ROAD WEATHER INTELLIGENCE

ARTIFICIAL INTELLIGENCE PAVING THE WAY FOR ROAD SAFETY

klimator

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- VD för Klimator AB - ledande inom digitalt intervägunderhåll
- Bakgrund inom affärsutveckling, tech och tillväxtbolag
- Tidigare verksam inom management consulting och entreprenörskap
- Har lett digitaliseringsinitiativ inom transport, infrastruktur och hållbar mobilitet
- Kommunikationsvetare från Jönköping University
- Digital evangelist för vinterindustrins modernisering och uppkoppling
- Brinner för att omsätta avancerad teknik till praktiska lösningar med samhällsnytta

LinkedIn

www.klimator.se

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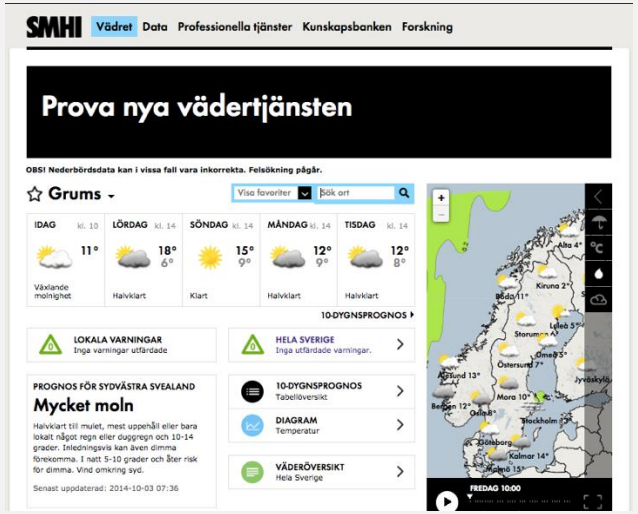

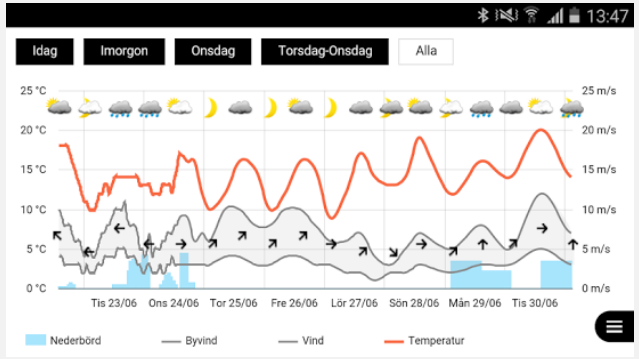

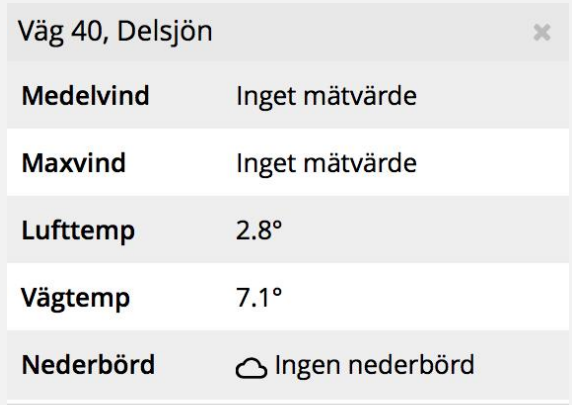

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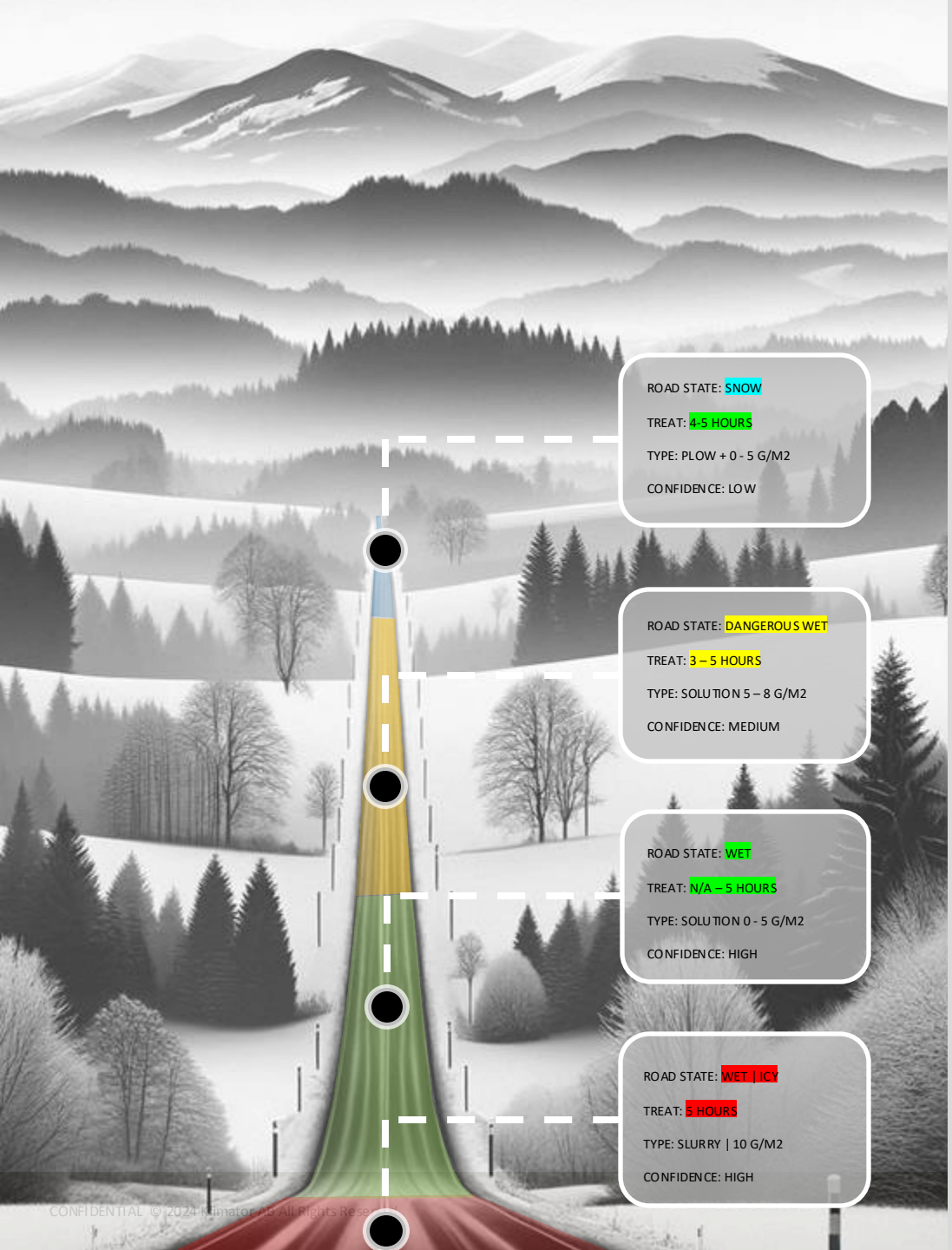
Klimator provides unparalleled road weather data by combining machine learning, rule-based algorithms, and vast amounts of data.

We are local. Globally.™

- **Founded**: 2001, Gothenburg, Sweden
- **Focus**: Road weather intelligence: hyper local road weather forecasts
- **Offers**: Klimator provides unparalleled road weather data by combining machine learning, rule-based algorithms, and vast amounts of data.
- **Mission**: Data-driven change for safer traffic
- **Team Klimator:** 4 PHD Climatology, 8 Devops, 3 Computer vision and AI expertise , 4 sales and management.



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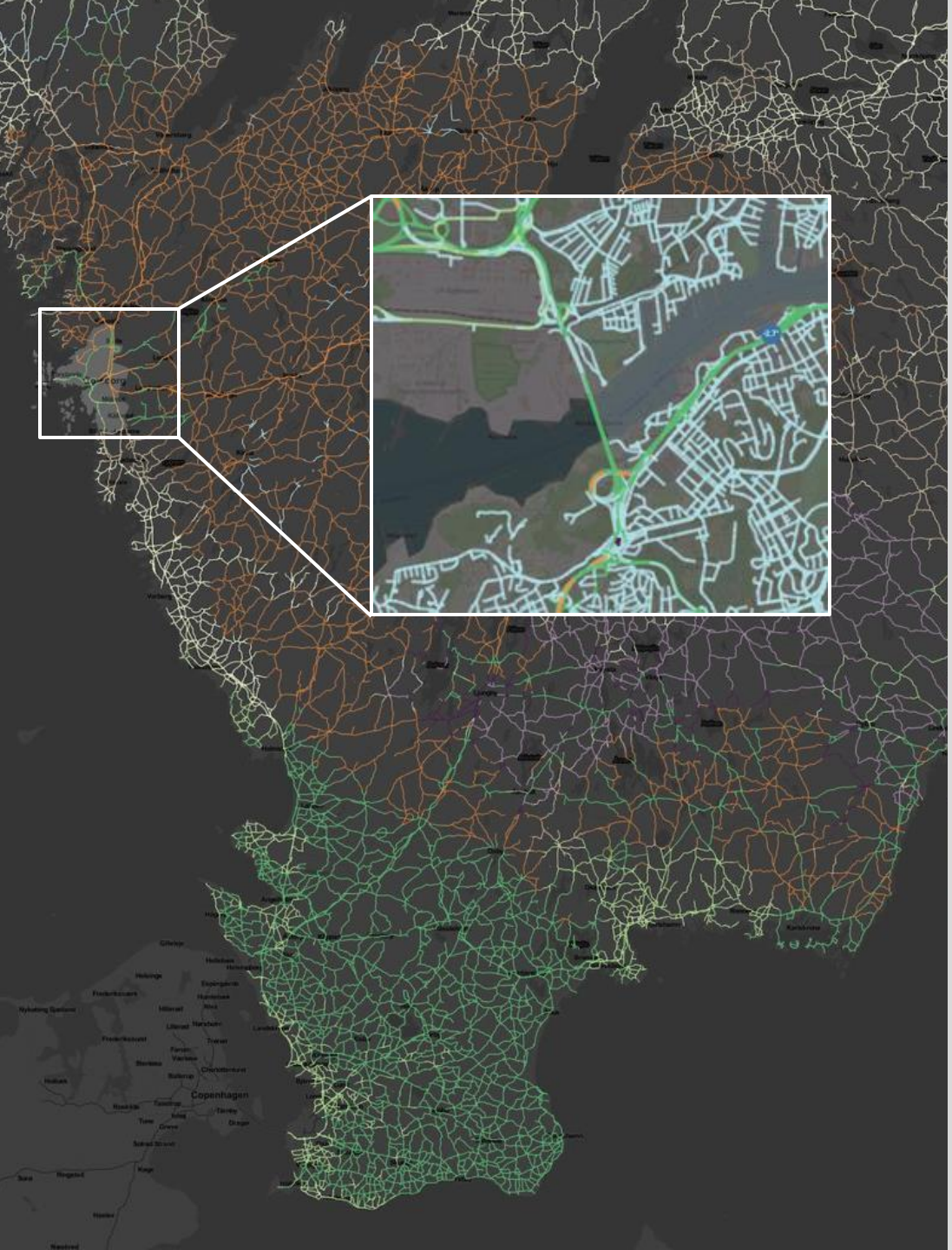
GLOBAL MODEL

MESO MODEL

HYPER LOCAL MODEL

WHATS THE DIFFERENCE?

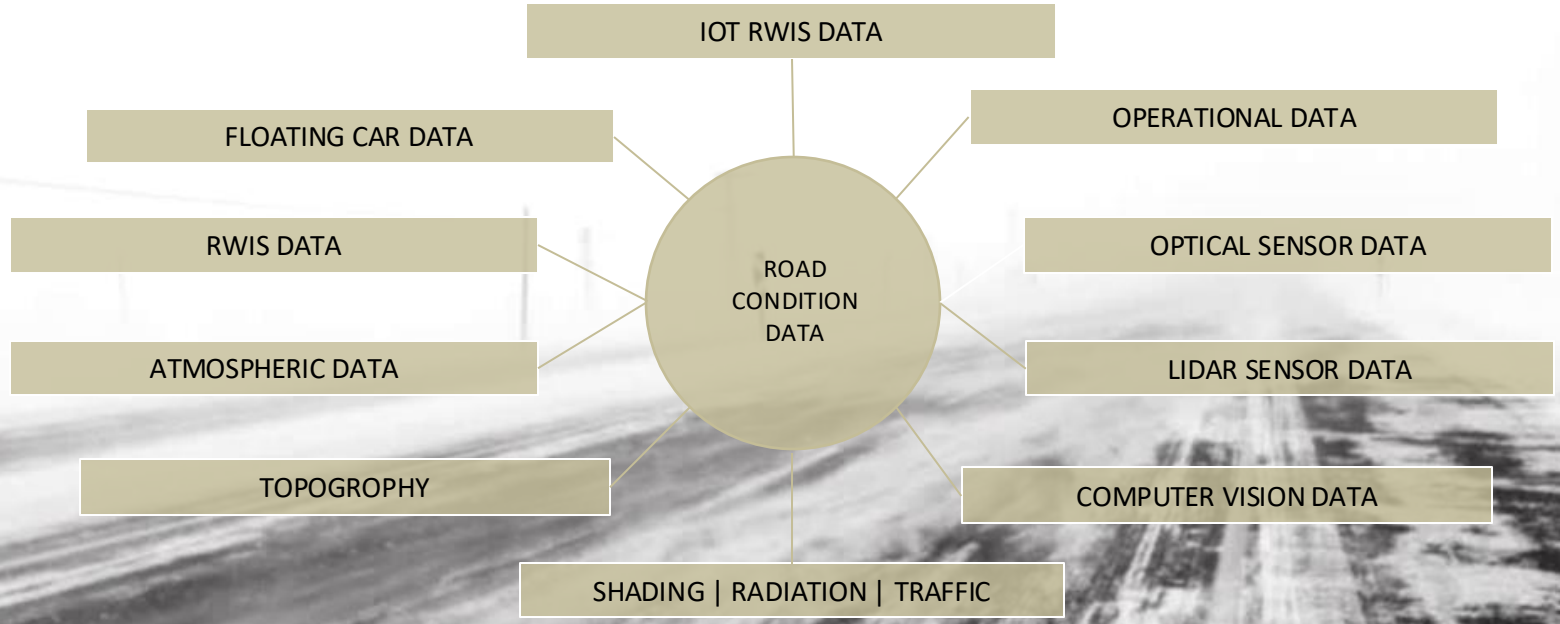
- **Pureplay** road climatology focus - We analyse **bottom-up**.
- Klimator **predictive** models using road climatological variations using weather only as one of many data sources.
- **30 years experience** in road climathology; research, development and implementation.
- 15 years experience of utilizing **vehicle data**
- 10 years experience utilizing **optical sensors**
- 5 years experience utilizing **computer vision** for slippery roads.



ROAD CONDITION DATA, RCD

- **WHEN? WHERE? WHAT?**
- 24 Hours forecast, new every hour.
- Road segment down to 25 meter
- Local climate, hyper local road weather forecasts
- Multiple data sources based on use case
- Combines machine learning, rule-based algorithms with physical models.

RCD MODEL IS OPTIMIZED FOR A VAST NUMBER OF REALTIME DATA SOURCES



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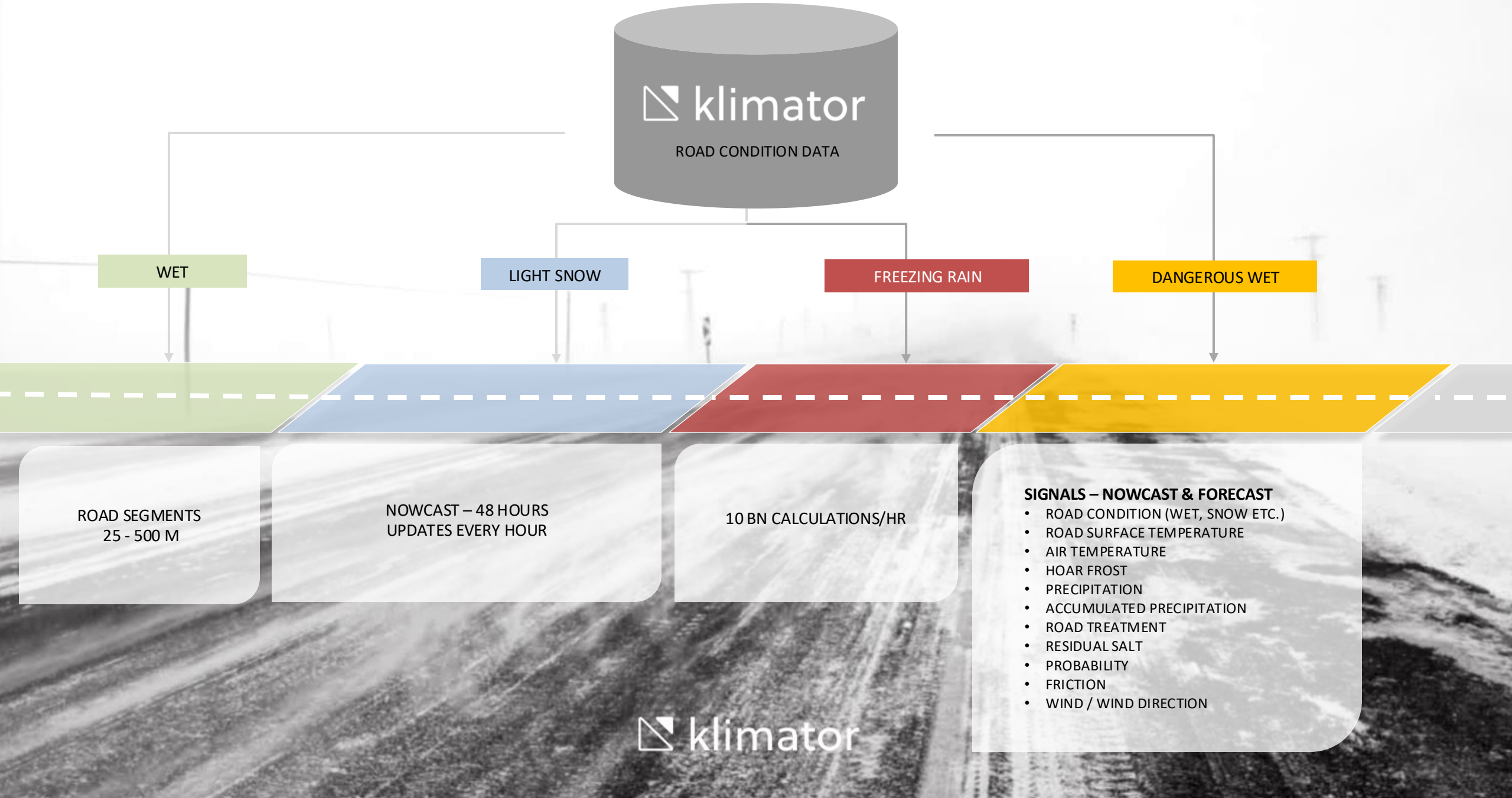
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ROAD CONDITION DATA
WET
LIGHT SNOW
FREEZING RAIN
DANGEROUS WET
ROAD SEGMENTS
25 - 500 M
NOWCAST – 48 HOURS
UPDATES EVERY HOUR
10 BN CALCULATIONS/HR
SIGNALS – NOWCAST & FORECAST
• ROAD CONDITION (WET, SNOW ETC.)
• ROAD SURFACE TEMPERATURE
• AIR TEMPERATURE
• HOAR FROST
• PRECIPITATION
• ACCUMULATED PRECIPITATION
• ROAD TREATMENT
• RESIDUAL SALT
• PROBABILITY
• FRICTION
• WIND / WIND DIRECTION
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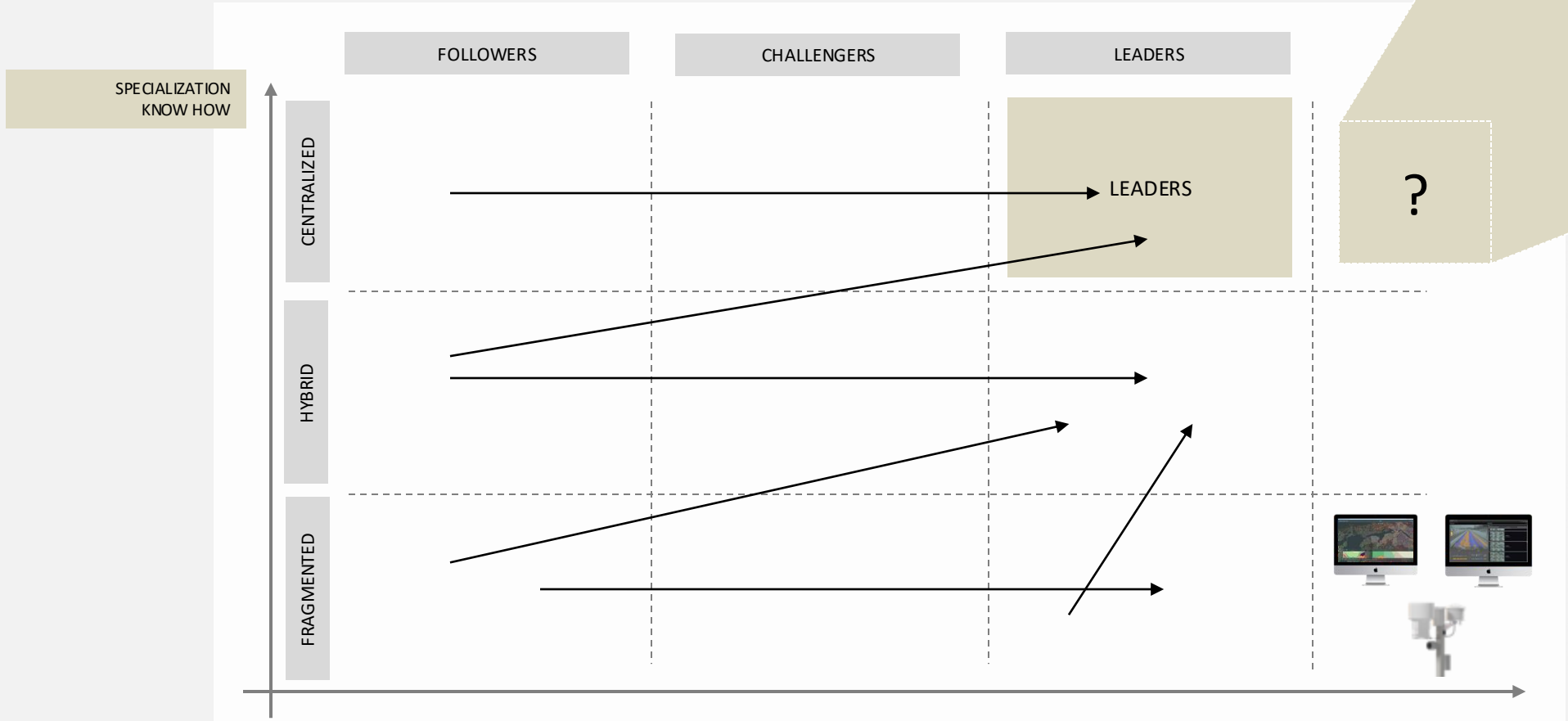
THE WINTER MAINTENANCE INDUSTRY OVERVIEW

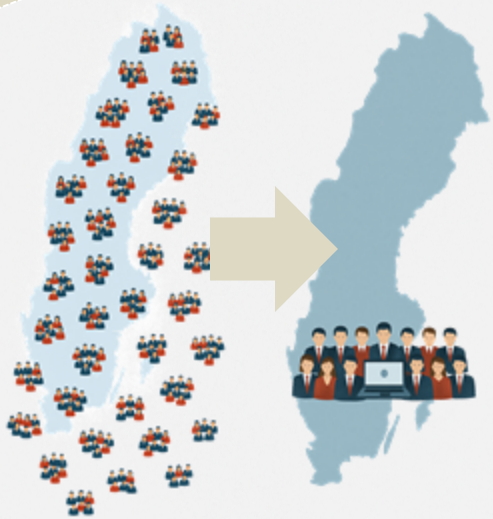
CALL-OUT
- STANDARDIZED DECISIONS
- CENTRAL CALL-OUT
- COMMON KNOWLEDGE BASE / DEVELOPMENT

IMPLEMENTATION
- DRIVER ASSISTANCE
- **AUTOMATIC SALT / ADAPTIVE SALT**

FOLLOW-UP
- APPROVED MEASURE YES/NO
- PROFITABLE YES / NO
- WORK ORDER YES/NO

QUALITY AND PROCESS
- STANDARD TECHNOLOGY
- STANDARD IMPLEMENTATION





TECHNOLOGY / AUTOMATOION / STANDARDIZATION

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KLIMATOR TECHNOLOGIES | WINTER MAINTENANCE

SAAS DECISION SUPPORT
ROAD STATUS INFORMATION

ADAPTIVE SALTING
REAL TIME ROAD CONDITION

IOT SENSOR
TECHNOLOGIES

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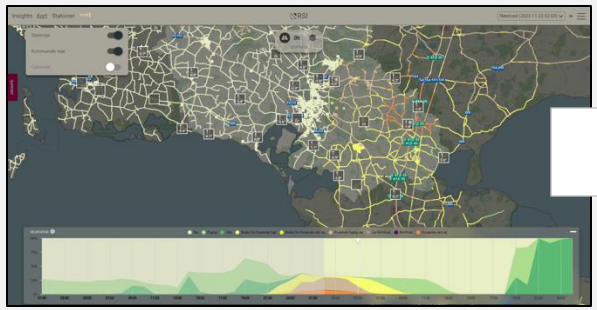
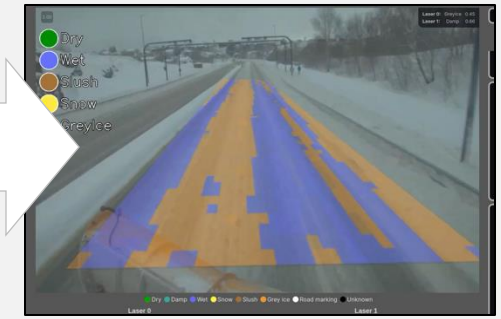
USE CASE ADAPTIVE (AUTONOMOUS) SALTING



ROAD CONDITION FORECAST

TREATMENT FORECAST
BASED ON WEATHER EVENTS
AMOUNT, LIQUID, MOISTNED SALT, DRY SALT

TREATMENT FORECAST
INTEGRATED WITH SPREADER



AHEAD – REALTIME MICRO CALIBRATION OF
SPREADER BASED ON ACTUAL CONDITION

OPERATIONAL DATA TO RCD

AHEAD DATA TO RCD

mesta

NO: STATE ROAD CONTRACTOR

SVEVIA

SE: STATE ROAD CONTRACTOR

SBM

NO: STATE ROAD CONTRACTOR

Kolding Kommune

FAABORG-MIDTFYN KOMMUNE

DK: MUNICIPALITY

VCO

NO: STATE ROAD CONTRACTOR

POC
SAVINGS
20 -55%*

* Depends on weather event

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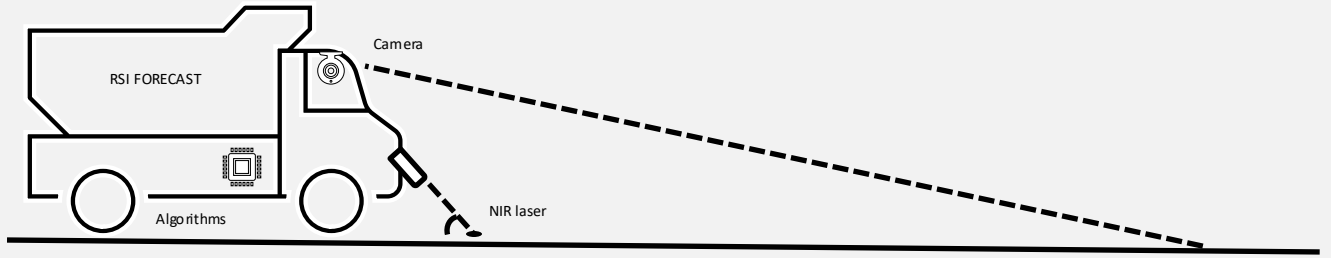
PRODUCT DESCRIPTION ADAPTIVE SALTING

NIR LASER

ROAD STATUS
GRIP / FRICTION



RGB FRONT CAM

ROAD STATUS
ALGORITHM

EDGE FUSION

GPS, CAN

POSITION

USE CASES AHEAD

- INPUT TO FORECAST
- ROAD DOCUMENTATION
- ADAPTIVE SALTING
- VENDOR DOCUMENTATION

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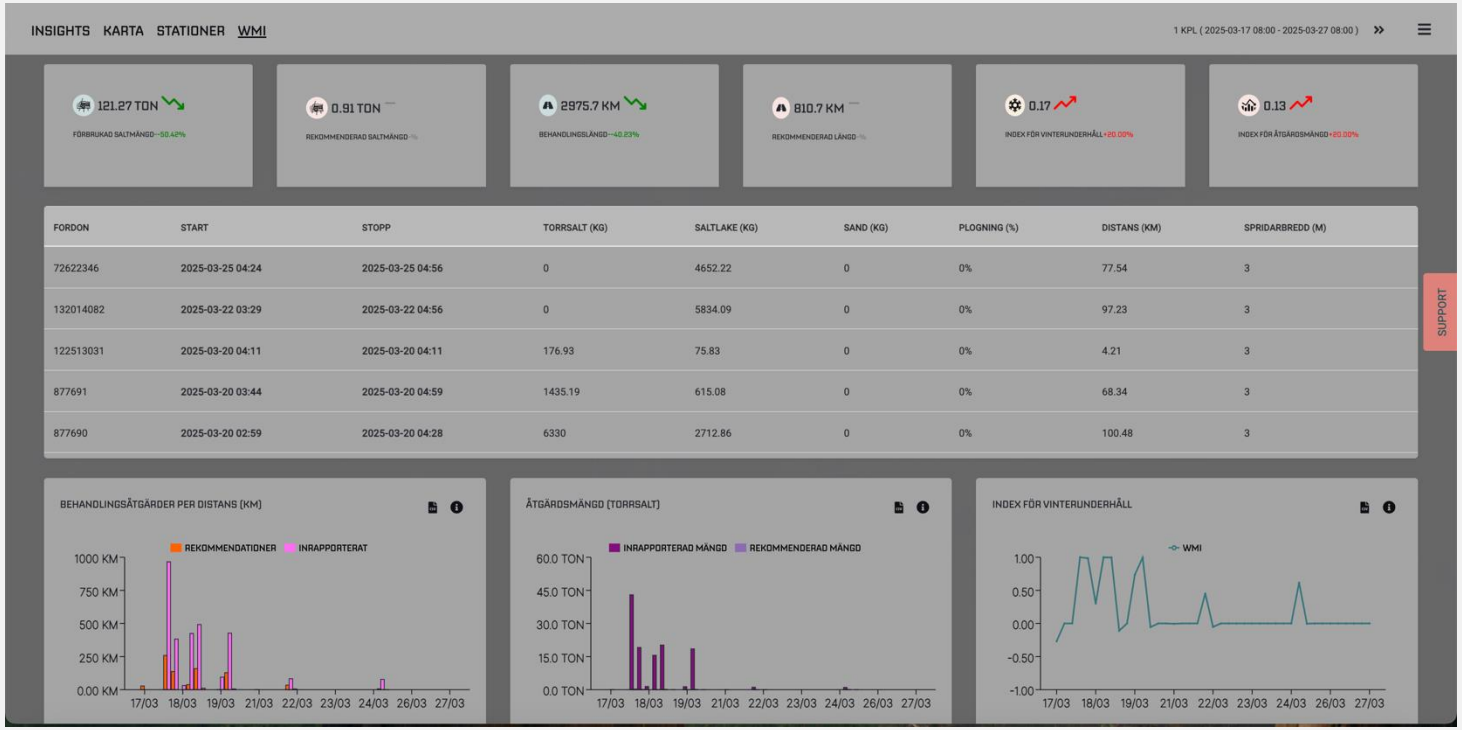
PAUSE
AHEAD running
Spreader running
AdaptSalt error
10g
1g

KLIMATOR WINTER MAINTENANCE INDEX

THE FOLLOW UP



QUALITY DEFINITONS

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KLIMATOR WMI – KONTRAKTSNIVÅ

THE FOLLOW UP

QUALITY DEFINITONS

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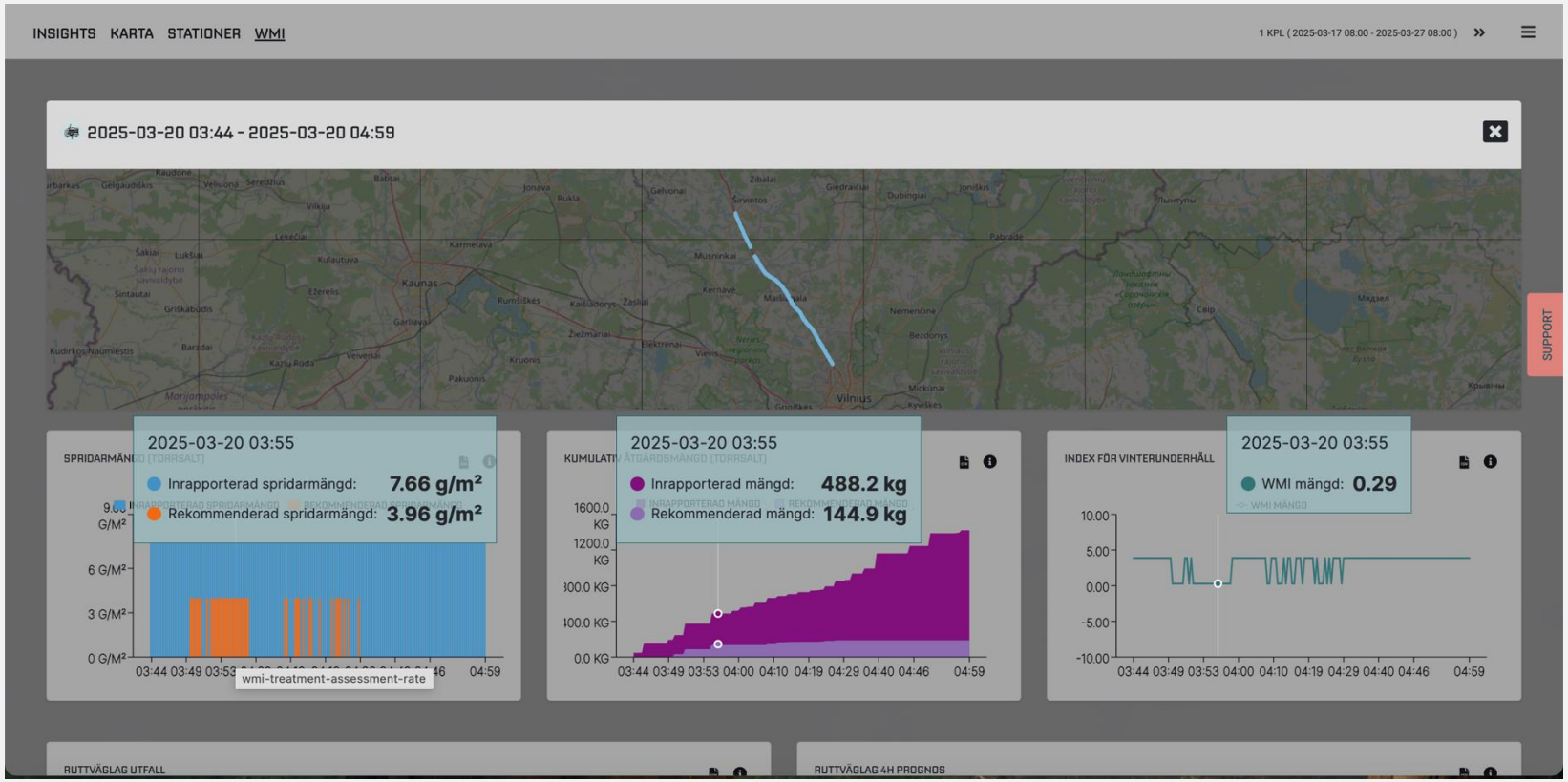
KLIMATOR WMI – ONE ROUTE

THE FOLLOW UP



QUALITY DEFINITONS

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THE PIECES IN THE PUZZLE

Börja i liten form…

1. Analysera nuläget

Kartlägg dagens arbetssätt, kostnader och förbättringsbehov.

2. Vad behöver vi för att komma igång?

Tydligt mål. Beslutstöd. Sensorer.

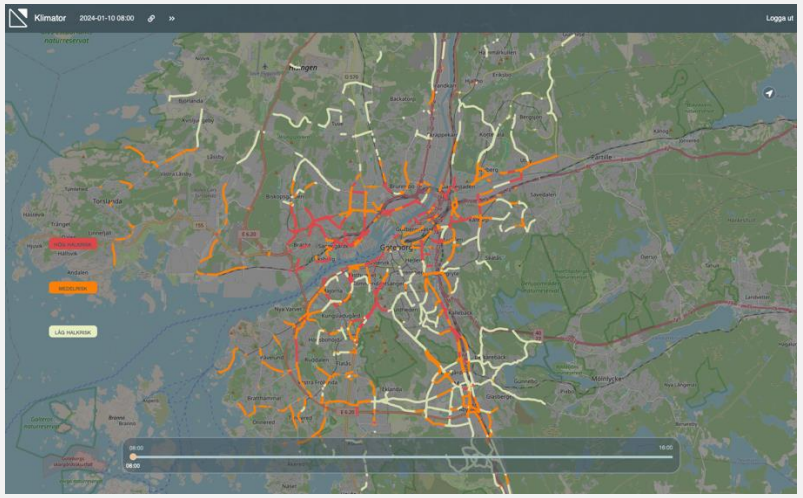
3. **Utbilda personal och entreprenörer**

Säkerställ att alla kan arbeta datadrivet och effektivt.

4. Följ upp och skala upp

Mät resultat, justera åtgärder och utöka till fler områden.

5. Inkludera medborgaren



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RSI INDUSTRY STANDARD| DEVELOPED #TOGETHER

ROAD ATHORITIES

Vejdirektoratet · BANEDANMARK · Statens vegvesen · TRAFIKVERKET · Miljøministeriet Naturstyrelsen

STATE ROAD CONTRACTORS

HedeDanmark · Kelių priežiūra · mesta · PRESIS VÄGDRIFT · PEAB · SVEVIA · terranor · VEIDEKKE · SBM · VCO

MUNICIPALITIES | SMART CITIES

Göteborgs Stad · Aalborg Kommune · Fredericia Kommune · Viborg Kommune · Vejle Kommune · Mölndals stad · Luleå kommun · Växjö kommun · Oskarshamns kommun · Silkeborg Kommune · Skivekommune · Næstved · Oulu · Gladsaxe · NK Forsyning · Egedal Kommune · Lejre Kommune · Gribskov Kommune · Tønder Kommune · Esbjerg Kommune · Ishøj Kommune · Rudersdal Kommune · Faaborg-Midtfyn Kommune · Assens Kommune · Hedensted Kommune · Vordingborg Kommune · Sønderborg · Herlev Kommune · Lolland kommune · Svendborg Kommune · Slagelse Kommune · Kalundborg Kommune · Hillerød Kommune · Odense Kommune

ROAD STATUS IN SHORT.

- ESTABLISHED IN SEVEN COUNTRIES
- ROADS & BIKING LANES
- +200 CONTRACTS
- SAVINGS FROM 10 – 55%
- + 1500 DAILY USERS
- CENTRALIZE & OPTIMIZE OPERATIONS

PARTNERS | COLLABORATORS

aebi schmidt group · AFRY · AUTORI · BM SYSTEM · epoke · Friggeråkers Verkstäder AB · Kelių priežiūra · Rennicks · SNOWER · ZEEKIT

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