Safety culture and automated vehicles and machines

Johanna Larsson
SAFER presentation, March 20th 2024
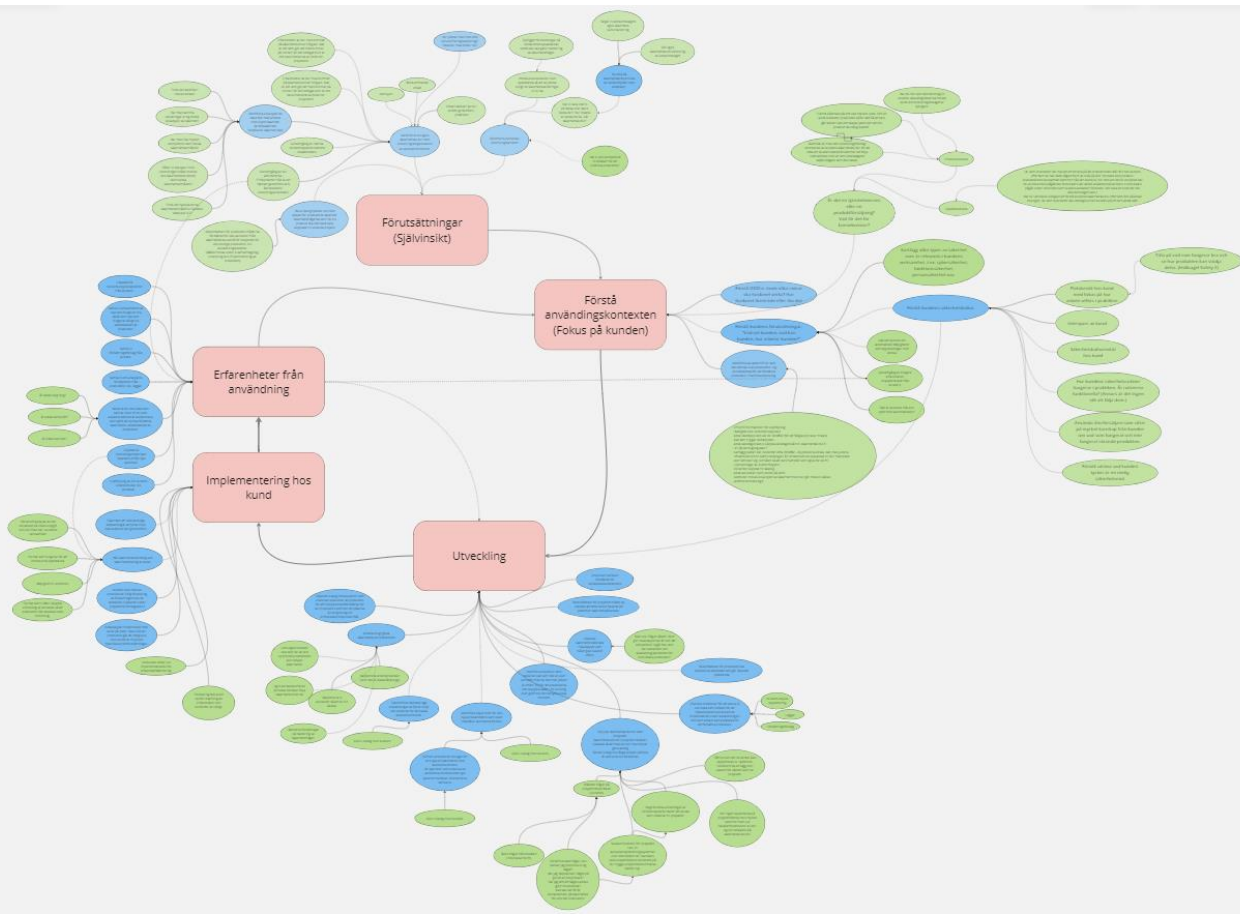
Funded by Vinnova FFI and
participating oragnizations

Main result: The SCAV model

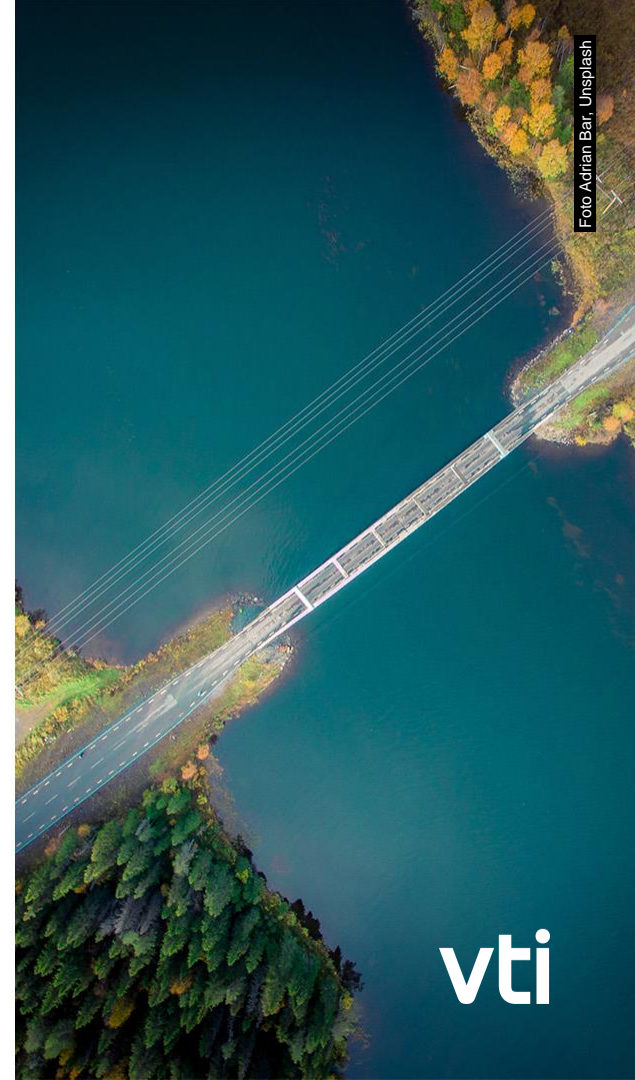A model to include safety culture in the development of autonomous/automated vehicles and machines.
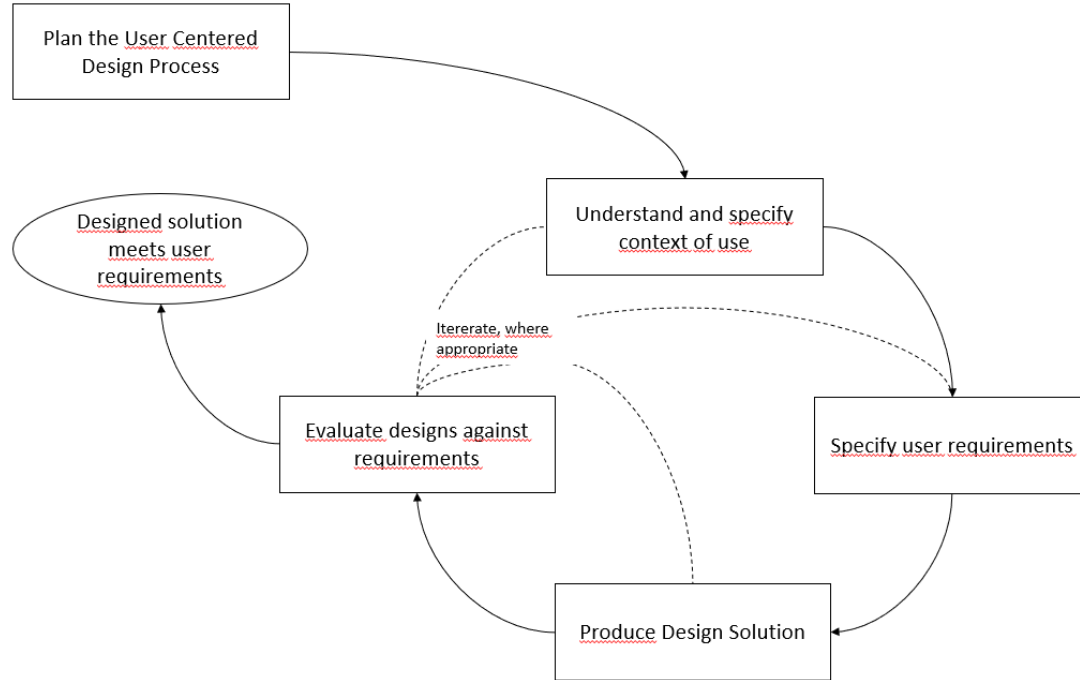
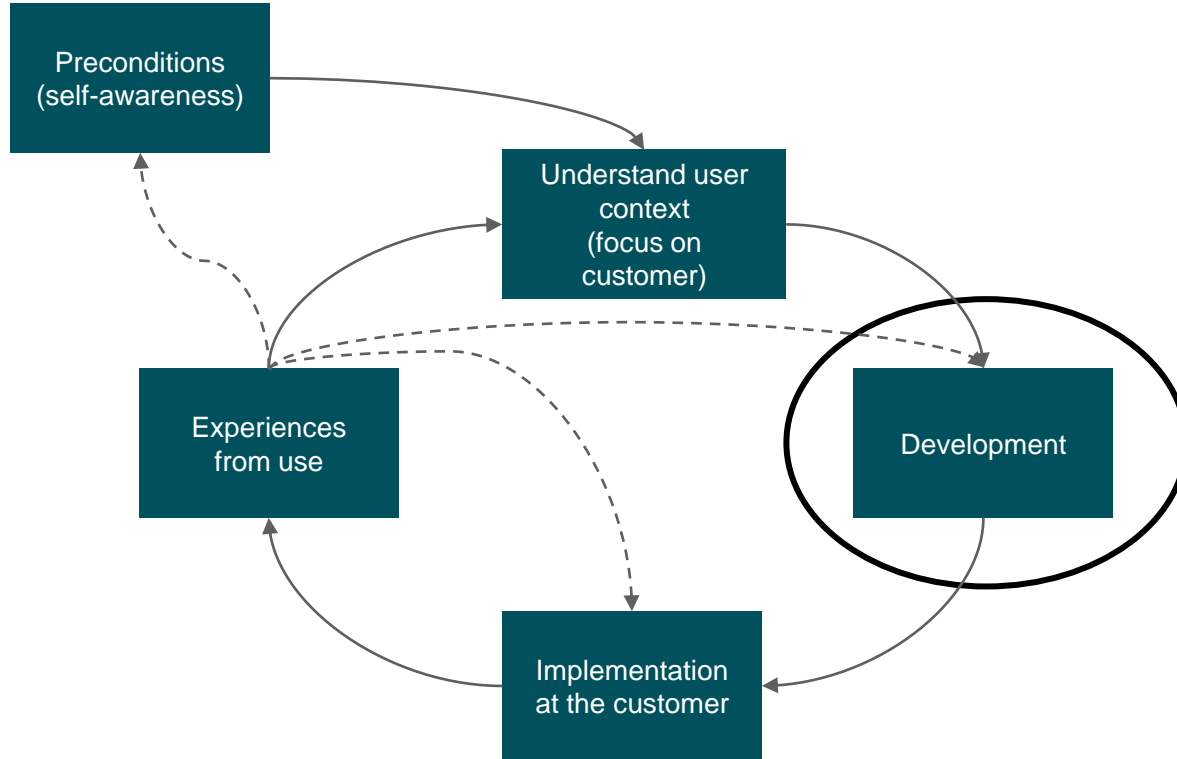Based on the Human Centered Design Process
(ISO 9241-220:2019)

Comparison to ISO 26262
(Functional safety)

Meant as a toolbox.

First draft. Remains to be tested in practice.

User Centered Design process

Plan the User Centered Design Process

Understand and specify context of use

Designed solution meets user requirements

Itererate, where appropriate

Evaluate designs against requirements

Specify user requirements

Produce Design Solution

Foto Adrian Bar, Unsplash

vti

Preconditions (self-awareness)

Understand user context (focus on customer)

Experiences from use

Development

Implementation at the customer

Förutsättningar
(Självinsikt)

Förstå
användningskontexten
(Fokus på kunden)

Erfarenheter från
användning

Implementering hos
kund

Utveckling

Example of activities and tools

Development	
Activity	Tools/Questions
Work according to good safety culture behaviors	Management needs to live as they learn and encourage behaviors that support safety.
	Own staff/experienced staff need to follow the safety procedures
	Report deviations so that they become known.
	Repeat expectations for how to handle safety issues
	Report work processes that are not fit for purpose
Continuous dialogue between parties who develop different parts of the product, to promote overall understanding of how the product will affect its surroundings during operation/use/maintenance.	
Identify necessary adaptations of physical environment at end customer to suit autonomous vehicles.	In dialogue with customer.
Identify (new) roles for the new business that will soon include autonomous vehicles.	In dialogue with customer.
Develop job descriptions for the new business with autonomous vehicles.	The supplier needs to define the new roles required by the autonomous vehicles/new system.
Identify markers which indicate what has not yet been done. These should be removed when the job is done. To prevent users from doing things in the wrong order or forgetting to do certain steps.	
Developers need an understanding of the end-user context.	Site visit to customer.

vti
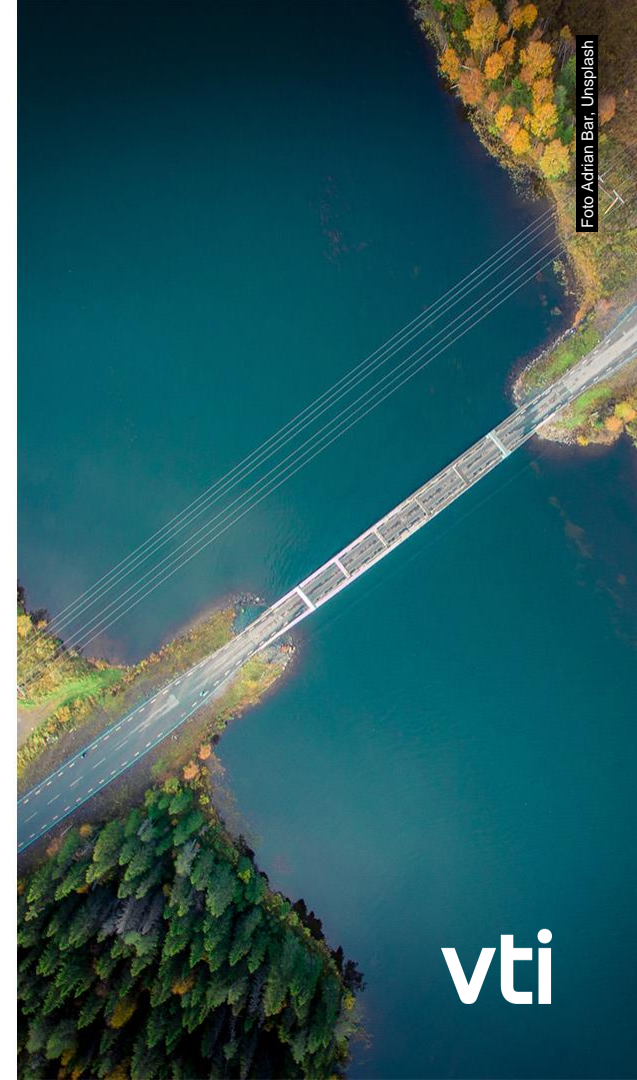
Why work with safety culture?

- The introduction of autonomous vehicles and machines into existing operations often involves changes in the physical environment and the organization.

- Autonomous vehicles and machines may introduce new risks.

- We believe that the safety culture, both among developers and customers/end users, plays an important role in developing autonomous vehicles and machines that are both safe and efficient where they will be used.
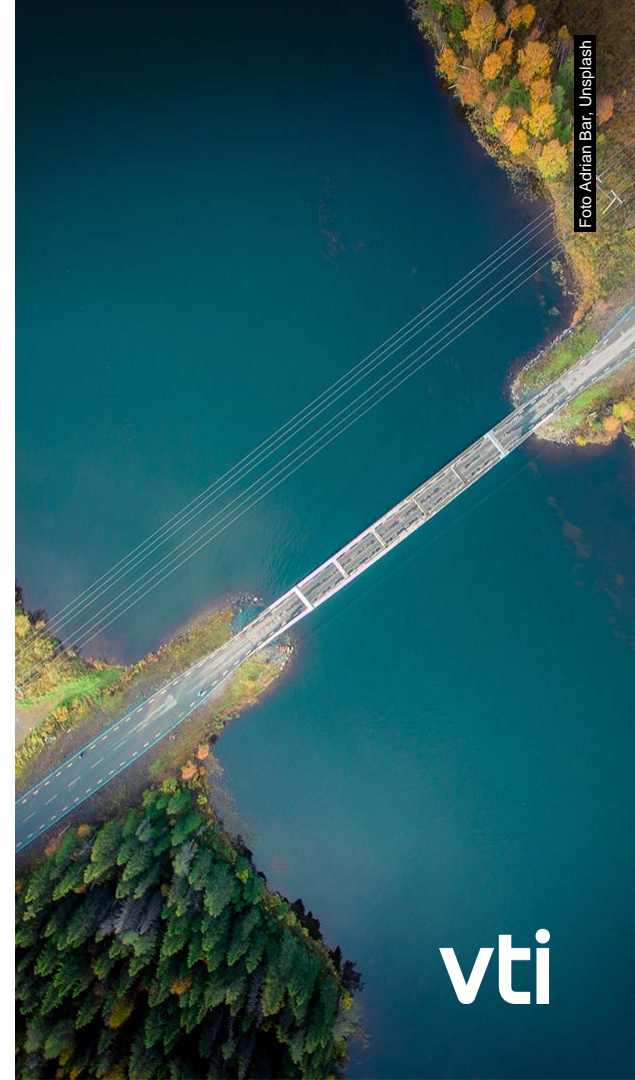
vti

Safety culture definitions

- More or less one definition for each industry

- Defined by attributes/dimensions/aspects, e.g.

    - Management's commitment to safety

    - Employees' commitment to safety

    - Continuous learning and improvement

    - Communication

    - Systematic safety management
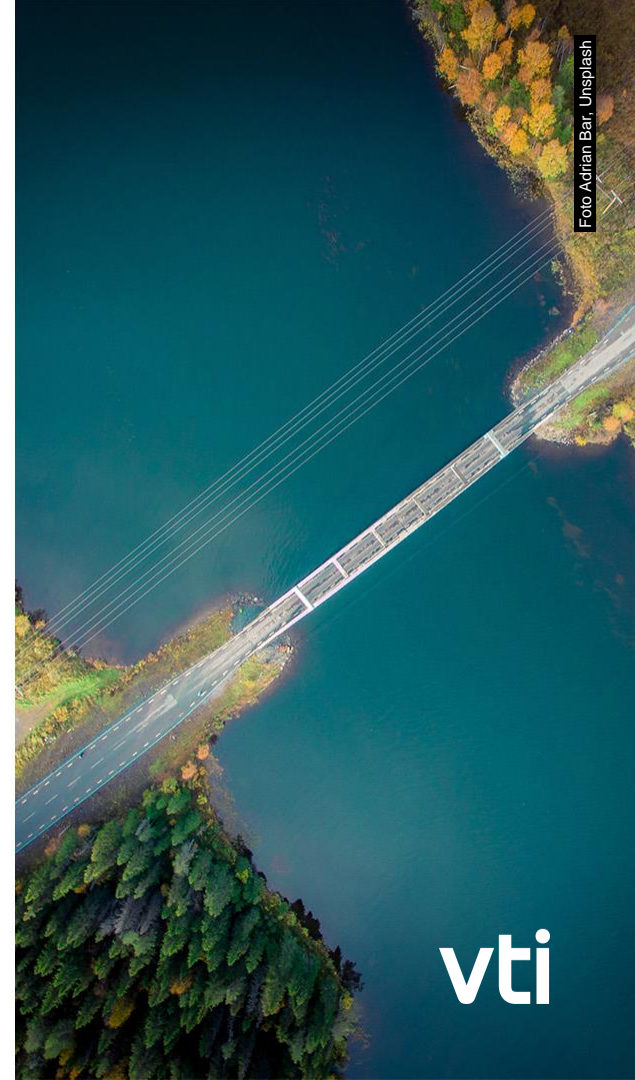
- Overlaps and gaps among the attributes

vti

One definition of safety culture

"Safety culture is about an organization's common way of thinking and acting in relation to risk and safety, i.e. how an organization prioritizes and actually works with risks and safety related to its activities."

Transportstyrelsen/Swedish Transport Agency (2023)

What's missing?

The effects (on safety) that the products and/or services of the organization will have on the customer/end user.
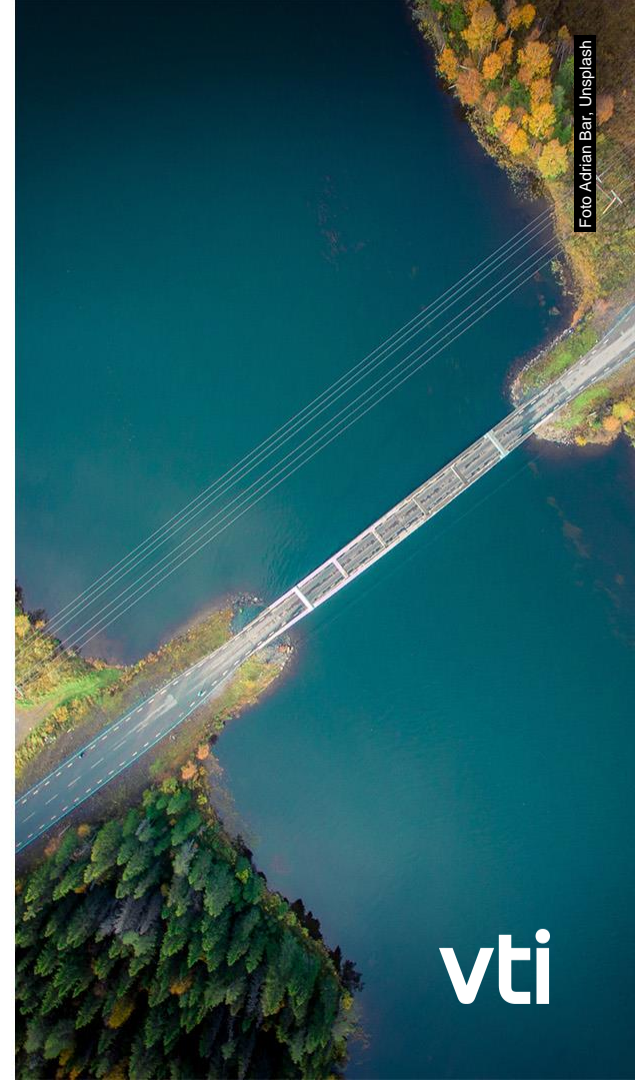
Foto Adrian Bar, Unsplash

vti

Our definition of safety culture

"Safety culture is about an organization's common way of thinking and acting in relation to risk and safety, i.e. how an organization prioritizes and actually works with risks and safety related to its activities, *products and services*."
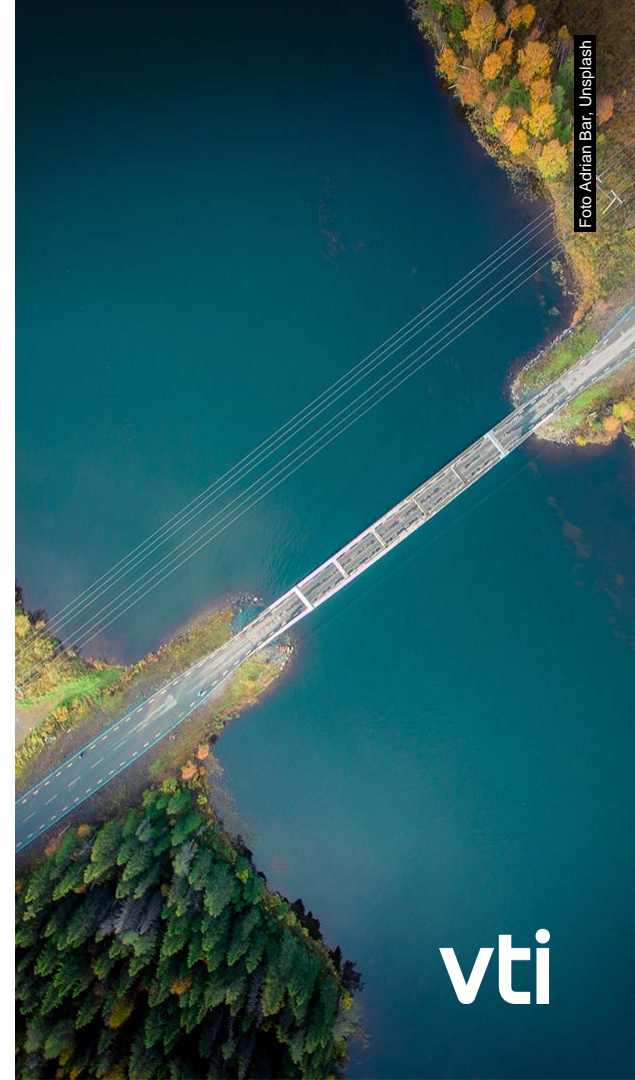
vti

Project Goal

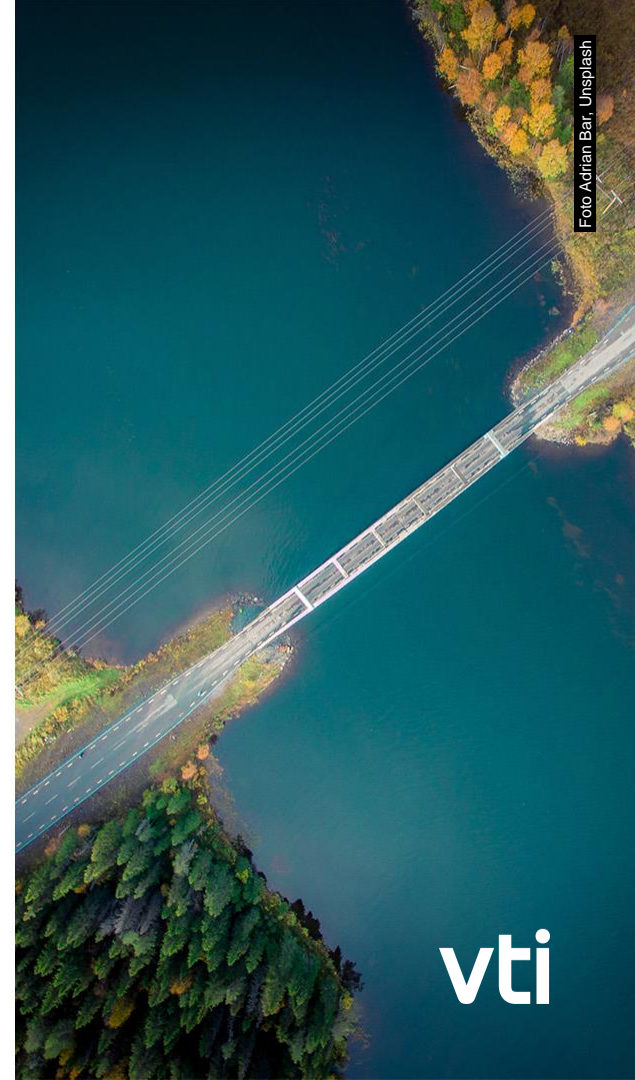Develop methods to improve safety culture where people and automated technology interact as agents in a joint system.

vti

What we did

- Interviewed developers, customers and users of automated vehicles and machines.

- Adapted and tested a survey for measuring safety culture in the autonomous vehicles/machines industry.

- Analyzed incident report data from autonomous shuttles and driverless industrial trucks.

- Looked at how data from autonomous vehicles could be used as safety performance indicators for improving the vehicles/machines.
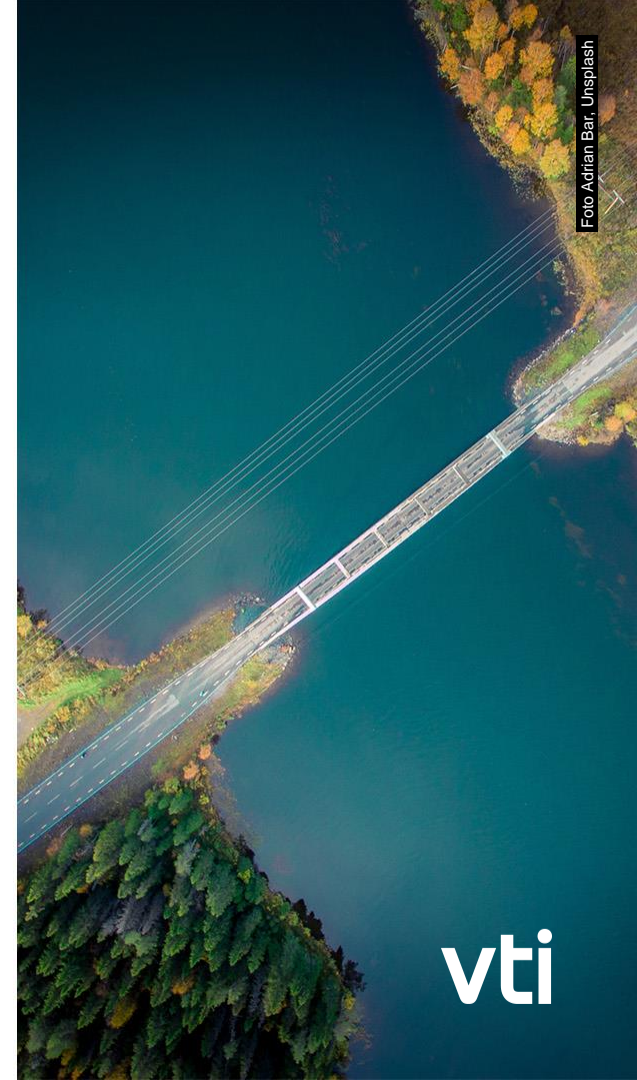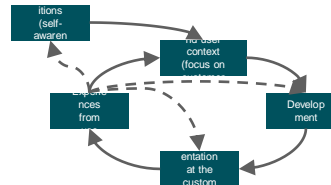
- Combined these into the SCAV model.

vti

Some highlights

- Safety vs efficiency/performance

- Safety vs safety

  - Internal safety (passengers and drivers)

  - External safety (other road users)

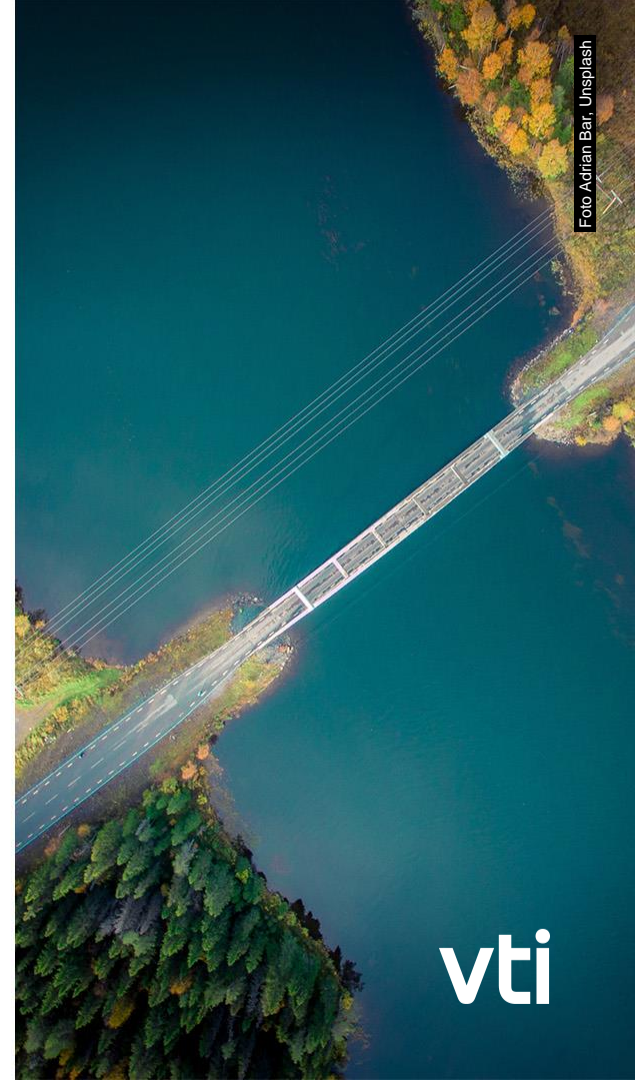- Define what types of safety are relevant in your organization and which is prioritzed.

Foto Adrian Bar, Unsplash

vti

Want to learn more?

Johanna Larsson
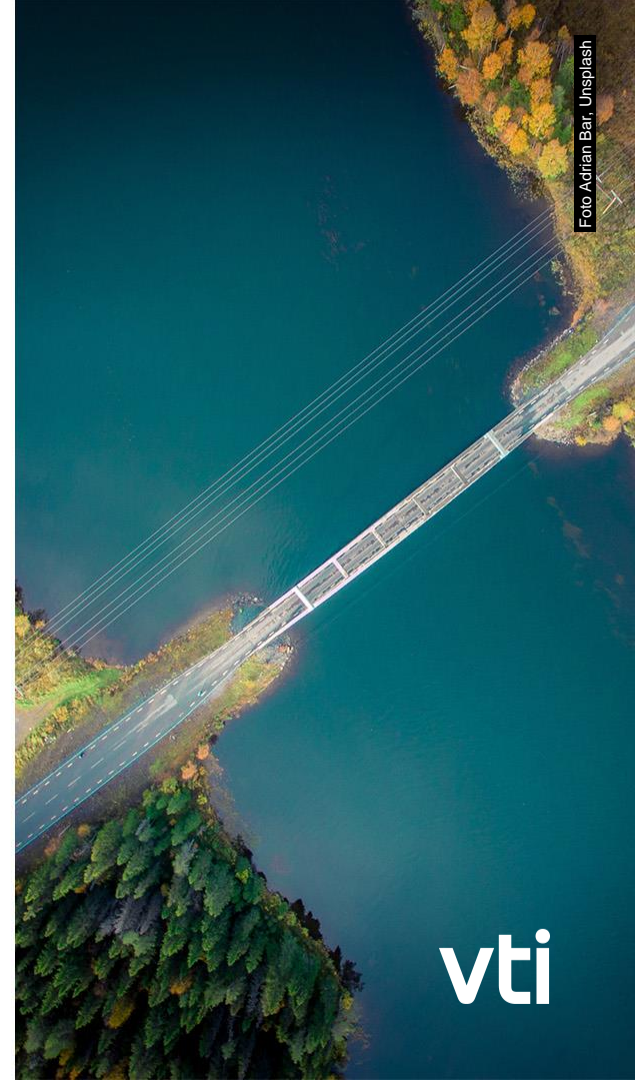
013-20 40 38

johanna.larsson@vti.se

Thank you!

VOLVO

COMBITECH

TOYOTA
MATERIAL HANDLING

vti

RI.
SE

Funded by Vinnova FFI and
participating oragnizations