01-01	continuing	Vegdirektoratet (Norge)	TÖI
CRASHED	Giulio F. B. Piccinini	2015-12-01	2018-03-31	VINNOVA	Chalmers, VCC, AB Volvo, LYTX

Appendix 6: Dissertations and Licentiate seminars

The following PhD students working in the SAFER environment have written their doctoral thesis during the operational year:

- **The contribution of vehicle, occupant and crash factors to the risk of injury as a result of vehicle rollover – new approaches to data and modeling**
Stephen Ridella, industry PhD-student from NHTSA, USA, Department of Mechanics and Maritime Sciences Chalmers University of Technology, May 17, 2017
<https://chalmersuniversity.app.box.com/s/ijyzu316e5gy7m393d4gbx2ub2gnatey/file/164290352775>
- **Same, Same but Different: On the Design of Cross-Regional Advisory Traffic Information Systems**
Minjuan Wang, Interaction Design, Chalmers University of Technology, May 24, 2017
<https://research.chalmers.se/publication/249202>
- **Muscle responses in dynamic events – volunteer experiments and numerical modeling for the advancement of human body models for vehicle safety assessment**
Jóna Márin Ólafsdóttir, Applied Mechanics, Vehicle Safety, Injury Prevention, Chalmers University of Technology, June 13, 2017
<https://research.chalmers.se/publication/249498>
- **Traffic Situation Management for Driving Automation of Articulated Heavy Road Transports -From driver behaviour towards highway autopilot**
Peter Nilsson, Mechanics and Maritime Sciences, Vehicle Engineering and Autonomous Systems, Chalmers University of Technology and Volvo Group, October 10, 2017
<http://publications.lib.chalmers.se/records/fulltext/251872/251872.pdf>
- **Understanding Boundary Conditions for Brain Injury Prediction –FE Analysis of Vulnerable Road Users**
Victor Strömbäck Alvarez, Royal school of Technology, November 6, 2017
The research was a s part of the associated FFI financed project “FFI Pedestrian - head and neck, part 2”, finalized in December 2016.
<http://www.diva-portal.org/smash/record.jsf?pid=diva2%3A1148842&dswid=1092>

The following students working in the SAFER environment have written their licentiate thesis during the operational year:

- **Older car drivers – Needs of vehicle support for safe individual mobility**
Thomas Broberg, Division of Vehicle Safety within SAFER, Chalmers University of Technology and Volvo Cars, April 20, 2017
<https://research.chalmers.se/publication/248730>
- **Visual response to attentional demand in increasing levels of automation**
Alberto Morando, Department of Mechanics and Maritime Sciences, Chalmers University of Technology, June 8, 2017
<http://publications.lib.chalmers.se/records/fulltext/249269/249269.pdf>

- **Female and male whole spinal alignment and cervical kinematic responses in rear impacts**
Fusako Sato, Applied Mechanics, Vehicle Safety, Injury Prevention, Chalmers University of Technology, June 19, 2017
<https://research.chalmers.se/en/publication/249576>
- **Driver interaction with vulnerable road users: Understanding and modelling driver behaviour for the design and evaluation of intelligent safety systems**
Christian-Nils Boda, Applied Mechanics, Accident Prevention in the Traffic Safety Division at Chalmers University of Technology, August 25, 2017
<http://publications.lib.chalmers.se/records/fulltext/250519/250519.pdf>
- **Calibration and Modelling of Adipose Tissue Under Impact Loading**
Hosein Nasari, Department of Mechanics and Maritime Sciences, Chalmers University of Technology, November 23, 2017
 His research is part of the ongoing associated project “Adipose Tissues”.
<http://publications.lib.chalmers.se/records/fulltext/252887/252887.pdf>
- **Modelling driver behaviour in run-off-road crashes: Applications in safety system development and safety benefit estimation**
Daniel Nilsson, Department of Mechanics and Maritime Sciences, Chalmers University of Technology, December 15, 2017
<http://publications.lib.chalmers.se/records/fulltext/253279/253279.pdf>
- **Mind off Driving: Effect of cognitive load on driver glance behaviour**
Emma Nilsson, Department of Mechanics and Maritime Sciences, Chalmers University of Technology and Volvo Cars, March 26, 2018
<https://research.chalmers.se/en/publication/501276>

Appendix 7: Seminars and conferences

Conducted external SAFER seminars, conferences and other events during year #12 includes:

- SAFER Project Day with project presentations, April 25, 2017.
- SAFER Seminar: “A Chinese outlook on future transportation and traffic safety” with CTS China-Sweden Research Centre for Traffic Safety, April 11, 2017.
- SAFER Seminar: “Protecting Occupants of all Ages, Shapes and Sizes” with Dr. John Bolte, The Ohio State University College of Medicine, May 3, 2017.
- SAFER Seminar: “Safety for automated vehicles” with Pete Thomas and Stephan Ridella, May 17, 2017
- SAFER Seminar: “Automotive Human Machine Interaction Design” with MariAnne Karlsson, Fang Chen, Jacques Terken and Andrew L. Kun, May 23, 2017.
- SAFER participated in Enhanced safety for Vehicles (ESV), Detroit, June 5-8, 2017.
- Child safety seminar: “Child Occupant Protection - Latest knowledge and future opportunities”, September 20, 2017.
- SAFER seminar: “Feasibility study of Chinese crash test dummy and human modelling development” with experts from CATARC, October 21, 2017.
- SAFER Seminar: “What does vehicle automation mean for infrastructure, road user behaviour and safety?” with Dr. Hanaeen Farah, Assistant Professor at TU Delft, Transport & Planning Department, November 2, 2017.
- SAFER Day: study tour to Halmstad University and Cycleurope in Varberg, December 7, 2017.
- SAFER Seminar: “Skilled Visuomotor Control in a Real-world Task - Explorations in the Cognitive Science of Driving” with Otto Lappi from University of Helsinki, December 14, 2017.
- Transportforum: SAFER held a session “Hur kan liv räddas och trafikskadorna reduceras genom att utveckla och förbättra vård och räddningsinsatser?”, January 10, 2018.
- SAFER seminar: “Security and privacy issues in future connected vehicles” with Tomas Olovsson, January 23, 2018.
- SAFER Workshop on Driver modelling (within QUADRE with Dream4Cars EU-project members), January 26, 2018.
- Seminar “Säkrare tung trafik”, co-host with NTF, March 7, 2018

Appendix 8: SAFER's global collaborations

Institutes and academy

- Children's hospital of Philadelphia
- Nagoya University
- University of IOWA
- University of Michigan Transportation Research Institute (UMTRI)

Collaborative organisations and research programmes

- Australia Driverless Vehicle Initiative (ADVI)
- CLEPA European Association of Automotive Suppliers
- CTS (China Sweden Traffic Safety Centre)
- Drive Sweden
- European Automotive Research Partners Association (EARPA)
- European Council for Automotive R&D (EUCAR)
- European Road Transport Research Advisory Council (ERTRAC)
- Forum för Transportinnovation
- HUMANIST
- Movéo
- Neuroscience Research Australia
- The Association for the Advancement of Automotive Medicine (AAAM)
- The Group for national cooperation (GNS Väg)
- SDNS Northern Europe (Sustainable Development Solutions Network)
- WARA-CAT (Collaborative and Autonomous Transport)
- WASP (Wallenberg Autonomous Systems and Software Program)

SAFER
VEHICLE AND TRAFFIC SAFETY CENTRE AT CHALMERS