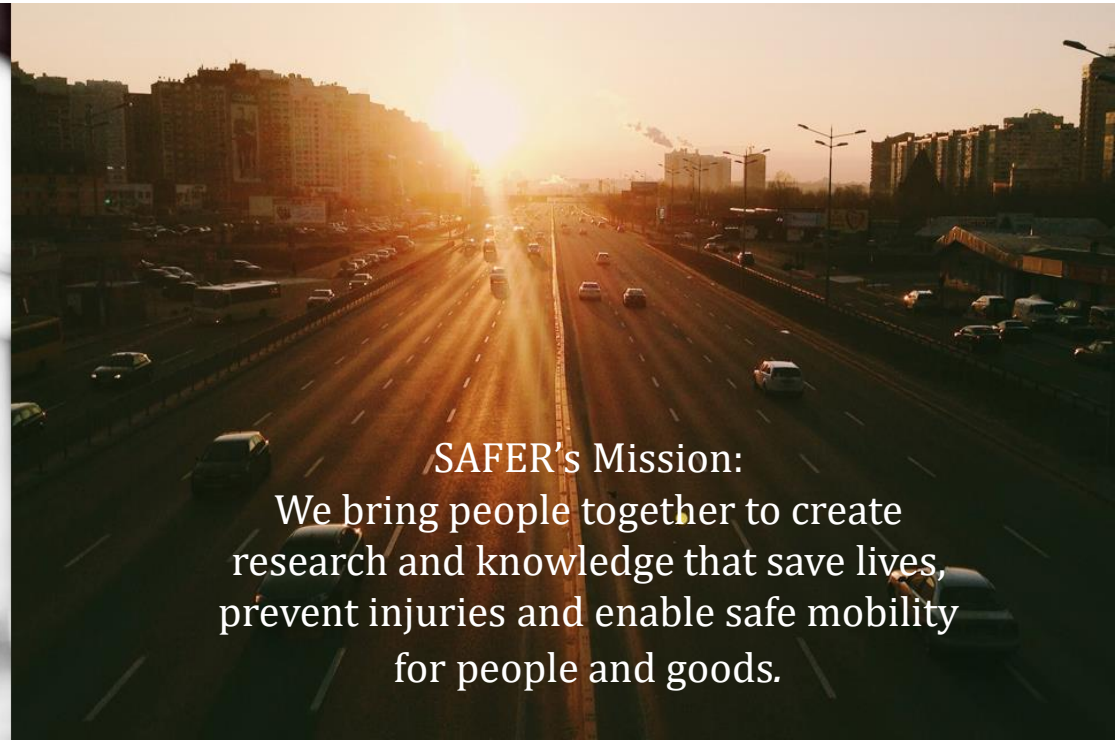
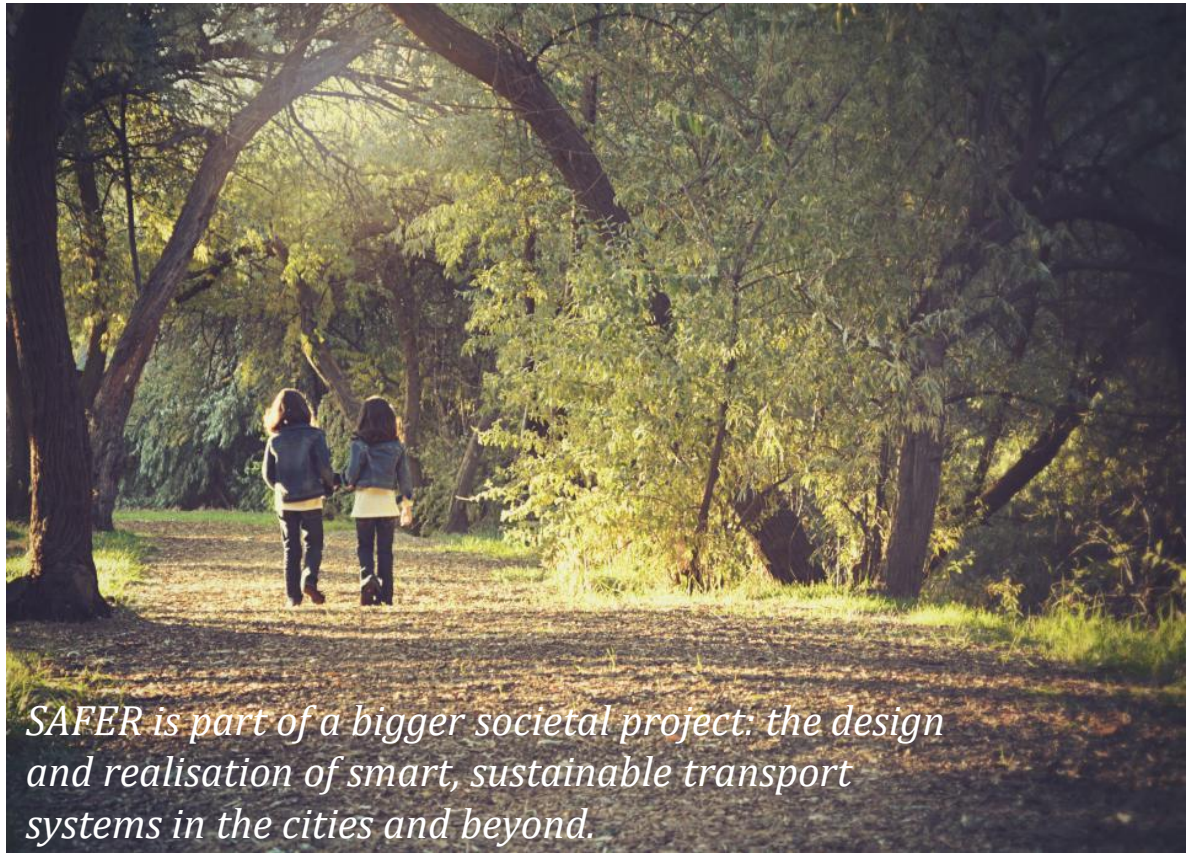

WELCOME TO SAFER.
WE BRING PEOPLE TOGETHER TO
CREATE RESEARCH AND KNOWLEDGE THAT
SAVE LIVES, PREVENT INJURIES AND ENABLE
SAFE MOBILITY FOR PEOPLE AND GOODS.
SAFER
VEHICLE AND TRAFFIC SAFETY CENTRE AT CHALMERS

SAFER'S VISION AND MISSION IN STAGE 5



THIS IS SAFER – KEY FACTS



SAFER is part of a bigger societal project: the design and realisation of smart, sustainable transport systems in the cities and beyond.

- A world leading **collaboration platform** for safe mobility.
- Performs **collaborative excellent multi-stakeholder research** with about 50 partners from the industry, the academia and the society.
- **Creates knowledge and value** beyond what a single partner can achieve on its own.
- Contribute to the creation of a **safe, sustainable, connected and automated traffic systems**, where traffic safety is the key.
- A **collaboration arena** where partners can co-create, meet and share research and knowledge.
- Gives access to the **unique traffic safety research competence** within the SAFER network.
- 18 years of successful research:
  - Close to 450 fulfilled projects
  - More than 1000 publications
  - About 600 active researchers

HOW CAN SAFER BE OF BENEFIT TO YOU?

In many ways!

- The **platform** with all its faciliation and co-creation opportunities.
- Our **network** – your source to knowledge, inspiration and answers to your questions.
- The **knowledge building activities** – keep up to date with the latest.
- World class **project portfolio** with its research results.
- **Connected research resources** that can be of benefit to your work.
- Possibility to **influence** on the international arena, e.g. calls, policy, legislation.
- Access to a broader **ecosystem**.

OUR SAFER PARTNERS

Active in Stage 5.

Society

City of Gothenburg
NTF Väst
Swedish Transport Administration
Swedish Transport Agency
Region Västra Götaland - *financier*

Academy & Institutes

AstaZero
Chalmers Industriteknik
Chalmers University of Technology
Halmstad University
Institute of Transport Economics (TØI)
Jönköping University
RISE (Research Institutes of Sweden)
Swedish National Road and Transport Research Institute (VTI)
University of Borås
University of Gothenburg
University of Lund
University of Skövde

Industry

Afry
Agreat
Aptiv
ASTUS
Arriver
Asymptotic
Autoliv
BETA CAE
Bookman
CEVT
Combitech
Consenz
Cycleurope
DuWill
Einride
Folksam
Hövding
If Insurance
Knightec
Malmeken
Pionate
QRTECH
Scania
Smart Eye
Svanberg & Svanberg
Tier
Trivector
Veoneer
Viscando
Volvo Car Corporation
Volvo Group
Voi
Zenseact

Italics: members / associated partners

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VEHICLE AND TRAFFIC SAFETY CENTRE AT CHALMERS

OUR RESEARCH AREAS AND DIRECTORS

Dedicated to save lives, prevent injuries and enable safe mobility.

SYSTEMS FOR ACCIDENT PREVENTION AND AUTOMATED DRIVING

KATRIN SJÖBERG
VOLVO GROUP

ROAD USER BEHAVIOUR

ANNA SJÖRS DAHLMAN
VTI

HUMAN BODY PROTECTION

JOLYON CARROLL
AUTOLIV

SAFETY PERFORMANCE EVALUATION

LINUS WÅGSTRÖM
VOLVO CARS

PRE-STUDY PROGRAM

Summary Stage 5

- Proposals received and reviewed: **54**
- Pre-studies funded: **32** (approval rate of 63%)
- Funding granted: **3 165 KSEK**
- Overall program budget: **7 MSEK**
- Already finalized: **25** (7 ongoing, joining into phase 6)
- Some results:
  - **Funding for larger projects** e.g., FFI project “I2Connect” or the Skyltfonden project “Here I go”.
  - **Master theses and PhD work** have been based on some of the pre-studies
  - **Publications** both in scientific journals and conference proceedings

Feedback: “The pre-study created a **very good collaboration**, not least with industry partners. SAFER has been a **key basis for knowledge, interaction, and key research areas** together with industries and other academic areas.“

SAFER'S COMPETENCE NETWORKS

The SAFER Competence network will contribute to:

- Inspire to create cross-functional projects
- Capture good ideas
- Build and spread knowledge
- Use their excellence for different assignments (e.g. applications)
- Stimulate joint dialogue though networking and all good that comes with that!

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SAFER'S INTERNATIONAL ENGAGEMENT

We are involved in several international working groups and through SAFER we have the opportunity to influence, for example, future framework programmes for research and innovation.

SAFER'S NATIONAL COLLABORATIONS

SAFER is present and has the connections needed to perform successful research, some examples:

National collaborative projects

Strategic national research programs

Political body working groups

Competence centres

Other research providers

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SAFER IN THE SWEDISH ECOSYSTEM DURING STAGE 5

CONNECTED RESEARCH RESOURCES UNDER THE SAFER UMBRELLA

As a SAFER partner you get, through projects, access to SAFER's connected research resources. Also, expertise to use these is available within the community. Hence, easier, better and more efficient research!

- SAFER open innovation arena and office environment (SAFER)
- SAFER Naturalistic Driving Data Platform (SAFER)
- Revere research lab for active safety and autonomous driving (Chalmers)
- AstaZero real-world proving ground (RISE/Chalmers)
- Driving simulators (e.g. VTI's SIM IV)
- SAFER's Human Body model
- Stora Holm Test Track
- The SAFER Data catalogue

OUR MAIN ACHIEVEMENTS IN STAGE 5

Over the past half-decade, we have significantly advanced our understanding of a safe traffic environment through partners' research. Our collective expertise has grown, propelling us into the next phase with enriched knowledge.

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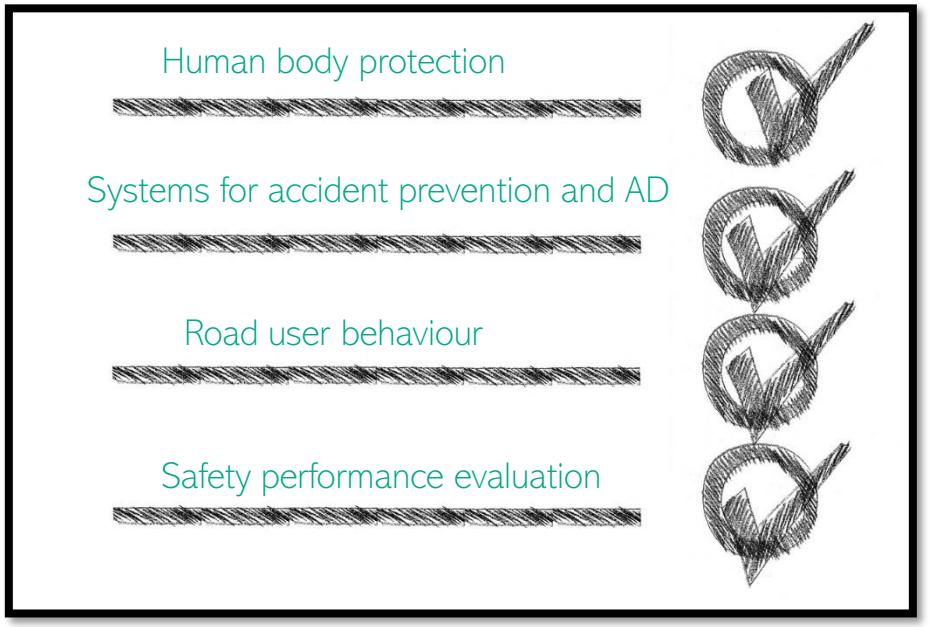
VEHICLE AND TRAFFIC SAFETY CENTRE AT CHALMERS

1. SCIENTIFIC TARGET FULFILMENT

We managed to generate research and activites for most of our research targets!

The **SAFER Pre-study program** has been an important tool for us to achieve this.

Our Research Area Directors and Ines will let you know more and see details in our exhibition today!



2. AI ADVANCEMENT

Elevated traffic safety research by integrating and exploring AI tools, notably through the **AI AWARE** project and the **AI Enhanced Mobility** program, financed by Drive Sweden.

Examples of explored areas:

- Road user intention recognition
- Risk assessment and accident avoidance
- Driver support
- Decision making in societal planning
- Optimised road maintainance
- Anonymisation
- Dynamic maps

We have concluded AI can be a valuable tool in infrastructre development to enhance traffic safety.

3. KNOWLEDGE DEVELOPMENT IN AUTOMATION FOR ROAD SAFETY

SAFER's competence network for Automotive safety assurance network has contributed to influencing **future safety standards** in automation.

Key contributions include **L3Pilot and ENSEMBLE**, major EU projects affiliated with SAFER, showcasing methods and challenges in automated driving.

ISO International Organization for Standardization

OUR MAIN ACHIEVEMENTS IN STAGE 5

4. KNOWLEDGE TRANSFER

Our research insights have disseminated in our network and beyond, reaching stakeholders through over **350 collaborative knowledge building activities**.

Ongoing strategic knowledge transfer projects in counties with high traffic mortality are underway with **India, Africa, and China**.

Hosting conferences

SAFER has had the privilege of hosting several leading international conferences, for example

- The **International conference on Driver Distraction and Inattention** in 2022,
- The **Scandinavian conference on system and software safety** in 2021, 2022, 2023
- The **International Conference and Transport and Traffic Psychology** in 2022.

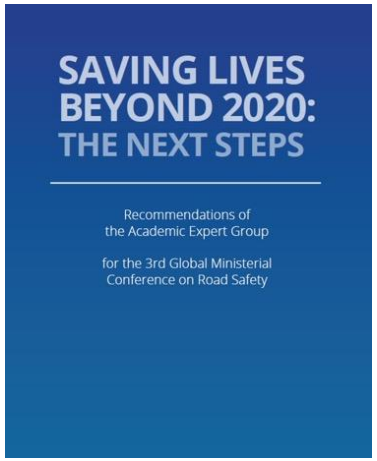
5. CONSORTIUM SUCCESS

Established strong consortia, resulting in successful **EU applications** such as the ongoing **Roadview** and **AfroSafe** projects.

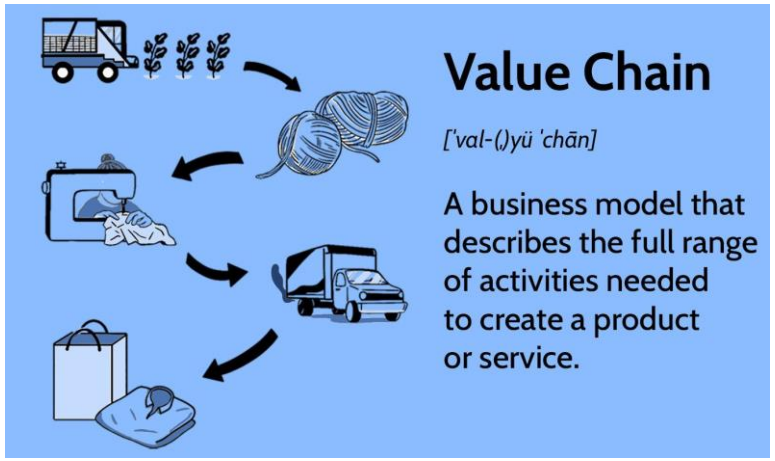
6. TRAFFIC SAFETY FOOTPRINT

Pioneered the **Traffic Safety Footprint approach**, presented at the UN conference on road safety in 2020 and gaining insights from the SAFER Think Tank.

The concept of traffic safety footprint, introduced at the global ministerial conference in Stockholm 2020, became a key focus for SAFER, aligning road safety with sustainability goals.



The recommendations from the UN conference in 2020 continue to guide and inspire us in our research.



Together we explored how organisations can integrate traffic safety into their corporate responsibility agenda; follow up and report their traffic safety impact throughout its value chain.

OUR MAIN ACHIEVEMENTS IN STAGE 5

7. NETWORKING EXCELLENCE

Recognised for creating valuable connections and facilitating high-level seminars and workshops, including SAFER's influential breakfast/ and lunch seminars that inspire ideas among attendees.

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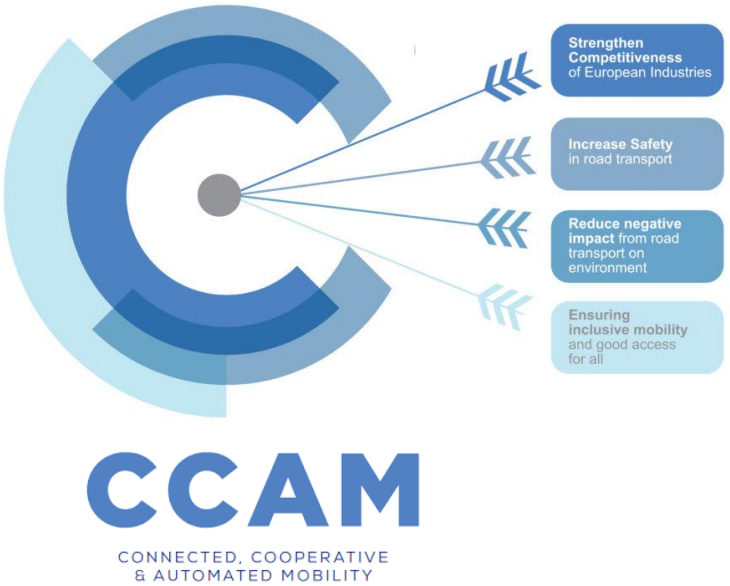
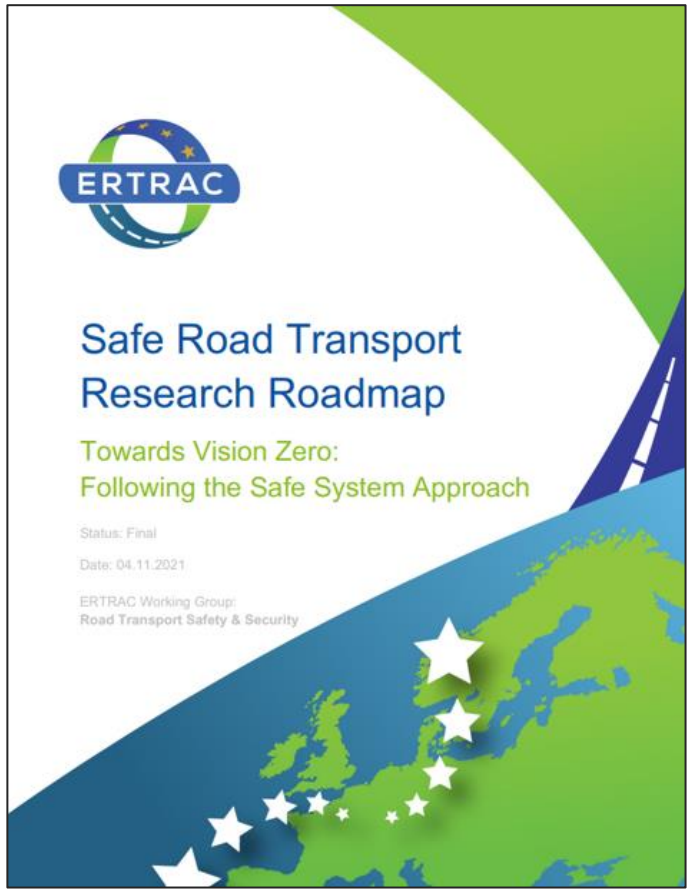
8. INFLUENCE THE GLOBAL TRAFFIC SAFETY AGENDA

Positioned SAFER at the forefront of global traffic safety discussions through contributions to, for example, ERTRAC and the CCAM partnership. Shaping the **Horizon Europe framework program**– our research agenda is secured.





9. DATA EXPERTISE

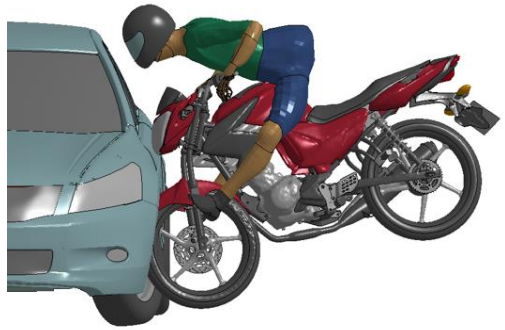
Partners plays central roles in EU projects like **Hi-DRIVE** and **FAME**, focusing on data collection, analysis, and sharing frameworks.

The SAFER Data Catalogue was launched in 2022 to further support partners with quality assured data for research.

Hi-Drive
Designing Automation

10. SAFER HUMAN BODY MODEL EVOLUTION

Successfully developed and applied the SAFER Human Body Model across numerous research projects.



Johan Iraeus, Chalmers University and Lotta Jakobsson, Volvo Cars, received the SAFER 15 years anniversary award as representatives from the cluster of HBM-projects at the prize giving ceremony in September 2021.

Key Achievements Stage 5

Project Milestone: SAFER HBM Version 10

- Achieved in year 2020 as part of Injury-HBM step 4 project with contributions from several other projects.
- Notable model updates were a population average male pelvis, new soft tissue mesh with softer materials for the torso, and new distal upper and lower extremities.

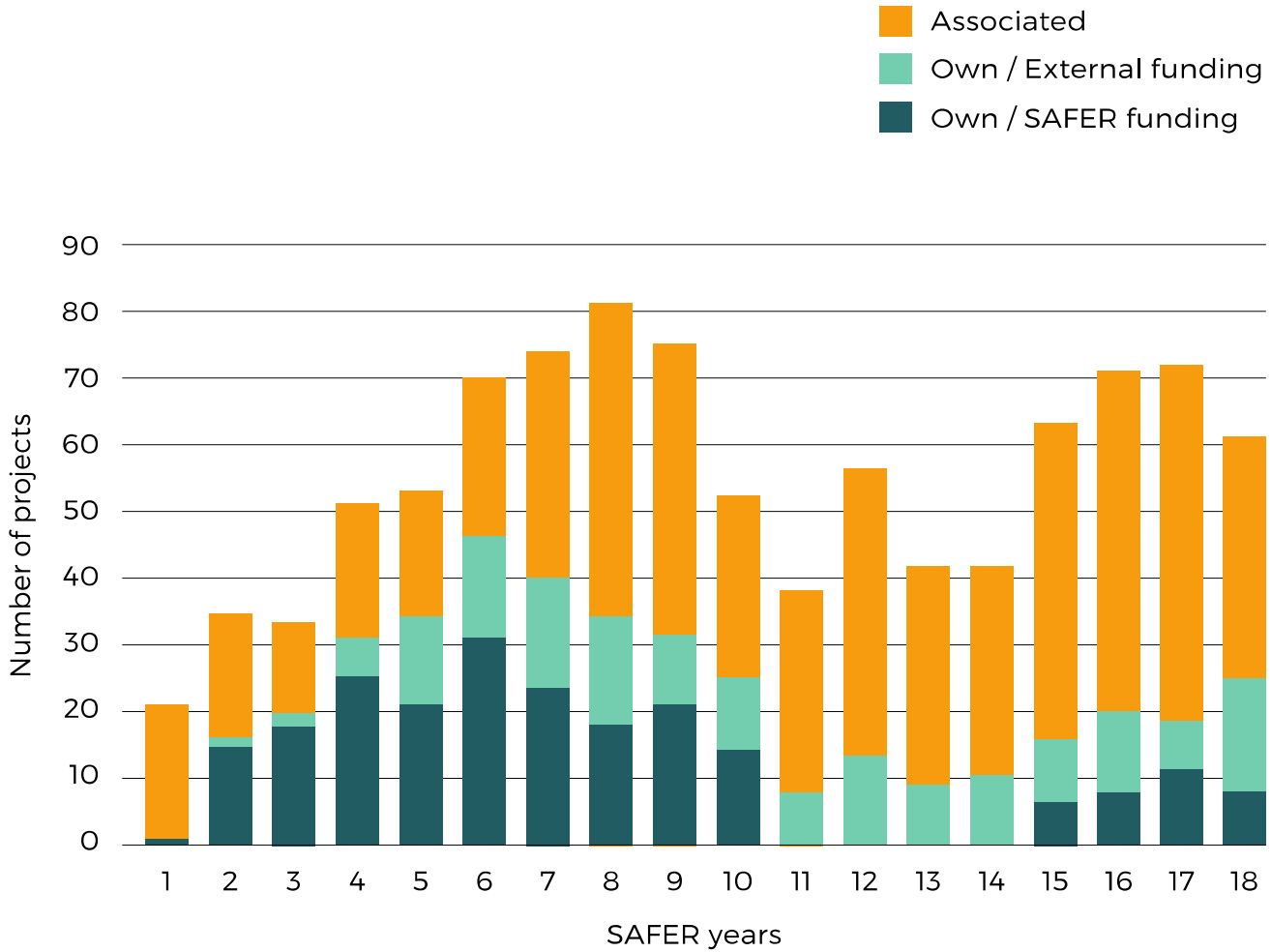
Targets achieved during this phase:

- Improved omnidirectional injury prediction capabilities, such as further improved prediction for rib fracture and brain injury.
- Model validation to simulate a variety of impact scenarios.
- Scalability by morphing to a diverse population of occupants.
- Demonstrations of whole-sequence crash simulation capability, addressing the challenges posed by increased vehicle automation.

SAFER 15 year Anniversary Award – most important cluster of projects in SAFER's history, according to the partners.

Publication output: 29 publications

DEVELOPMENT OF SAFER'S PROJECT PORTFOLIO



KEY FIGURES FOR STAGE 5

- More than **420** projects from start in 2006
- **169** ongoing projects
- **131** new projects
- **142** finalised projects
- **40** projects enters year 19, #1 in SAFER Stage 6

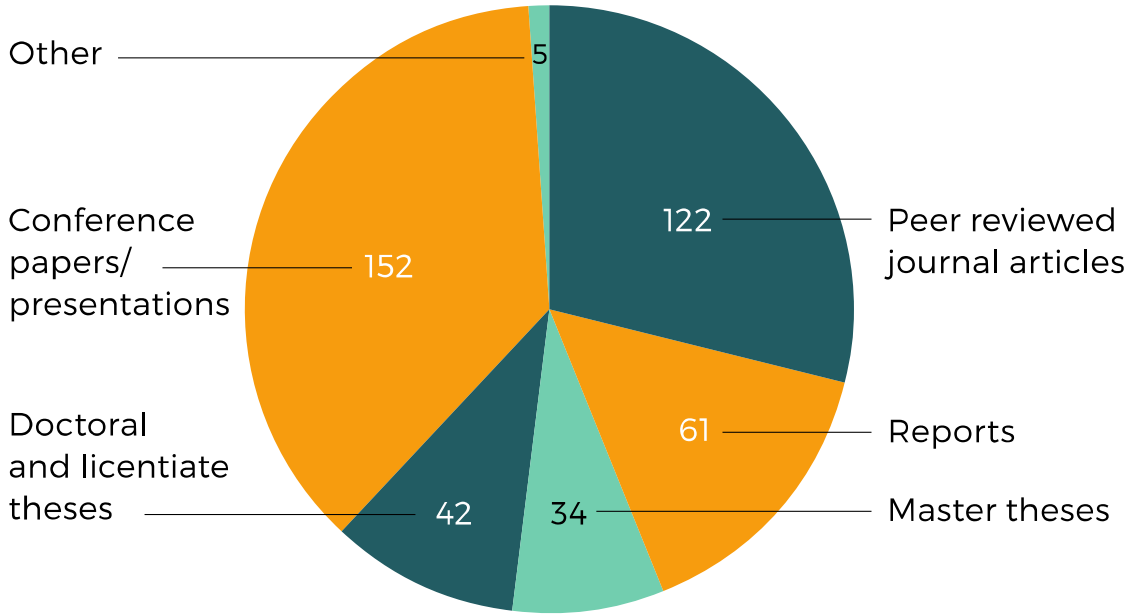
Project value sums up to **4000 MSEK** for all project partners and **1200 MSEK** for SAFER partners.

INTERDISCIPLINARY COLLABORATIVE RESEARCH

Key to excellence and successful dissemination

PUBLICATIONS

416 publications in total – over 1000 publications since the start in 2006!



Number of publications per type in SAFER Stage 5

Find them all at www.saferresearch.com/knowledgelibrary

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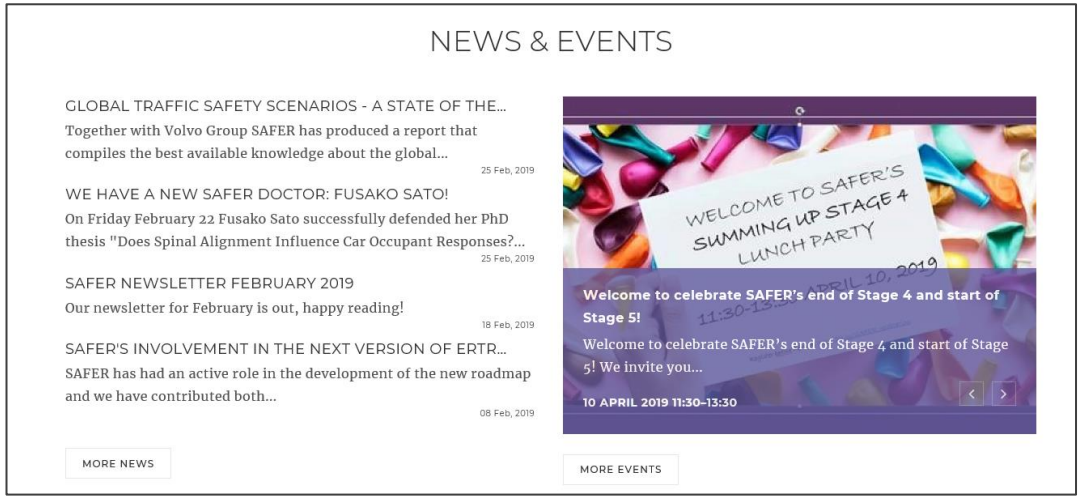
saferresearch.com

THE SAFER PUBLICATION LIBRARY

Enhance your insights in safe mobility research

On our website www.saferresearch.com you can find e.g. news and a calendar with SAFER's seminars and conferences. There are also information about project portfolio, access to publications and other information about SAFER.



SAFER STAGE 5
CROSS FUNCTIONAL PROJECTS & INITATIVES

PROJECTS IN STAGE 5	
Total number	**23**
Finalised:	**9**
Started:	**21**

DRIV
DataRätt InnoVation

Cross functional projects and activities

What this project gave our partners:

- Established framework for sharing and leveraging data.
- Addressed legal challenges.
- Provided assistance for compliant data management.

DRIV took place between October 2021 and October 2023. The project was coordinated by AI Sweden (Lindhomen Science Park) and was jointly led by Chalmers Industriteknik and RISE. Other project partners included Gothenburg University, Lund University, MAQS Law Firm, Delphi Law Firm, Västra Götaland Region, Stockholm Region, Halland Region, Helsingborg City, Swedish Transport Administration (Trafikverket), Swedish Patent and Registration Office (PRV), NCC, and Tyréns.

How do young people want to travel?

We found out in the Young Mobility study!

Cross functional projects and activities

- SAFER participated in a project, Young Mobility, together with NTF Väst and Halmstad municipality.
- Within the framework of this, we produced a biannual survey, to **map young people's mobility and traffic safety habits, such as how young people think and feel about travel habits, use of protective equipment, driving licenses and the need for mobility.**
- The target group was young people aged 15-24.

Fast, comfortable and seamless – many young people prefer going by car rather than using more sustainable transport modes

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HEUDRIS

Cross functional projects and activities

HEUDRIS - Horizon, Europe, and Drive Sweden

- HEUDRIS the result of the strategic project "EU Coordination Drive Sweden," aimed at **determining the future direction** of Drive Sweden's engagement with the EU.
- With Horizon Europe now formalized, HEUDRIS builds upon this foundation, focusing on research content and project development, particularly in **CCAM-related areas** and potential partnerships such as DUT and 2Zero, aligning with the Climate Neutral and Smart Cities Mission.

Ingrid Skogsmo, VTI, and member in SAFER's Management team, is leading the HEUDRIS work.

HOSTING CONFERENCES!

Cross functional projects and activities

During this stage of SAFER we have been trusted to host six conferences!

- The International Conference on Driver Distraction and Inattention (2021, 2022)
- The Scandinavian Conference on System and Software Safety (2021, 2022, 2023)
- The International Conference on Traffic and Transport Psychology (2022)

WORKSHOP SERIES TO IDENTIFY FUTURE TRAFFIC SAFETY RESEARCH NEEDS

Cross functional projects and activities

Utilizing the Gothenburg Green City Zone initiative

The workshop series aimed to identify future research needs in traffic safety within the framework of the GGCZ initiative. Conducted in collaboration with industry, academia, research institutes, societal actors, and SAFER partners, the project contributed to valuable insights to our collaborative research agenda. Concluding in partnership with Business Region Gothenburg, the project involved about 25 partners.

Workshop objectives:

1. Explore long-term traffic safety needs and sustainable mobility in future cities using the GGCZ concept.
2. Identify areas requiring deeper understanding to address future challenges, mapping research questions and project ideas for sustainable products and services.
3. Position GGCZ as an opportunity for SAFER partners' researchers, supporting local industry in sustainability efforts.

Cross functional projects and activities

AI ENHANCED MOBILITY

EXPLORING HOW AI CAN BE USED AS A TOOL IN TRAFFIC SAFETY

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AI ENHANCED MOBILITY

One of the success stories in Stage 5!

Cross functional projects and activities

- Stage 5 initiative **engaging 20+ SAFER partners** to explore **AI's role in traffic safety**.
- Facilitated **knowledge sharing** and offered a **funding program.**
- A **successful workshop methodology** was used to bring together needs owners with traffic safety researchers and AI experts.
- **6 pre-studies** were funded and several larger projects started up through this program.
- Led by CLOSER at Lindholmen Science Park and funded by Drive Sweden/Vinnova – SAFER led the traffic safety focus group..

AI ENHANCED MOBILITY

One of the success stories in Stage 5!

Cross functional projects and activities

Examples of what we explored and learnt in this program:

- AI's possible role in **driving schools and medical evaluations**, enhancing driver suitability decisions, and saving time, contributing to safer roads.
- Investigated **intention recognition** to aid bus drivers, finding AI valuable in complex traffic scenarios, mitigating errors caused by stress.
- Used AI to create **safer school routes**, leading to a larger project approved by Vinnova for developing decision support tools, involving Jönköping municipality.
- Utilized a system **merging vehicle sensors and data** to predict real-time accident risks comprehensively, laying the foundation for a significant future project.

AI ENHANCED MOBILITY

One of the success stories in Stage 5!

Cross functional projects and activities

More examples:

- We found that AI can help us **identify risks by combining data** from various sources and **identify traffic patterns** in the traffic environment and proactively mitigating accidents.
- We also saw a potential in **optimising road maintenance** to ensure safety.
- And in our knowledge generation, we discovered that AI can be suitable **for creating dynamic maps** that more correctly represent real-world conditions, facilitating more informed decision-making.

Our new asset for enhanced research and collaboration was launched in September 2022:

THE SAFER DATA CATALOGUE!

The SAFER Data Catalogue contains information about available **quality assured datasets** for research and description on how these can be **accessed**. This will help ensuring that SAFER continues to be **relevant** for its partners, and also **attractive** to other research groups in the world.

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TRAFFIC SAFETY FOOTPRINT

Cross functional projects and activities

SAFER partners pioneered the **Traffic Safety Footprint approach**, presented at the UN conference on road safety in 2020, and gained insights from several projects under the SAFER umbrella during this stage!

"Throughout this stage, our primary emphasis in this field has been on educating organisations about the benefits of mapping their transportation activities and implementing strategies to monitor and improve traffic safety footprint within their operations".

Cross functional projects and activities

SMART URBAN TRAFFIC ZONES

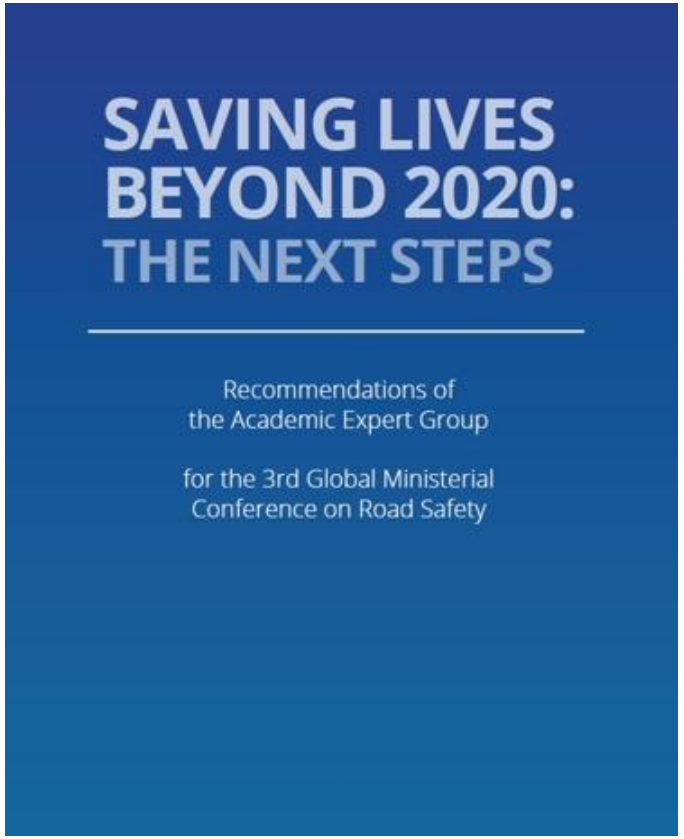
Urbanization intensifies space competition, necessitating smarter traffic systems for seamless interaction between vehicles and city dwellers and SAFER partners looked into this more in detail.

Core result:

- The project enhanced city flexibility, optimised transport efficiency, and boosted traffic safety.
- Researchers addressed gaps from previous stages, the focus is on creating prerequisites for smart zone implementation.

KNOWLEDGE DISSEMINATION AND IMPLEMENTATION OF THE STOCKHOLM DECLARATION'S 9 RECOMMENDATIONS

Cross functional projects and activities



At the UN Conference on Road Safety in Stockholm 2020, nine recommendations were presented to achieve global traffic safety objectives.

Following the conference, SAFER conducted educational initiatives to disseminate knowledge about the recommendations and initiated several new projects based on "Saving Lives Beyond 2020".

INFLUENCING UPCOMING AND UTILIZING EUROPEAN FRAMEWORK PROGRAMS

Cross functional projects and activities

A crucial aspect of our work has been enhancing value for our partners by **ensuring access to research funding**, aligned with our shared research agenda.

Below are examples of projects that have facilitated our efforts, both in terms of influencing initiatives and utilizing programs, such as through project creation workshops, on the European collaborative platform:

- **FUTURE-HORIZON** CSA supporting ERTRAC work
- **TSIH** – Traffic safety in Horizon 2020
- **STRENGTH_M** - Stimulating road Transport Research in Europe and around the Globe for sustainable Mobility
- **HEUDRIS** - Horizon EUrope och DrIve Sweden

SAFER'S RESEARCH AREA

HUMAN BODY PROTECTION

How do we best protect people in a traffic crash?

By understanding the biomechanics and tolerances of humans in addition to their postures and behaviors;
tools and methods are developed enabling creation of countermeasures to prevent injuries.

PROJECTS IN STAGE 5	
Total number	**27**
Finalised:	**19**
Started:	**13**

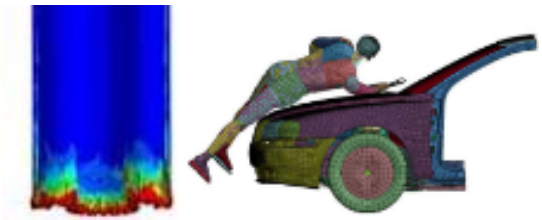
JOLYON CARROLL
Research Area Director
Autoliv

SARA KALLIN
Co-Research Area Director
Jönköping University

HUMAN BODY PROTECTION

This research area included e.g.:

- Biomechanical injury mechanisms, responses and consequences, incl. pre-crash.
- Principles for protection including usage and pre-sensing input.
- Structural requirements (design guidelines) regarding crashworthiness (self and opponent protection).
- CAE tools for material and structures.
- Mechanical and mathematical occupant and unprotected road user models for complete crash sequence.



Key challenges and topics for Stage 5:

- New sitting postures in vehicles.
- Vast distribution of transport modes.
- Heterogeneous population.
- Modeling challenging material, e.g. fat tissues, composites.

RESEARCH TARGETS

Human body protection

- ✓ An increased understanding on how **shared mobility** and increased variations of sitting postures and activities in passenger cars will influence occupant protection needs.
- ✓ Human body models with enhanced **omnidirectional injury prediction capability**, and posture adjustments, capable of serving as an industrial and research tool addressing the needs in the increased automated context.
- ✓ Methods to **scale and tune** human body models, accommodating simulation of a variety of humans in a crash, including preceding events.
- ✓ An increased understanding of how pre-crash factors and **individual differences** influence injury outcome, by monitoring and quantifying sitting postures and behaviour in vehicles and other road users.
- ✓ **Biomechanical investigations** addressing future challenges which require more in-depth understanding of injury occurrence and tolerances. For car occupants, the **pelvis area** is one key area in which significant steps will be taken.
- ✓ Modelling **challenging materials**, e.g. fat tissues and composites.
- ✓ Expanding the application of tools and knowledge on road users beyond vehicle occupants, such as **pedestrian in different interactions**, two-wheelers, boards and “wheels on feet”.

KEY FINDINGS

Examples from the Human Body Protection team

- **Enhanced understanding of injury risks** in transportation events, focusing on traffic-related mechanisms, biomechanical responses, and protection principles.
- **Development of countermeasures for body protection**, addressing emerging transportation challenges and emphasizing occupant and vulnerable road user models for complete crash sequences.
- **Advancements in Human Body Models** with enhanced injury prediction capability and posture adjustments to accommodate increased vehicle automation needs.
- Methods developed to **scale and tune HBMs** for simulating a variety of humans in crashes, including risk assessments for rib fractures and pelvis population variance
- Increased understanding of how **pre-crash factors** and individual differences influence injury outcomes, with a focus on **monitoring sitting postures and behavior** in vehicles and other road users, alongside advancements in vehicle ergonomics and crash analyses.

OUTCOME OF THE RESEARCH TARGETS

Human Body Protection

1. An increased understanding of how shared mobility and increasing variations in sitting postures and activities in passenger cars will influence occupant protection needs.

- Enhanced understanding of **crash protection in future vehicle seating** configurations.
- Insights into challenges and **risks associated with reclined seating** preferences.
- Development of **effective countermeasures to mitigate risks**, including lap belt geometry challenges and submarining risk.
- Recommendations for **easy-to-use child restraints** and tailored protection solutions for varying passenger preferences.
- Use of **advanced modeling techniques** to address safety concerns, such as shoulder belt roll-out and neck loading in reclined positions.
- Proposal of **innovative solutions** for enhanced crash protection in future vehicles.

A core topic for Human Body Protection:

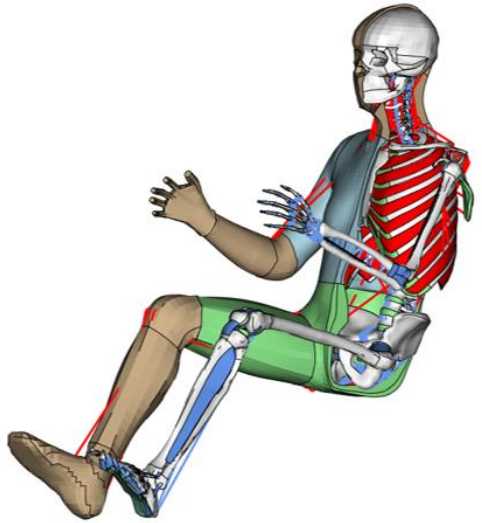
FUTURE SEATING POSITIONS

Together, we enhanced our understanding of crash protection and seating positions for improved safety, including insights into risks associated with reclined seating preferences, e.g. perhaps in automated vehicles.

OUTCOME OF THE RESEARCH TARGETS

Human Body Protection

2. Provide Human Body Models with enhanced omnidirectional injury prediction capability, and posture adjustments, capable of serving as industrial and research tools; and furthermore, also addressing the needs arising from increased vehicle automation.



Two paths for Human Body Models in the SAFER community:

1. Open-source tools for broad research access
2. SAFER HBM for industrial applications

PROJECT EXAMPLES

- **The VIRTUAL project** enhances road user safety with open-access virtual testing protocols and VIVA+ models for rear impact testing.
- E.g. FFI-funded **Active HBM Step 4** refines the SAFER HBM, improving upper body control for realistic responses.
- **Global SAFER HBM** project expands access beyond SAFER for global industrial use, focusing on the cervical and thoracic spine.

OUTCOME OF THE RESEARCH TARGETS

Human Body Protection

3. Scale and tune human body models, accommodating the need to simulate the variety of humans in a crash, including preceding events.

- Developed methods for **rib fracture risk assessment** considering rib cage geometry and age, and pelvis population variance.
- Explored **elderly occupant** variations using morphed Human Body Models.
- Active Human Body Model simulations cover full sequences of braking and impact for various **pre-crash events**.

- Important contribution in our knowledge generation from the EU funded project **OSCCAR**.

KNOWLEDE GENERATION

In the Human Body Protection research area

OSCCAR

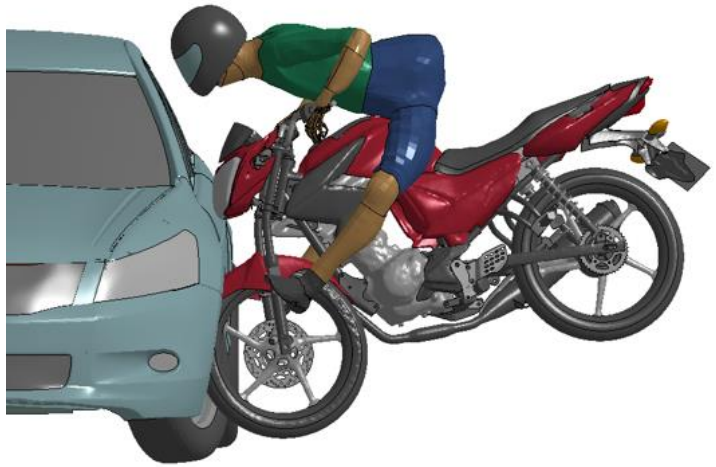
FUTURE OCCUPANT SAFETY FOR CRASHES IN CARS

- EU **OSCCAR Project** studied sitting posture, belt position, and lateral movement in cars, addressing pre- and in-crash phases.
- OSCCAR proposed advanced occupant protection principles emphasing improved **HBMs considering gender, demographics, and material properties.**

OUTCOME OF THE RESEARCH TARGETS

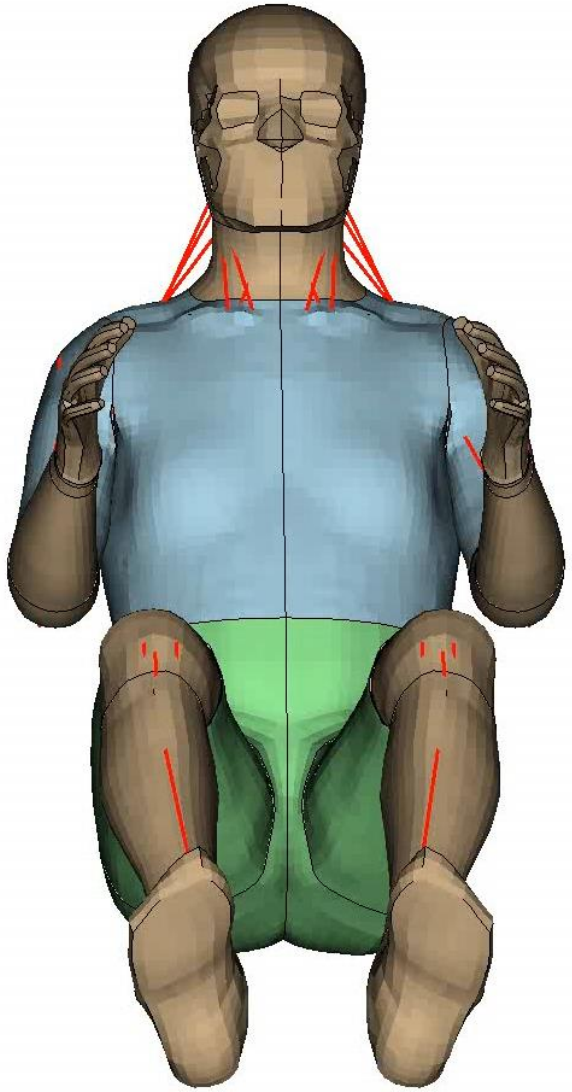
Human Body Protection

4. Increase understanding of how pre-crash factors and individual differences influence injury outcome, by monitoring and quantifying sitting postures and behaviour in vehicles and other road users.



- **Car Passenger Protection** project explored rib fracture risk predictions and individual differences in SAFER's human body model development.
- Muscle activation during crash response, particularly in far-side events, enhances **SAFER-HBM's effectiveness** for occupant protection evaluation.
- SAFER-associated **Motorcycle Rider Model** project aims to update SAFER HBM for predicting motorcycle rider kinematics and critical injuries.
- **ADOPT!VE** project focuses on advanced vehicle ergonomics, improving crash analysis with accurate posture prediction models.

THE SAFER HBM



ADOPT!VE

- ADOPTIVE aims to study vehicle user interaction and develop **advanced vehicle ergonomics analysis** methods using simulation tools.
- Focus on assessing and **optimising vehicle interior geometries** and user accommodation levels through fast, objective, and automated virtual driving test simulations.
- Utilization of **accurate posture prediction models** and improved virtual human models for input in human body models used in crash analyses.

ADOPT!VE

Automated Design and Optimisation of Vehicle Ergonomics

OUTCOME OF THE RESEARCH TARGETS

Human Body Protection

5. Investigate future biomechanical challenges which require more in-depth understanding of injury occurrence and tolerances. For car occupants, the pelvis area is one key area in which significant steps will be taken.

- FFI-funded project utilized SAFER's Human Body Model for **predicting long-term head and arm injuries** in traffic crashes.
- Refinement of **SAFER HBM's upper extremity enhanced biofidelity**, particularly focusing on the elbow's anatomical response to axial impacts
- Introduction of an **instrumented crash test dummy forearm** facilitated the development and evaluation of an airbag concept for car occupant hand protection, showcasing SAFER's innovative safety concepts for long-term consequences in traffic crashes.
- FFI-funded **Injury HBM Step 4** refined the SAFER HBM, improving the pelvis with statistical modelling of the bones to represent the population better.

OUTCOME OF THE RESEARCH TARGETS

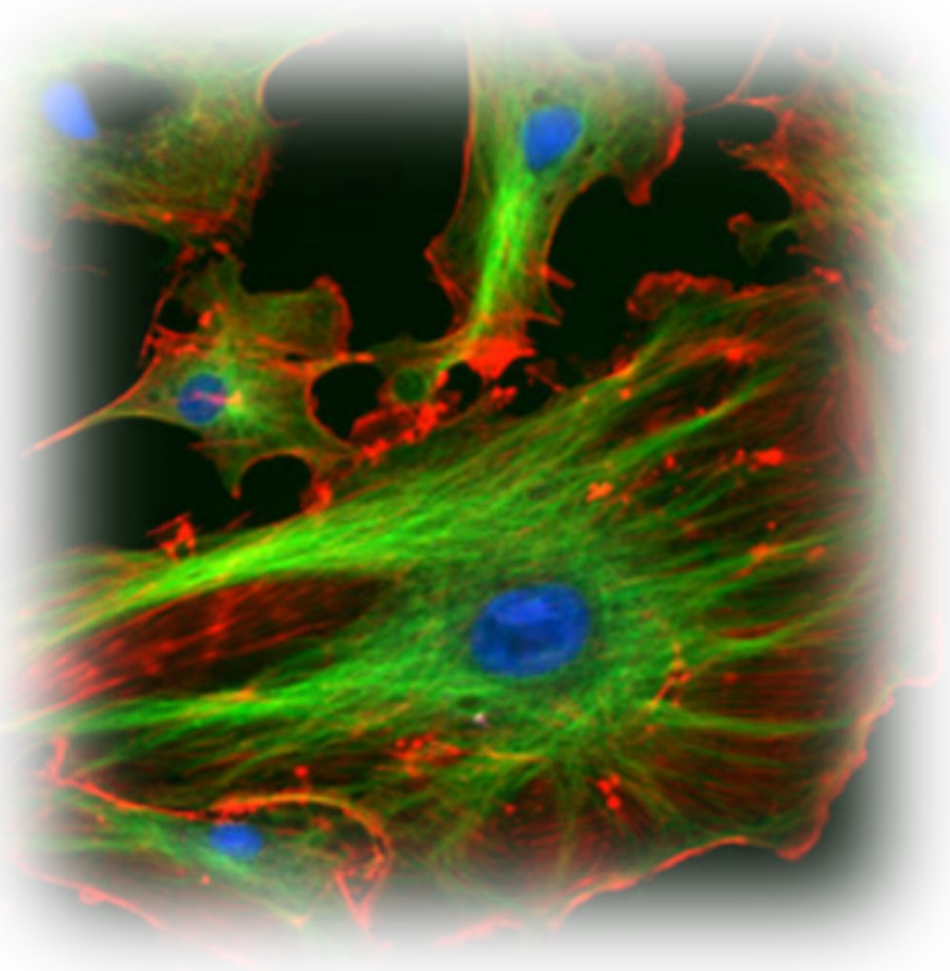
Human Body Protection

6. Model challenging material, e.g. fat tissues and complex structural composites.

- SAFER partners has pioneered **sustainable composite research** for vehicle safety, focusing on crash simulation challenges.
- **FFI-Crash2** project highlights delamination modelling importance, showcasing SAFER partners' **CAE leadership** in this area.
- Advances in composite fiber kinking and **finite element modelling validated**, extending into **CompCrash2**.
- **ICONIC** modelled **strain rate effects in unidirectional plies** for improved crash safety.
- **UTMOST** explored **biocomposites** for enhanced occupant safety.

IN VITRO MODEL OF WHIPLASH TRAUMA IN DORSAL ROOT GANGLIA – A PILOT STUDY

- Research uncovered how car collisions deform dorsal root ganglia, causing pressure transients in the central nervous system.
- Findings suggest a **link between these deformations and long-term central pain sensitisation** in whiplash injuries, revolutionising understanding in this field.
- Investigation into **nerve cell physiology** during whiplash motions reveals dorsal nerve root ganglia deformation.
- Pilot in-vitro setup replicates nerve injury mechanisms, **promising advancements in car protection systems** and whiplash diagnosis/treatment.

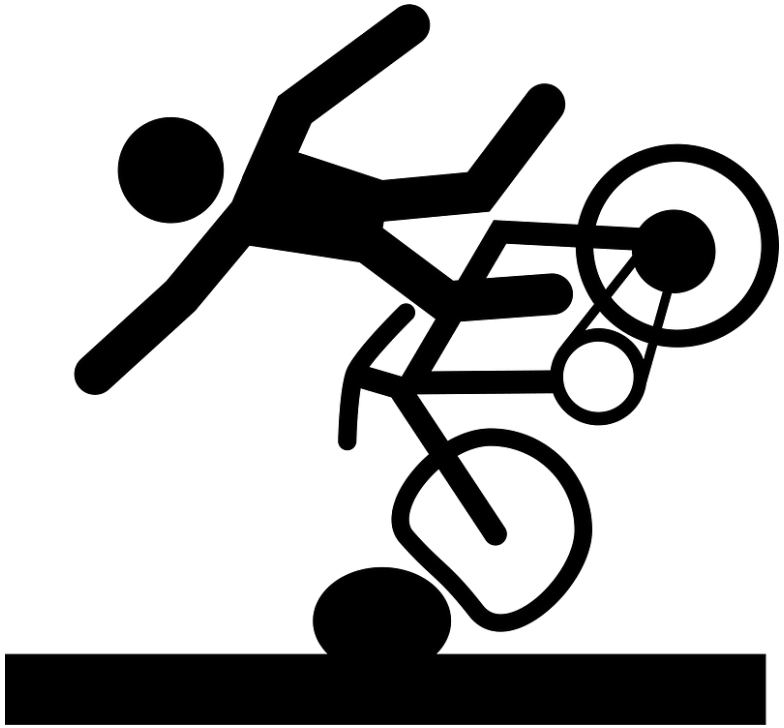


OUTCOME OF THE RESEARCH TARGETS

Human Body Protection

7. Expand the application of tools and knowledge on road users beyond vehicle occupants, such as the different interactions for pedestrians, two-wheelers, scooters, boards and other emerging transport trends.

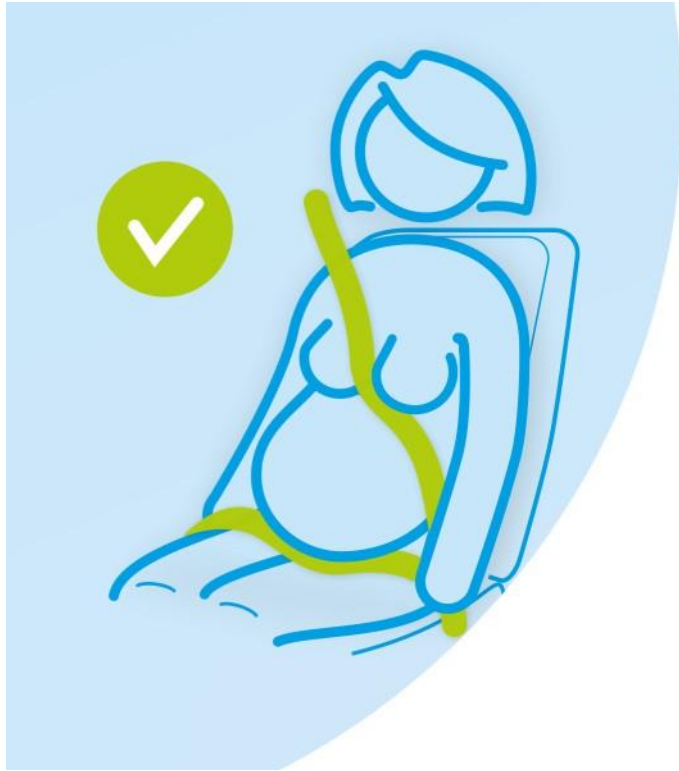
- Collaboration with China on **Virtual Evaluation Tools for Pedestrian Integrated Safety** enhances road user safety evaluation technology.
- **SAFER's cycling pre-study** spawned new projects, enhancing shoulder protection in bicycle crashes.
- Ongoing FFI projects explore SAFER-HBM for **predictive motorcycle crash injury assessment**.
- Future challenges involve **expanding child HBM** representation, refining virtual testing protocols, and exploring applications beyond driving postures.



SAFETY FOR PREGNANT WOMEN

Who owns this question?!

- Study investigated misuse of seatbelts and comfort products by pregnant women, highlighting safety concerns.
- Approximately **16% of pregnant women incorrectly use seatbelts**, often relying on comfort products.
- Previous tests show **most comfort products negatively affect crash safety**.
- The project aims to **evaluate safety and effectiveness of comfort products** marketed to pregnant women.
- Expected outcomes include **insights into need for re-evaluation** of these products.



THE AWARD WINNING SAFER HBM CLUSTER

The cluster of SAFER's human body model projects was awarded the 15 years anniversary prize for the most ground-breaking project in the research- and competence centre's history.

Johan Iraeus, Chalmers University and Lotta Jakobsson, Volvo Cars, represented the HBM team at the prize giving ceremony.

The jury's motivation states that:

The cluster of SAFER HBM projects has provided the partners with world leading human body model functionality, used by the industry in safety developments to save lives and prevent injures in traffic. The model has also contributed to position SAFER's multi-disciplinary research excellence internationally. This area is not only a role model for excellent and cross-border research, it is also a role model for how the collaboration within the SAFER community can achieve more than just single project execution.

SAFER'S RESEARCH AREA

ROAD USER BEHAVIOUR

How do people behave in the traffic system and how can we support safe behaviour? 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 behaviour.

PROJECTS IN STAGE 5	
Total number	**33**
Finalised:	**26**
Started:	**24**

ANNA SJÖRS DAHLMAN
Research Area Director
VTI

NIKLAS STRAND
Co-Research Area Director
RISE

ROAD USER BEHAVIOUR

This research area included e.g.:

- Development of **methods and tools** to investigate road user state and behaviour
- Road user **monitoring** to ensure safe interaction in traffic
- Implement **nudging** solutions into traffic systems
- Road user **experience**

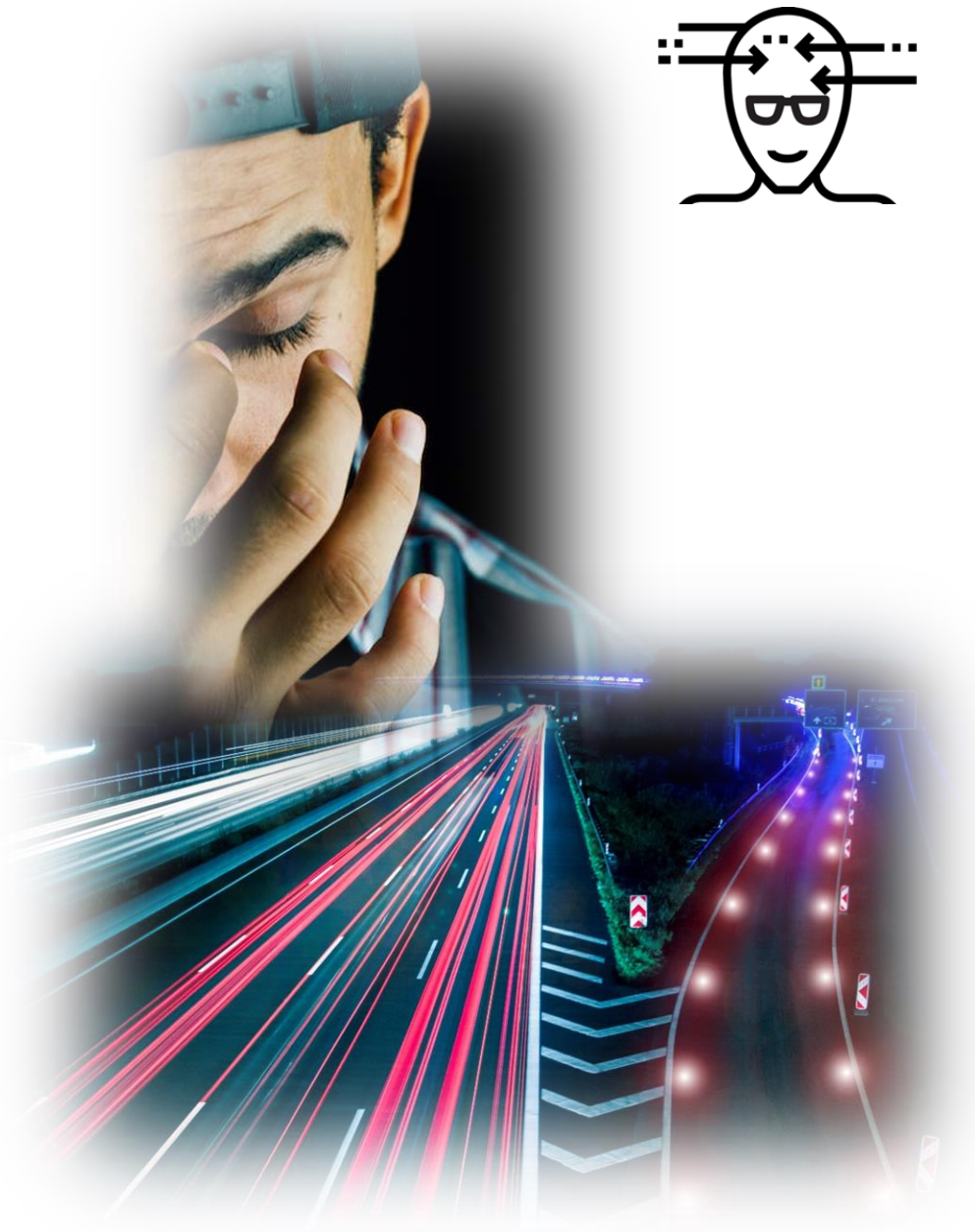
Key challenges and topics for Stage 5:

- Monitor driver state during whole trip
- Further develop indicators regarding how ”fit” road users are
- Make benefit from AI tools
- How to systematically account for variations in populations
- Road users, not only drivers

MAIN RESEACH FINDINGS

Road user behaviour

- Understanding the **use of monitoring systems** for safety system improvement in vehicles.
- Insights into **short-term driver impairments** like fatigue, intoxication, and inattention, and methods for detection and mitigation.
- Application of driver monitoring for **assessing fitness** in partly automated vehicles.
- Utilization of **nudging** for promoting safer behaviors among drivers, pedestrians, and cyclists.
- Advancements in **interaction principles**, including studies on automated vehicle interactions with vulnerable road users and the development of a realistic bicycle simulator.



SAFER
VEHICLE AND TRAFFIC SAFETY CENTRE AT CHALMERS

OUTCOME OF OUR RESEARCH TARGETS

Road user behaviour

1. We can study road user behavior in their door-to-door travels

The **AHA-II** project focuses on future mobility services.

- Developed a collaborative model for **human-centred mobility design.**
- Utilised **ethnographic insights** to understand future transport needs.
- Shifted focus from citizens or technology users to **understanding people** in their everyday lives.
- Addressed the gap in knowledge regarding **people's engagement with Mobility as a Service** (MaaS).

Core project in this work:

Design Ethnographic Living Labs for Future Urban Mobility – A Human Approach (AHA II)

OUTCOME OF OUR RESEARCH TARGETS

Road user behaviour

2. We can monitor the driver state and position during the whole trip in-vehicle.

- We have evaluated driver monitoring tech for impairments and non-driving activities.
- Mature tech available; new ones need research.
- **DRAMA** project developed system using cabin cameras.
- **RE-ENGAGE** found benefits in adapting driver interaction.

Insight from the RE-ENGAGE project:

"There are both behavioral and experiential benefits of adapting the interaction with the driver based on the driver's activities".

OUTCOME OF OUR RESEARCH TARGETS

Road user behaviour

3. We can diagnose a fit driver based on monitoring data.

- **Monitoring systems** for driver impairments like fatigue and distraction have been refined and tested.
- Initial steps taken for **real-time monitoring** of alcohol intoxication and sudden sickness.
- Further research needed for reliable fitness-to-drive monitoring.
- **Fit2Drive** project revealed effects of alcohol intoxication on attention and safety margins.
- **Improved fatigue detection** and novel intoxication measures developed using driver monitoring cameras.

Insight from the Fit2Drive project:

"Detrimental effects of alcohol intoxication on driver attention, safety margins in driving, and engagement in NDRT."

OUTCOME OF OUR RESEARCH TARGETS

Road user behaviour

4. We can ensure a safe interaction between automated vehicle and vulnerable road users.

- **HAVOC** and **In the Hub** projects studied remote operations of heavy vehicles and interaction with autonomous vehicles in transport hubs.
- Provided insights into safe design for remote operations.
- **GLAD, E-HMI, and Drive2theFuture** projects found external HMI useful for facilitating interaction between automated vehicles and VRUs.
- Pre-study on **safety culture in automation** conducted, leading to continued larger-scale projects like **SCAV**.
- **SCAV** project ongoing, with results expected in 2024.

Key Insight:

Informed safe design for remote operations.

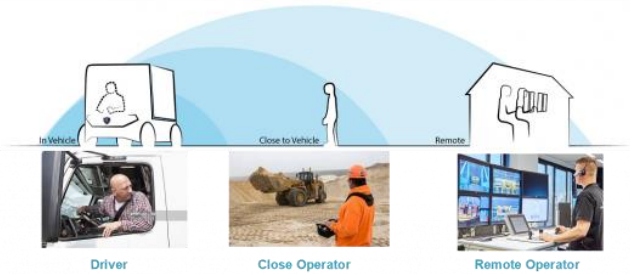
SAFER
VEHICLE AND TRAFFIC SAFETY CENTRE AT CHALMERS

ROAD USER BEHAVIOUR

Knowledge generated!

Interactions with AVs

- **GLAD** - Goods deliveries under the last mile with automated delivery vehicles
  - *"Human operators will most likely have important roles in the delivery chains with ADV" "the human - ADV interactions will be critical from safety and efficiency points of view"*
- **HAVOC** - Heavy Vehicle Operation Centre
  - *"Importance of a systems perspective in the analysis and design of future remote operation centres"*
- **In the HUB**
  - *"Natural interaction technologies, such as voice and gesture interaction, has great potential to improve user experience during interactions with AVs in transport hubs"*
- **Drive2theFuture**
  - *Prepare individuals for the future of transportation by embracing connected, cooperative, and automated modes, while also supporting industry understanding and adaptation.*



DRIVE2 THE FUTURE

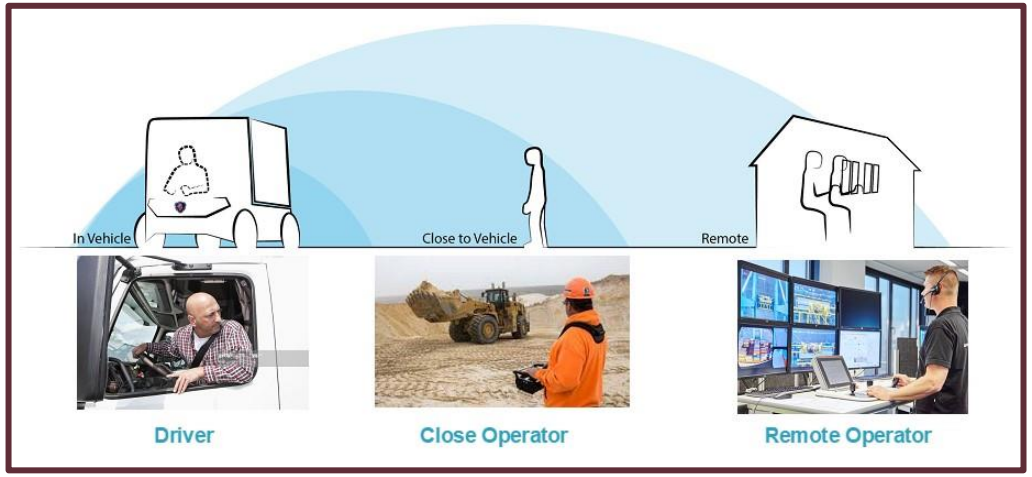
From SAFER pre-study to Vinnova project:

Heavy Automated Vehicle Operation Center (HAVOC) - Requirements and HMI Design

Addressing human behavior challenges in remote control of automated heavy vehicles, focusing on developing crucial knowledge for safe operation.

KEY RESULTS:

- Defined **HMI requirements** for remote heavy vehicle operation.
- **Differentiated HMI needs** across various remote operation scenarios.
- **Enhanced ICE remote** center with novel HMI concepts.
- **Assessed the potential** for single-operator control of multiple heavy vehicles.



OUTCOME OF OUR RESEARCH TARGETS

Road user behaviour

5. We have developed several nudge-based solutions and evaluated them.

- The **MeBeSafe** project demonstrated effectiveness of nudging principles for traffic safety.
  - Utilized infrastructure measures like street lines and signaling lights to nudge speeding **drivers to slow down.**
  - Developed apps with nudges to promote **safe distance** between cars using ACC.
  - Implemented surprise rewards as a **nudge for tired drivers** to take breaks.

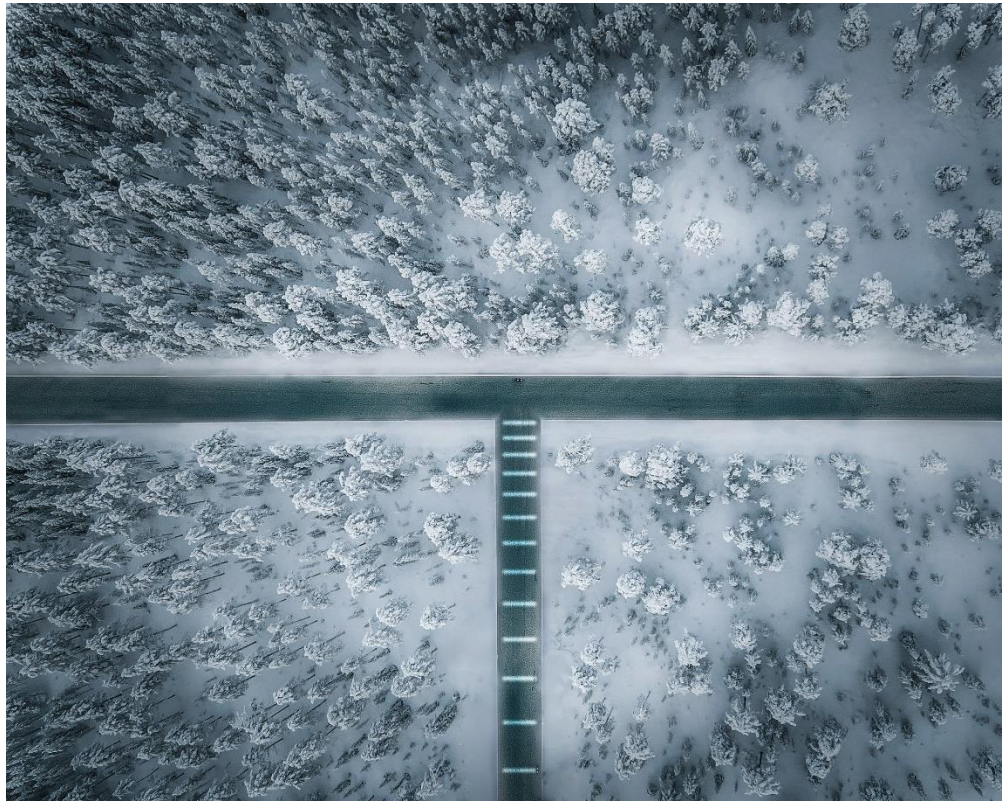
A nudge is a gentle push that influences behavior without restricting freedom of choice.

Coaching app to use the ACC more often.

SAFER
VEHICLE AND TRAFFIC SAFETY CENTRE AT CHALMERS

NUDGING

Examples evaluated in the MeBeSafe project



Cyclist nudge to slow down

In-vehicle nudge to slow down

Take a break reward

OUTCOME OF OUR RESEARCH TARGETS

Road user behaviour

6. We can define and measure several user experience indicators to contribute to safety.

- Projects use various **UX indicators**, both validated and new, tailored to different use cases.
- **PANACEA** develops a framework focusing on user acceptance, trust, and perceived safety for driver solutions.
- SAFER partners contributes to the **FAME project**, creating CCAM testing guidelines and UX evaluation.

PANACEA develops a holistic driving assessment system for commercial drivers, integrating cloud-based monitoring and coaching solutions, along with tailored health toolkits, to ensure fitness to drive and enhance safety in commercial vehicle operations.

ROAD USER BEHAVIOUR

Knowledge generated!

Cycling and micromobility

- New bike simulator created through the **How we roll** pre-study.
- Seminars: *"Safety and ease-of-use assessment of new electric vehicles for personal mobility in urban environment"* was held in 2022.
- **Skara Guardian Angel** aims at developing innovative and economically viable solutions with drones for both lighting bicycle roads as well as providing companion support to improve the cycling safety and comfort in rural areas.
- **Modal shift/active mobility seminar** and workshop.

SAFER'S RESEARCH AREA:

SYSTEMS FOR ACCIDENT PREVENTION AND AUTOMATED DRIVING

How can active systems and automation predict and prevent collisions? Through creative system development research on new technologies as well as by innovative research and development of new verification and validation methods, based on field data analysis.

PROJECTS IN STAGE 5	
Total number	**28**
Finalised:	**21**
Started:	**15**

KATRIN SJÖBERG
Research Area Director
Volvo Group

CARINA BJÖRNSSON
Co-Research Area Director
Volvo Cars

SYSTEMS FOR ACCIDENT PREVENTION AND AUTOMATED DRIVING

This research area has included e.g.:

- Understanding basic principles relevant for safety performance of collision avoidance and mitigation systems
- Principles of sensors and algorithms relevant for safety performance in more complex conflict scenarios
- Connected traffic systems where infrastructure, vehicles and road users interact to enhance safety

Key challenges and topics for Stage 5:

- Safety aspects of vehicles, road user and infrastructure towards higher degree of automation
- Scientific base for verification and validation
- Contribute to standardized test methods

OUR JOINT RESEARCH TARGETS

- ✓ We can evaluate different ways to act in the traffic situation and decide upon how to progress safe and efficiently.
- ✓ We have developed a methodology to verify and validate assisted and automated systems in cooperation with international researchers in this area.
- ✓ We have developed prediction models for human cognition and behaviour in the areas of "driver engagement", transitions between manual and automatic driving, and interaction between human and ADAS features.
- ✓ We have obtained knowledge essential for development of new perception components that enable high-performance, reliable information about the vehicle environment and the driver/riders in the vehicle.

SYSTEMS FOR ACCIDENT PREVENTION
AND AUTOMATED DRIVING

OUTCOME OF THE RESEARCH TARGETS

1. **We can evaluate different ways to act in the traffic situation and decide upon how to progress safe and efficiently:**

- SAFER achieved significant milestones in evaluating safe and efficient traffic interaction during Stage 5.
- Challenges in deploying automated vehicles on public roads, especially in **verifying and validating ADSs**, were encountered.
- The ADS's **Operational Design Domain** (ODD) shifted from broad coverage to specific applications like automated valet parking and autobahn driving in congested traffic.
- Concluded projects such as **SWEDEN4PLATOONING** and **AUTOFREIGHT** demonstrated SAFER's commitment to addressing complex issues.
- Projects like **SAFETYNET FOR TRUCKS** and **SALIENCE4CAV** provided valuable insights, particularly in tactical decision-making with safety guarantees.
- Despite challenges, this research target remains a **focal point** in SAFER Stage 6.

GAINING INSIGHTS IN PLATOONING TECHNOLOGY

SAFER as a platform achieved significant milestones in evaluating safe and efficient traffic interaction.

Knowledge generated, examples:

- Enhanced methodology for verifying assisted and automated systems.
- Development of new perception components for reliable vehicle information.
- Enrichment of knowledge within the SAFER platform regarding platooning technology.

OUTCOME OF THE RESEARCH TARGETS

SYSTEMS FOR ACCIDENT PREVENTION AND AUTOMATED DRIVING

2. We have developed a methodology to verify and validate assisted and automated systems in cooperation with international researchers in this area:

- Implemented comprehensive methodology for verifying and validating assisted and automated systems.
- Collaborated with international researchers to exchange ideas and best practices.
- Ongoing projects like **VALU3S, SALIENCE4CAV**, and **ASSERTED** demonstrate commitment to methodology refinement.
  - **VALU3S** project positions SAFER partners as leaders in advancing safety, cybersecurity, and privacy.
  - **SALIENCE4CAV** provides insights enhancing automated system reliability.
  - **ASSERTED** focuses on ensuring safety in rapid autonomous driving deployment.
- Completed projects like **REALSIM FOR AD, HEADSTART**, and **ESPLANADE** contributed to methodology development.
- Active participation in ISO5083 work demonstrates commitment to industry standards.
- Engagement in global initiatives strengthens SAFER's role in automated system development.

HOW DO WE KNOW AUTOMATION IS SAFE?

This has been our main focus in the **competence network for Automotive Safety Assurance**, led by Fredrik Sandblom, Zenseact!

Main deliverables to the SAFER platform:

- Leveraging Gothenburg's competitive edge in AD technology.
- Contributing to future improvements in traffic safety by means of Automated Driving Systems (ADS:s).
- Established a network of experts in the field.
- Provide a channel into the development of ISO TS 5083.
- Clarifying the relation of ADS feature safety argumentation to standards and best practices.
- Focusing on methods for showing how L3-L4 ADS features can be developed to have a predictable and verifiable risk.
- Facilitating collaboration and clarity by using a language consistent with literature, regulations, standards.
- Identifying properties of safe automated driving systems and of design principles that can be shown to limit risk of harm.
- Providing a forum to discuss what “safe” can mean for an ADS feature.

OUTCOME OF THE RESEARCH TARGETS

SYSTEMS FOR ACCIDENT PREVENTION AND AUTOMATED DRIVING

3. We have developed prediction models for human cognition and behaviour in the areas of driver engagement, transitions between manual and automatic driving, and interaction between human and ADAS features.

- **Developed prediction models for human cognition** and behavior in driver engagement, manual-to-automatic transitions, and **ADAS interaction**.
- Primarily addressed in the Road User Behavior reference group.
- ADAS focus declined in recent SAFER phase due to initial automated driving hype.
- Recommends **increased activities in human cognition** and ADAS interaction projects for next SAFER stage.
- Reflects awareness of **changing landscape** and need for enhanced efforts in upcoming research agenda.

DEVELOPMENT OF TEST METHODS

Some examples of partners' projects to help ensure safe vehicles

EVIDENT - Enabling VIrtual valiDation and vErificatioN for ADAS and AD features

- Exploring strategies to trade fidelity levels in testing environments.
- Transitioning from retroactive to proactive validation and verification strategies.
- Encouraging increased testing efforts in ADAS and AD testing within the automotive industry.

Self-driving bicyle for active safety test

- Developing self-driving bicycles for safety system testing.
- Creating prototypes with portable equipment for autonomous operation.
- Enhancing safety systems for cyclists through repetitive validation tests.

SEVVOS - Simulering och Emulering av Vattenspray för Validering av Optiska Sensorer

- Developing a method for simulating and emulating water spray.
- Collaborating with industry partners to refine testing methods.
- Validating simulated spray against real-world data for accuracy.

OUTCOME OF THE RESEARCH TARGETS

SYSTEMS FOR ACCIDENT PREVENTION AND AUTOMATED DRIVING

4. We have obtained knowledge essential for development of new perception components that enable high-performance, reliable information about the vehicle environment and the driver/riders in the vehicle.

- Developing new perception components for assisted and automated driving faces complexity challenges:
  - Challenges include **sensor performance in adverse weather** and acquiring annotated data for machine learning algorithms.
  - **Integrating sensors into a cohesive world** representation is also a significant challenge.
  - Research and advancements **in perception components** during SAFER stage 5 were confidential, led by startups.
- Further exploration and development are necessary to achieve this research target.
- Projects like **ENSAMBLE** and **SWEDEN4PLATOONING** are vital for addressing this need in SAFER Stage 6.

The Horizon Europe project:

ROADVIEW

HORIZON EUROPE

Significant insights are being gained on the effective utilization of AD and ADAS technologies in **challenging weather conditions**.

What we can expect from this project:

- Development of a **unique approach to automated mobility** for enhanced performance in extreme weather conditions like snow, rain, and fog.
- Implementation of **adaptive sensor fusion** to optimise cost-effective multisensory setups.
- Improvement of **object and vulnerable road user detection** through early sensor noise filtering.
- Enhancement of **robustness** by incorporating collaborative perception and mathematically grounded sensor noise modeling.

SAFER'S RESEARCH AREA:

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 manage and analyse field data and assessment procedures for safety performance using data from both real and virtual environments.

PROJECTS IN STAGE 5	
Total number	**26**
Finalised:	**17**
Started:	**22**

LINUS WÅGSTRÖM
Research Area Director
Volvo Cars

ANNA THEANDER
Co-Research Area Director
Volvo Group

SAFETY PERFORMANCE EVALUATION

This research area has includes e.g.:

- Accident data analysis
- Naturalistic driving studies
- Field operational tests
- Method development
- Standardisation for data recording, data sharing and other general aspects of data analysis

Key challenges and topics for Stage V:

- Cross-functional area, i.e. integration with the other research areas while remaining independent
- Development of methods with regards to all aspects of data management
- Further development of methods for effect analysis of safety measures, including automated driving

RESEARCH TARGETS

Safety performance evaluation Stage 5

- ✓ Identified safety gaps, e.g. long-term injury types.
- ✓ Identified critical use cases, e.g. driving a heavy truck in fog among vulnerable road users.
- ✓ Identified new critical load cases, e.g. multiple impact car crash.
- ✓ Evaluation of implemented safety systems performance, i.e. safety benefit analysis.
- ✓ Prediction of safety benefits of new safety systems.
- ✓ Prediction of future safety critical scenarios, automation included.
- ✓ Determination of required safety level for automated drive.

SAFETY PERFORMANCE EVALUATION

OUTCOME OF RESEARCH TARGETS

Safety performance evaluation

1. Identification of safety gaps, some examples:

- Fundamental **review of Swedish in-depth accident database** **STRADA** conducted to identify safety gaps.
- Research on **contributing factors**, exemplified by the **Traffic Accidents and Risk Factors Among Elderly** project.
- Exploration of research collaborations to identify critical use cases, such as driving **heavy trucks in fog among vulnerable road users.**
- Development of field operational tests **data collection methods** in **FOT-E**.

IGLAD
INITIATIVE FOR THE GLOBAL HARMONISATION OF ACCIDENT DATA

SAFER
VEHICLE AND TRAFFIC SAFETY CENTRE AT CHALMERS

OUTCOME OF RESEARCH TARGETS

Safety performance evaluation

1. Identification of safety gaps, some more examples:

- **Integration of data in research frameworks:**
  - **Hövding data for risk assessment**
  - **AI AWARE**
  - **Vulnerable Road Users - E-scooter target**
- **SITIS** and **AfroSAFE** provide **global insights into infrastructure** and traffic situations.
- **Adverse weather conditions** in the **Roadview EU-project**.

OUTCOME OF RESEARCH TARGETS

Safety performance evaluation

2. Identify new critical load cases, such as multiple impact car crashes, mainly related to injury prevention.

- Research **explored methodologies for identifying critical load cases**, connecting with Human Body Protection.
- SAFER partners engaged in projects like **L3Pilot:**
  - Evaluated safety system performance, including **safety benefit analysis**.
  - This involvement extended to ongoing research assessing methodologies for **identifying critical load cases.**

From Data to Design:

L3PILOT INSIGHTS FOR AUTOMATED DRIVING

- Europe's first comprehensive **pilot test of automated driving on public roads**.
- The L3Pilot project demonstrated SAFER's strong position in **NDS data analysis**, focusing on evaluating over 20 self-driving features and understanding drivers' attitudes toward self-driving cars.
- Developed robust in-vehicle **perception and decision-making systems** for connected and automated vehicles.
- The **Hi-Drive project**, initiated in 2021, builds on the success of L3Pilot to further test and **evaluate high automation functions.**

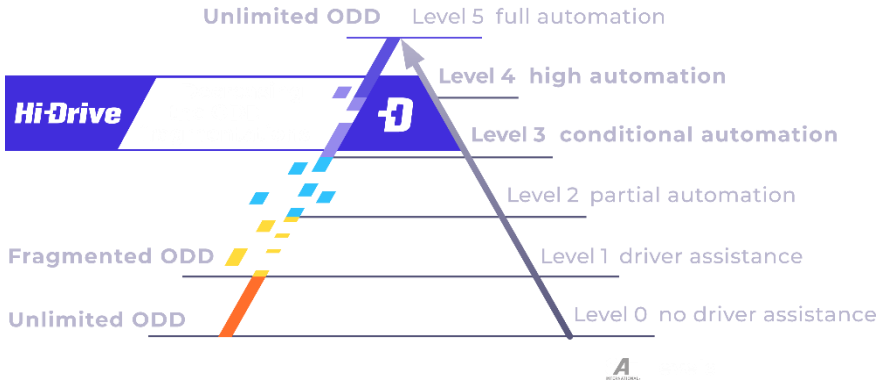
Contributed to understanding: challenges and opportunities in advancing automated driving technologies, such as drivers' response times and gaze behavior during take-over requests.

L3Pilot demo in Gothenburg

OUTCOME OF RESEARCH TARGETS

Safety performance evaluation

Hi-Drive
Deployment of Higher Automation



3. Predicting future safety-critical scenarios, including automation.

Hi-Drive and **L3Pilot** are examples of important partner projects!

Expected knowledge to the SAFER community from Hi-Drive:

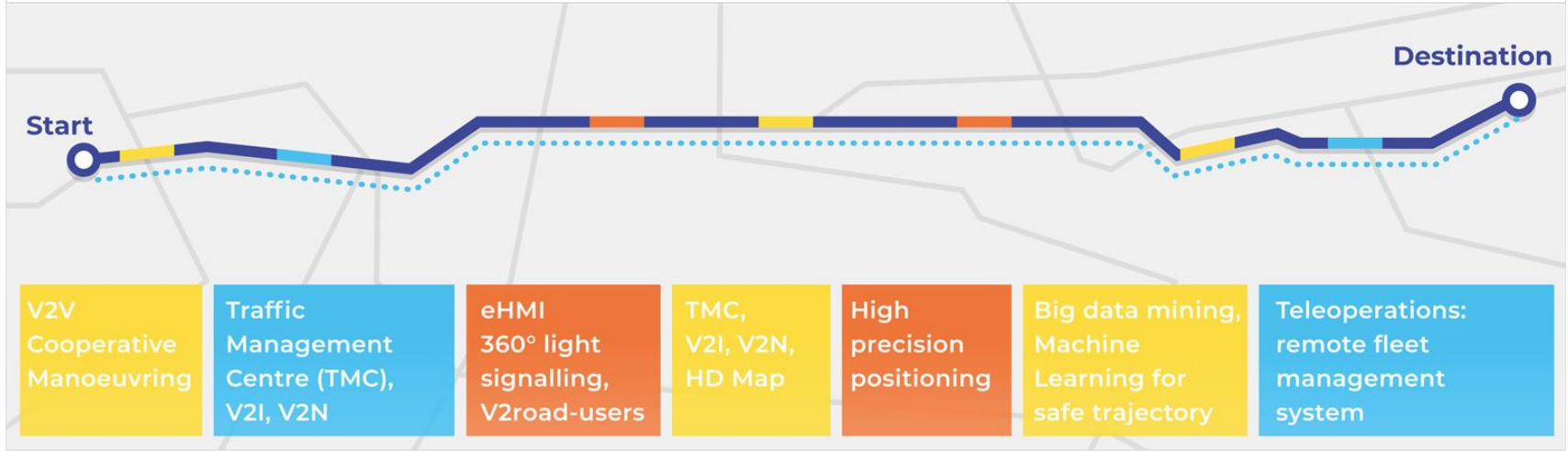
- Insights into addressing **challenges hindering** higher automation deployment.
- Advance automated driving technologies through **testing and evaluating** robust high automation functions.
- Investigate **implementation of V2x communication** to improve traffic flow and safety.
- Develop **understanding of user preferences**, reactions, and trust for viable business models in automated driving.
- Evaluation of **societal benefits of automated driving**, including impacts on individual behavior, network performance, and accessibility.

ODD CHALLENGES

ODD (Operational Design Domain) — Automated Driving — Manual Driving

Continuous Automated Driving in cybersecure, interoperable, interactive and user-aware vehicles

Hi-Drive ENABLERS



OUTCOME OF RESEARCH TARGETS

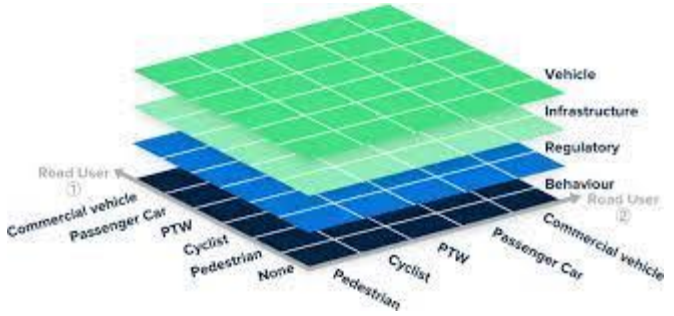
V4SAFETY

4. Predicting safety benefits of new safety systems, one example:

V4SAFETY provides a safety assessment framework for various safety measures.

What we can expect to learn:

- Establish prospective safety assessment framework for connected, cooperative, and automated mobility.
- Project safety outcomes for future scenarios and across EU regions.
- Characterise influence of contributing factors and uncertainties.
- Ensure transparency and consistency in simulation-based safety assessment.
- Provide clear guidelines for interpreting results from diverse studies.



OUTCOME OF RESEARCH TARGETS

5. Determining the required safety level for automated drive:

The EU projects **Headstart** and **SUNRISE**, with a focus on **test and verification**, as well as SAFER's competence network for Automotive Safety has contributed to advancing the research frontier.

HEADSTART

- **Defined testing procedures** for CCAM functions, involving 17 partners including SAFER JRU.
- Focused on **validating safety and security performance** through simulation and real-world tests, addressing key technologies like **communications and cyber-security**.
- **Garnered significant attention** in the European community and influenced initiatives like the Horizon Europe Pillar 2, Cluster 5 CCAM call for common approaches in safety validation of CCAM systems.

SUNRISE

- Achieved a **scalable Safety Assurance Framework** for CCAM systems, enhancing robustness and versatility.
- Demonstrated framework's **effectiveness** in varied use cases, ensuring repeatability and future applicability.
- Collaborated with existing testing sites to **maximise societal impact through improved standardisation** in CCAM safety validation.

A new tool to help organisations to contribute to save lives:
TRAFFIC SAFETY FOOTPRINT

The 2020 UN road safety conference advocated for a shift in responsibility to organisations to enhance traffic safety within their operations. SAFER responded by integrating traffic safety into sustainability agendas and procurement processes, focusing on the concept of a traffic safety footprint.

This led to the Stockholm Declaration and a UN resolution **urging organisations to prioritise traffic safety in their corporate responsibilities**, promoting systematic measurement and implementation of safety measures.

A new tool to help organisations to contribute to save lives in traffic:

TRAFFIC SAFETY FOOTPRINT

PROJECT EXAMPLES:

- A **SAFER Think Tank for traffic safety footprint**, funded by SAFER with partners from Autoliv, VTI, Volvo Group, the Swedish Transport Administration and Folksam has made great progress in mapping suitable activities and research questions that could be addressed to accelerate implementation.
- In **Traffic safety Footprint I and II**, researchers have developed tailored indicators for organizations to assess and monitor their influence on traffic safety, empowering them to proactively implement strategic actions based on the findings.
- **Follow-up of road safety requirement in procurement of freight transport:** In the pursuit of enhancing road safety in procurement processes for freight transport, the project team hypothesis was that a significant number of lives could be safeguarded if companies and organisations optimally integrate road safety requirements. Researchers from Volvo Group, VTI and DuWill explored the feasibility of improving road safety through the development of a methodology specifically designed for monitoring and enforcing road safety requirements in freight transport procurement.

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.
- Provide SAFER partners:
  - State-of-the-art data management
  - Several large datasets
  - Leading research competence regarding naturalistic driving data
  - Unique access to naturalistic data derived from 6,5 million driving kilometres
  - Access to the in-depth crash databases IGLAD and INTACT

Our new asset for enhanced research and collaboration was launched in September 2022:

THE SAFER DATA CATALOGUE!

The SAFER Data Catalogue contains information about available **quality assured datasets** for research and description on how these can be **accessed**. This will help ensuring that SAFER continues to be **relevant** for its partners, and also **attractive** to other research groups in the world.

SAFER
VEHICLE AND TRAFFIC SAFETY CENTRE AT CHALMERS