



ILMATIETEEN LAITOS
METEOROLOGISKA INSTITUTET
FINNISH METEOROLOGICAL INSTITUTE

SafeTrucks

Road weather service tailored for heavy vehicles

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Background



- Accidents involving heavy road vehicles potentially cause high-volume damages:
 - Human casualties
 - Operational losses
 - Infrastructure and traffic fluency losses
 - Negative environmental impacts.

→ Enhancing heavy traffic safety will have great impact for general traffic safety



Introducing the SafeTrucks project

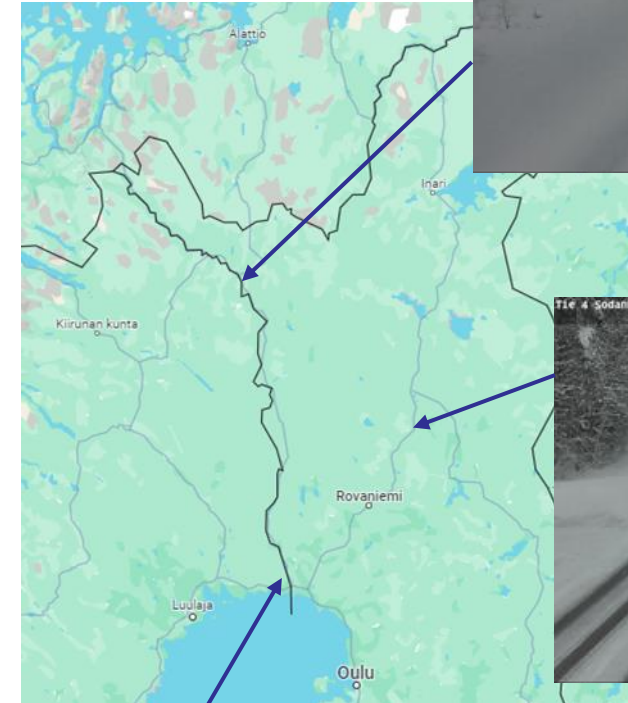


- New Finnish-Canadian Eureka Xecs SafeTrucks -project (Heavy traffic safety improvements by advanced dynamics and road weather services) develops real-time vehicle-specific weather and safety services, which are based on the vehicles' own observations combined with data from the service systems and an analysis of the vehicle's own dynamics
- Eureka Xecs SafeTrucks (Heavy traffic safety improvements by advanced dynamics and road weather services)
- Research project between Finland and Canada, conduction in 2023-2025
- Leading partner Finnish Meteorological Institute (FMI) in Finland, Canadian consortium coordinated by National Research Centre in Canada
- Main objective of the project: **Improve the safety of heavy traffic** by providing weather and safety warnings directly to the driver, adjusted individually to each heavy vehicle unit



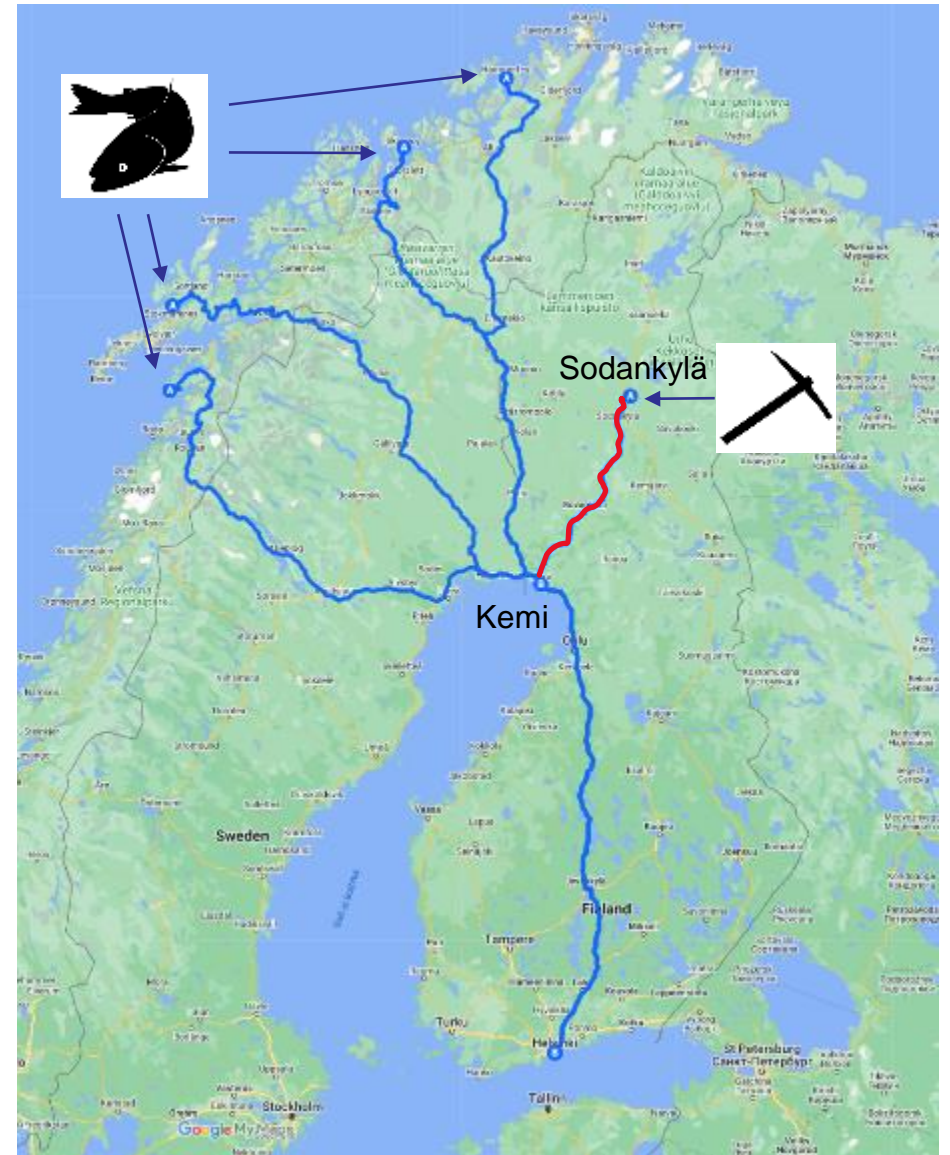
The aim of the project

- Improve the safety of heavy vehicles
- Focusing on the roads located in Northern Finland
 - Narrow roads
 - The maintenance level is low and the winter season long, darkness
 - Detours can be long and possibly even worse maintained
 - Lots of heavy vehicle traffic, especially due to mining and salmon deliveries from the North Atlantic to the south + regular bus routes and other goods transport by trucks
 - Drivers of heavy vehicle with no experience in winter road conditions



Pilot road between Sodankylä and Kemi (red line)

- Pilot road 300 km long
 - Varying weather conditions due to coastal area vs inland
- Piloting on winter 2024-2025
- Instrumentation (extra observation systems) on trucks
- Route weather
- Specific pilot sites
 - Curves, open and windy places, road weather stations, winter driving test track in Sodankylä



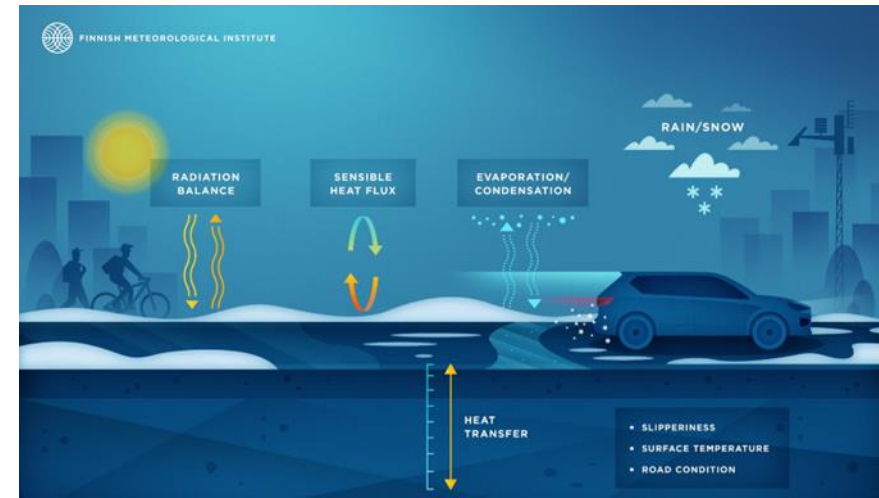
Services provided in the project

- Route weather
- Special warnings for pre-defined points:
 - Slipperiness: **Active braking distance**
 - Strong wind: **Warning of gusty wind**
 - Slipperiness + strong wind + curve: **Risk of trailer roll-over**

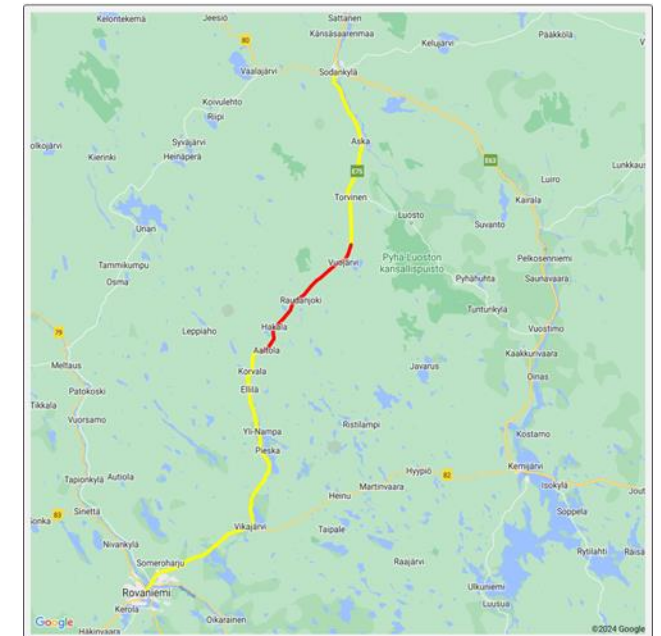


Route weather

- Based on road weather observations and FMI's road weather forecast
- Giving information about road surface temperature, road condition, traffic index, slipperiness (friction)
- Observations from moving vehicles
 - Temperature, friction, ...
- Visualization on on-board units / laptops



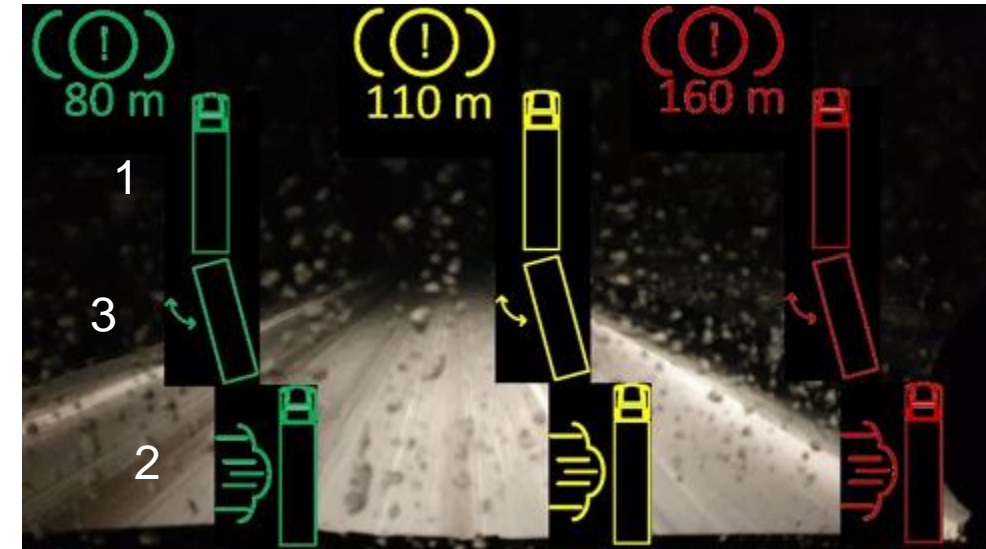
FMI's road weather model



Route weather example

Specific warnings

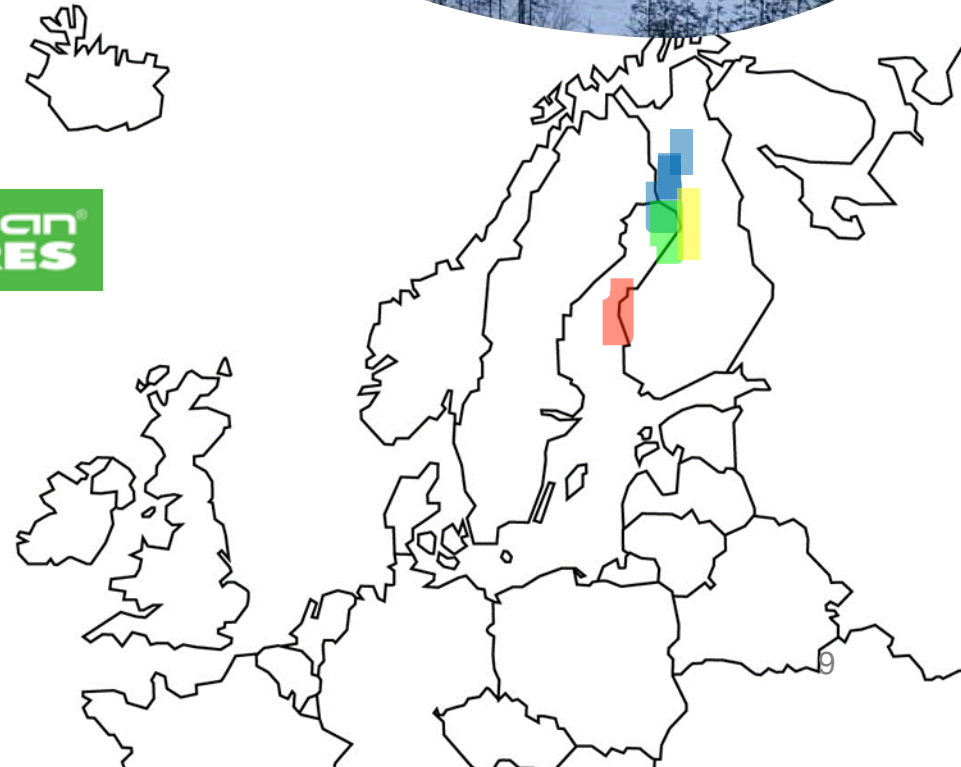
Service	Contents	Presented data
1: Active braking distance	Real-time estimate of current braking distance, based on road friction (estimate and forecast), tyre conditions, vehicle speed, weight and axel-level weights	Braking distance in meters, in red font when critical
2: Gust wind warning	Real-time estimate of gust wind effect to the vehicle and its trailer, based on road weather forecast adjusted to geographical area and vehicle and trailer dimensions and weight and speed of the combination	Extreme, high and moderate gust wind warning as blinking text or symbol
3: Trailer falling risk	Real-time estimate of trailer falling risk, based on friction (estimate and forecast) and vehicle dynamics (speed, tyre condition, trailer weight and axel-level weights, lateral movement of vehicle and trailer)	Extreme, high and moderate trailer falling risk as blinking text or symbol



Three-stage color coding system for warnings

Operative fleets

- Operative piloting in Finland with pilot services embedded to operative fleets as on-board instrumentation
 - Neste; tank vehicles in Oulu and North
 - Ahola Transport; freight vehicles in Vaasa and Western coast
 - VR Transport; heavy mining freight in the Sodankylä and North
 - University of Oulu and Nokian Heavy Tyres; tyre analysis in heavy test vehicle & trailer in Oulu
 - Lappia institute electric truck in Kemi area
- Varying on-board instrumentation, consisting of
 - OBU & user interface, laptop, vehicle PC
 - Friction instrument
 - Driving monitoring instrument
 - Can-BUS monitoring instrumentation
 - Tyre censoring
 - To be supplemented...



More detailed weather and road condition information

- FMI produces basic information about weather and road weather as well as warnings
 - **Transport companies use this information and can specify vehicle-specific information to obtain more detailed information**
 - The truck is empty or full
 - Is the brake system sensitive or not
 - Tyres new or worn
 - Other vehicle-related dynamics
 - Driver experienced winter road condition or not
 - Etc.



SafeTrucks system - Recap





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Thank you!

<http://safetrucks.fmi.fi>



Eureka Xecs **SafeTrucks** (Heavy traffic safety improvements by advanced dynamics and road weather services)