THE WORKING GROUP CONCEPT

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VEHICLE AND TRAFFIC SAFETY CENTRE AT CHALMERS

THE WORKING GROUPS

Why and how?

Main forum for idea generation and project development.

Open for all partners to contribute to and learn from.

Focused discussions on research and innovation themes.

Flexible in terms of time span and frequency.

THE RESEARCH COUNCIL

Leading SAFER's scientific journey.

The SAFER Scientific Council unites our Impact area leaders, director, communication expertise, project coordinator, and working group leaders, connected research resource leaders.

Facilitating activities and advancing research	**Managing portfolio**	**System perspective**
Knowledge dissemination	**Working group stewardship**	**Idea Exploration program**
Funding opportunities	**Expert contributions**	

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WORKING GROUPS IN PREPARATION

- Alternative fuel powertrain safety
- Connected safety
- Long-term impairments from injuries in traffic environment
- Post crash *(in collaboration with PICTA)*
- Road accident statistics
- Road user behaviour
- Safe infrastructure
- Safety of automated driving systems
- Safety of complex systems and emerging technologies
- Tools for crash assessment
- Traffic safety footprint

ENGAGE IN THE WORKING GROUPS!

Welcome to express your interest in working groups aligned with the knowledge you and your organisation wish to build through SAFER. You can read more about the challenges the groups will address and the expected outcome on the following slides.

Register your interest to join a group here:

SAFER Working Groups (webforum.com)

Do you want to initiate a working group? Contact the operational team, safer@chalmers.se and we will assist you with that!

Please note that all decriptions are drafts at this stage and will be further developed together with the members in each team.

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ALTERNATIVE FUEL POWERTRAIN SAFETY

CHALLENGES, NEEDS AND QUESTIONS TO ADDRESS

This working group, co-hosted by PICTA and SAFER, is focused on enhancing safety related to alternative fuel powertrains, particularly electric, gas, and hydrogen-powered vehicles. They address a wide range of needs and challenges, encompassing accident response, storage, firefighting, and safety during transport, all with the overarching goal of improving safety for both emergency responders and the public. The collaborative work will include dialogue, knowledge exchange, and identification of potential research needs, to increase the team's as well as the society's knowledge e.g.:

- Accident research: Examining the aftermath of accidents involving alternative fuel vehicles, with a specific focus on understanding the safety implications.

- Standardization and Legislation: Investigating the need for standardization and potential legislative changes in response to the challenges posed by alternative fuel vehicles.

- Outlook: Upcoming initiatives on the international as well as national arenas.

- Post-accident procedures, including vehicle recovery and repair: Contribute to protocols guidelines for, for example, safe storage of electric vehicles involved in accidents and safe removal and transportation of crashed electric vehicles.

- Firefighting: Investigating safety measures and best practices for responding to fires involving alternative fuel vehicles.

- Explosion Risks: Assessing and mitigating explosion risks associated with alternative fuel vehicles.

- Organisational aspects: Exploring the organizational aspects of emergency preparedness, emphasizing the roles of different stakeholders throughout the response chain.

- Learning from other domains: Assessing the application of post-crash procedures in various contexts, including mining and maritime settings.

EXPECTED OUTCOME
- Knowledge building in a broad network with stakeholders, including those outside SAFER:
- Disseminating knowledge about upcoming legislation, best practices, guidelines and policies within the field.
- Gathering questions from authorities and other societal actors and acting as a host for discussions with industry and research entities.
- Collecting research questions and identifying knowledge gaps (to take further within SAFER).
- Discussing and advancing publications, reports, and studies within the field.
- Sharing information from and announcing upcoming activities related to this topic.
- Key deliverables 2024: Arrange five meetings, Identify at least one project area suitable for a pre-study or project application, Arrange at least one workshop/seminar jointly with SEC.

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CONNECTED SAFETY

CHALLENGES, NEEDS AND QUESTIONS TO ADDRESS

This working group will dive into what role connectivity can play for road traffic safety. The work will be divided into phases:

1. Introduction to the field of connected safety (seminar series). Provide the status, opportunities, and challenges for this field.
2. Use accident databases to study where and when connectivity might have changed the outcome of accidents

EXPECTED OUTCOME

- Increased awareness and knowledge among SAFER partners for connected safety
- Joint publication on the outcome of the accident study if connectivity had been in place

LONG-TERM IMPAIRMENTS FROM INJURIES IN TRAFFIC ENVIRONMENT

CHALLENGES, NEEDS AND QUESTIONS TO ADDRESS

- Renewed efforts to understand the patterns of and prediction needs for non-life-threatening injuries with long term medical impairment (whiplash, mild brain injuries, extremity injuries etc.). Relate long-term impairment risk to physical and simulation tool outputs in a variety of road use applications.
  How are persons affected in long-term by injuries acquired in traffic environment? How can long-term impairments be reduced or avoided?

- Address the broad interests and expertise across SAFER including post-crash interventions and rehabilitation.

- To extend the knowledge-base we seek to engage with the SAFER community beyond those with dedicated project funding.

EXPECTED OUTCOME

- To host a short series of seminars intentionally in between relevant external events to feedback knowledge and generate momentum for the next. This maintains SAFER partners at the forefront of discussions in global *fora* on the topic.

- Guest speakers appearing at SAFER events would be a part of the task; intended to bring in enthusiasm and expertise, and to energise our response to the challenge.

- Initiatives for new projects will be taken.

- We are hoping that some partners receive EU Project funding on this topic early in the period (call in 2023), and will contribute to seminars.

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POST CRASH

CHALLENGES, NEEDS AND QUESTIONS TO ADDRESS

The post-crash phase is an integral part in addressing the challenges related to death and not least severe injuries and long-term consequences. Each minute that can be saved when an accident has occurred is extremely valuable and there are major challenges not least in the information flow, quality and availability between the different actors involved in the process. In addition to quick response and accurate caring for accident victims, emergency response organizations suffer from limited resources and increasing call volumes. Hence there is a great need to improve more effective and precise ways to assess, prioritize and monitor incidents to ensure appropriate response resources are allocated.

EXPECTED OUTCOME

- Project proposals
- Strengthened connections between the stakeholders, including vehicle manufacturers, suppliers, IT providers, rescue services, hospitals and relevant authorities, and universities and research institutes.

ROAD ACCIDENT STATISTICS

CHALLENGES, NEEDS AND QUESTIONS TO ADDRESS

By using traffic accident data, many questions can be answered. What type of accidents happen on our roads and what road users are involved? How frequent do they occur? Do we have the right countermeasures in place (vehicle, infrastructure, behavior etc.) to reach the target for 2030 and Vision Zero?

Road Accident Statistics working group will develop and educate methodology for working with accident statistics and accident databases (in Sweden, EU27 and globally). It identifies established forums for expanding partners knowledge in the field of accidentology and engage in reducing road fatalities. It will guide partners how to get access to more accident data (e.g. STRADA, Swedish Transport Administration's fatal accident database, STATS19) and identify gaps and new type of data needs that need to be collected to make even better research.

EXPECTED OUTCOME

Initiate research project to conclude effectiveness of existing and hypothetical safety features, using in-depth accident data e.g., Swedish Transport Administration fatal accident database and if possible, using GIDAS and IGLAD. To start with accidents involving heavy goods vehicles and passenger cars (high focus on on-coming accidents). Identify the nature of the fatalities (who is injured in traffic) in collisions with passenger cars and heavy goods vehicles at a global level.

Result: Methodology, research project reports, paper publications

ROAD USER BEHAVIOUR

CHALLENGES, NEEDS AND QUESTIONS TO ADDRESS

- Traffic safety depends largely on the behaviour of the humans in the transport system. Safe behaviour is not limited to ensuring road users follow rules and regulations, it is also about supporting humans in and outside of vehicles to make safe decisions and actions.
- Topics include but are not limited to:
- Interactions between (automated) vehicles and humans in and outside of the vehicle (HMI design, handover situations, remote operation, personalization etc).
- Human factors aspects of the technology developed to support the human (e.g., ADAS, DMS).
- How to support understanding and correct use of vehicles, infrastructure and new technology, including new mobility solutions.
- Development of tools and models to monitor and predict road user behviour (e.g., VRU intentions).
- Monitoring of and countermeasures for driver impairments, including fatigue, distraction, drug/alcohol use, illness.
- Adaptation of safety systems and emergency actions based on driver state.
- Long-term and short-term behaviour change.

EXPECTED OUTCOME

The main purpose of the group is to create a meeting point for researchers from different disciplines where you can discuss current challenges. The expected outcome is therefore knowledge sharing among partners and maintaining a strong network around road user behaviour.

Potential outcome:

- Collaborative project proposals
- Position papers or other joint publications

SAFE INFRASTRUCTURE

CHALLENGE

In road transport, like any other complex system involving humans and the interaction with the environment, improvements in safety are costly when a certain level has been reached and require new visions and strategies. Furthermore, roads are increasingly being experienced by heterogeneous users driving at different speeds with a tendency to share vehicles/rides/assets. As never before the role of the physical and digital infrastructure is central for a safe interaction between road users.

NEED

With the increasing automation in transport, a new mobility setting is taking over in European road network. In this context, the role of the infrastructure in accident events involving Connected and Automated Vehicles (CAVs) and conventional road users is not yet explained. Embracing this concept, Vision Zero and its implementation through the transition to Safe System has been adopted by the European Commission (EC) to create synergies among the different components involved in traffic safety. The introduction of CAVs seems to be challenging or can be seen as an opportunity under the condition of a self-explaining physical and (efficient) digital infrastructure.

QUESTIONS TO ADDRESS

The role of the infrastructure in accident events, and in general, in the interaction between CAVs and conventional road users is still not fully understood. Indeed, while technological progress is rapidly being pursued, significant issues remain related to the development and integration of CAVs with physical and digital infrastructure in shared roads. In addition, neither actual accident-based nor proactive methods for road safety analysis can be applied when CAVs interact with conventional users. This is primarily due to the lack of knowledge about the influence of digital and physical infrastructure in the interactions among vehicles in mixed traffic conditions. This also creates a gap that needs to be filled to ensure a continuum in traffic safety research to include CAVs in the safe system paradigm.

SAFE INFRASTRUCTURE

EXPECTED OUTCOME

The working group aims to identify critical issues related to the road infrastructure and its effects on traffic safety. Although this is the main outcome, the group expects to reach it by reaching the following objectives:

- Define the state of the art in traffic safety research related to physical and digital infrastructure, and the main gaps;

- Identify research directions to frame the future of science and innovation in traffic safety and infrastructure;

- Promote a multidisciplinary approach to traffic safety through the participation of scientists and practitioners from different disciplines;

- Identify the most prominent infrastructure issues and frame them into future mobility scenarios;

- Further develop a proactive approach for infrastructure safety evaluation based on surrogate measures of safety.

SAFETY OF AUTOMATED DRIVING SYSTEMS

CHALLENGES, NEEDS AND QUESTIONS TO ADDRESS

Automated driving is still not commercially widely available. The technology promises increased mobility and improved traffic safety, or at least these are expectations. However, predicting and committing to improved traffic safety is challenging since

- the driving task that is to be automated is complex and it is unclear how a computer algorithm can replace human intelligence; and
- humans are very good at driving, i.e., the safety level is high already;
- and verification involves making confident predictions from a limited set of data and it is not yet established how to do so.

Relations to other research areas include safety benefit assessment, sensing, human behavior, safety performance indicators (if they exist), extreme value theory, etc.

EXPECTED OUTCOME

Gothenburg based companies have competitive edge in AD technology, ADS:es contribute to improving traffic safety, providing a network for experts in the field (hopefully Swedish authorities could find it interesting as well). TS5083 is developed with Gothenburg input.

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SAFETY OF COMPLEX AND EMERGING TECHNOLOGIES

CHALLENGES, NEEDS AND QUESTIONS TO ADDRESS

The increase in scale and complexity of existing technology, and the emergence of new technologies (such as electrification, connectivity and artificial intelligence) lead to new risks for society related to traffic safety. There is also a shift in the industry from vehicle manufacturers to mobility providers, which increases the scope of safety assurance.

To ensure safety in a transport system context, an agile systems and model-based approach to safety assurance is needed which accounts for the capability of new technologies, human factors , and the complex dependencies between elements of a system (from component level, to vehicle/infrastructure level, to transport service level).

EXPECTED OUTCOME
- Best practices are defined in safety assurance of complex systems and emerging technologies.
- Knowledge sharing: new research questions, new approaches to problem areas, and examples of implementation of existing research in industry.
- New or deeper collaborations between OEMs, suppliers, relevant authorities, and universities/research institutes.
- Initiation of new research questions, new research project application, new thesis projects (Masters/PhD).
- Contribution to review and formulation of new standards in this area, such as ISO/CD PAS 8800.

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TOOLS FOR CRASH ASSESSMENT

CHALLENGES, NEEDS AND QUESTIONS TO ADDRESS

Tools replicating the humans in the crash are the core of crashworthiness assessment. This applies to all road users, including different types of vehicle occupants, 2-wheeler occupants as well as pedestrians. The working group serves the purpose to maintain and strengthen the Swedish long-term tradition of developments of crash test dummies (ATDs) and Human Body Models (HBMs). This is exemplified by very early pedestrian dummies, the BioRID in the 1990s and the advanced shoulder (which is now part of THOR), in addition to - more recently - the SAFER HBM and the VIVA+ HBMs. The challenges moving forward include the needs for a larger variation of tools, both physical and virtual, covering a wider context of road users, addressing the diversity of humans, as well as increased capability needs of injury prediction details. In addition, whole-sequence human kinematics is essential to replicate real-world needs of crash complexity and to support the development of automated functions in vehicles helping to mitigate crashes.

The group should address:
- Identify data needed for development and validation of ATDs and HBMs – global outreach and sharing network and insights.
- Identify other gaps of needs for overall road safety advancements. Discuss and potentially develop those of interest for the participants*. For instance, how to assess effectively low levels of injury risk as seen in high numbers of crashes (low risk and high exposure)
- Discuss and share insights on international work on ATD and HBM developments, including standardization activities. If needed, provide support to representatives in different fora.
- Specific task is to keep each other updated – and potentially collaborate - on the ongoing HBM for Virtual Testing initiatives (e.g., HBM4VT, EqOP)
- Learn from each other regarding cross-cutting areas of application, e.g. occupant tools for pedestrian application.
- …

Note, maintenance and development of the existing HBMs (SAFER HBM and VIVA+) are handled elsewhere and are <u>not</u> part of this group's tasks.

EXPECTED OUTCOME

Meet quarterly to discuss progress within area, share insights into ongoing discussions and identify need for knowledge exchange and/or research project initiation. Therefore:
- Meeting reports covering knowledge exchange (insights from events and preparatory effort needed)
- Research project proposal ideas, subject to needs and potential for initiation.
- Planning for these meetings to be held between external events where group members participate, so that they get the most from the interactions and can engage easily with the SAFER network afterwards.
- Safeguard and develop SAFER as a Swedish hub for research on human body models and crash test dummy developments, and the prerequisites for validation of those.

TRAFFIC SAFETY FOOTPRINT

CHALLENGES, NEEDS AND QUESTIONS TO ADDRESS

Our primary research question is how to systematically and value-driven follow up on traffic safety footprint in practice, leading to real road safety benefits. The concept of traffic safety footprint, which refers to the number of fatalities and serious injuries in traffic within an organisation's value chain, holds significant potential for effectively reducing traffic accidents. The novelty is to address road accidents from an organisational perspective; a new way of managing safety. However, implementing this concept in practice is not straightforward, and we believe that SAFER has a great opportunity to contribute to knowledge building, understanding the potential, and developing tools to assist in practical implementation. Our offer is to facilitate the discussion and gather knowledge in this area, ensuring that our partners can learn and implement these practices within their respective organisations.

EXPECTED OUTCOME

The expected outcomes of this group are to make a significant impact in the domain of traffic safety. In essence, our activities are geared towards enhancing SAFER's position as a leader in comprehending this concept from a scientific standpoint. Through our collaborative efforts, we anticipate achieving the following:

- **Knowledge enrichment:** We aim to develop a repository of best practices, equipping organisations with the tools and insights needed to comprehensively map their value chains, quantify traffic safety impacts, and institute effective countermeasures for improvements.
- **Research pioneering**: Our group will actively identify and address crucial research questions, initiating projects that push the boundaries of our understanding in this domain.
- **Stakeholder engagement:** We are committed to fostering meaningful dialogues with international stakeholders such as GRI (Global Reporting Initiative) and FIA (Fédération Internationale de l'Automobile). These conversations will enable us to gain deeper insights into needs and perspectives globally, facilitating our own collaboration for even greater impact. A global perspective is vital to improve traffic safety numbers.
- **Data Needs Assessment**: One of our key objectives is to identify the data requirements necessary for accurately mapping fatalities and accidents within an organisation's value chains. This fundational work will enable informed decision-making, using the concept of traffic safety footprint.
- **Knowledge Dissemination**: Beyond our working group, we will actively organize knowledge-building activities to disseminate the insights and expertise generated. By sharing our findings, we aim to raise awareness about the concept and encourage its adoption on a broader scale.

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