

# Comprehensive Winter Maintenance Management System to increase Road Safety and Traffic Flow



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**ID 27**

## **COST TU0702:**

**Real-time monitoring, surveillance and control of road networks under adverse weather conditions**

⇒ **Safety**

**24 % of all crashes occurred on slippery pavement or under adverse weather.**

⇒ **Mobility**

**About 25 % of non-recurring delays on highways is due to weather.**

⇒ **Environment**

**Chemical anti-icing and deicing account for roughly 1/3 of expenditures for snow and ice control.**

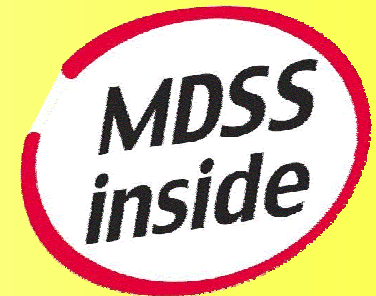


- Safety
- Environment
- Economy

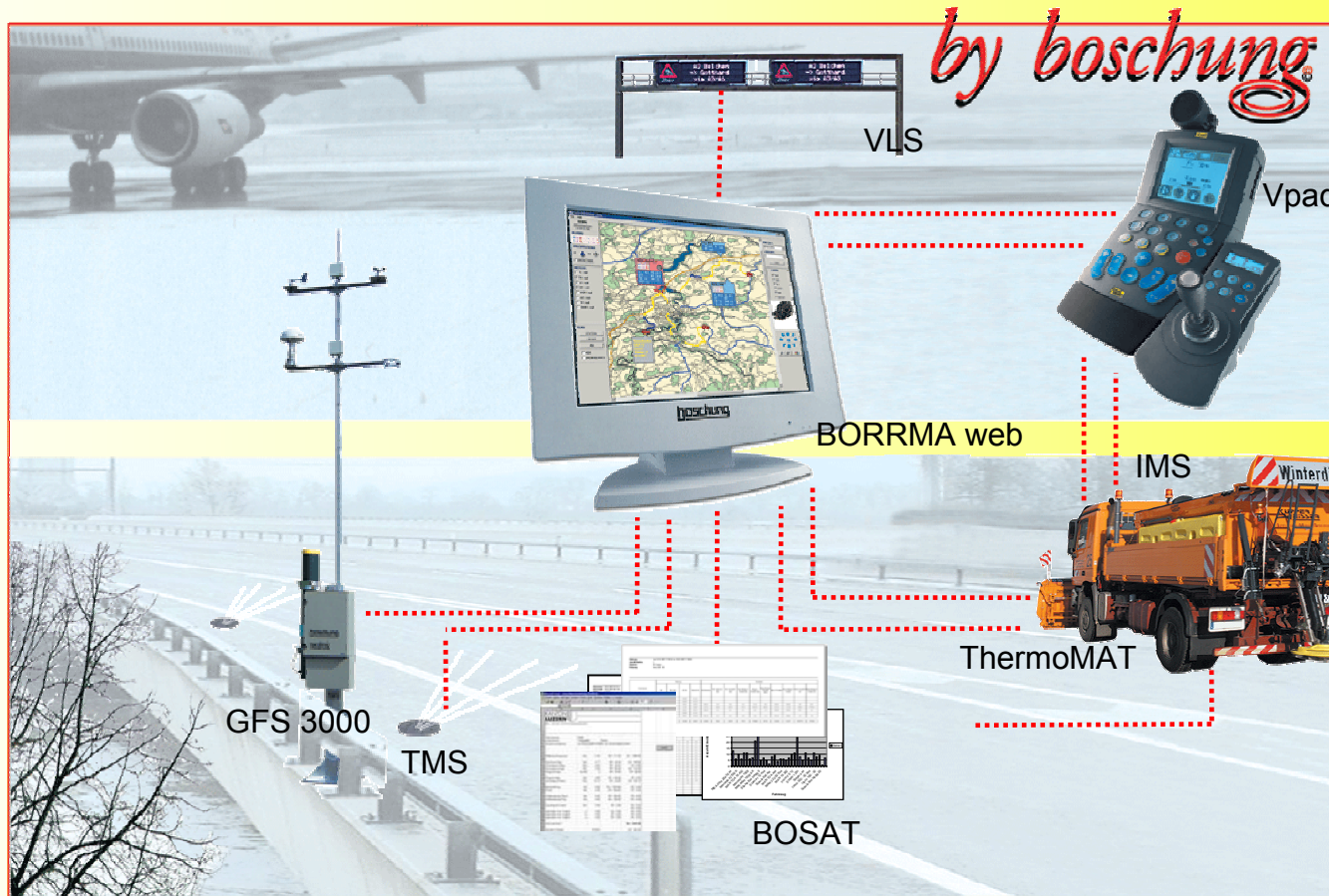
⇒ Need of modern Management Systems



***BORRMA-web***



**General overview**



fixed

mobile

**GFS 3000**

Surface Condition Assessment

On-board-sensors

**FAST**

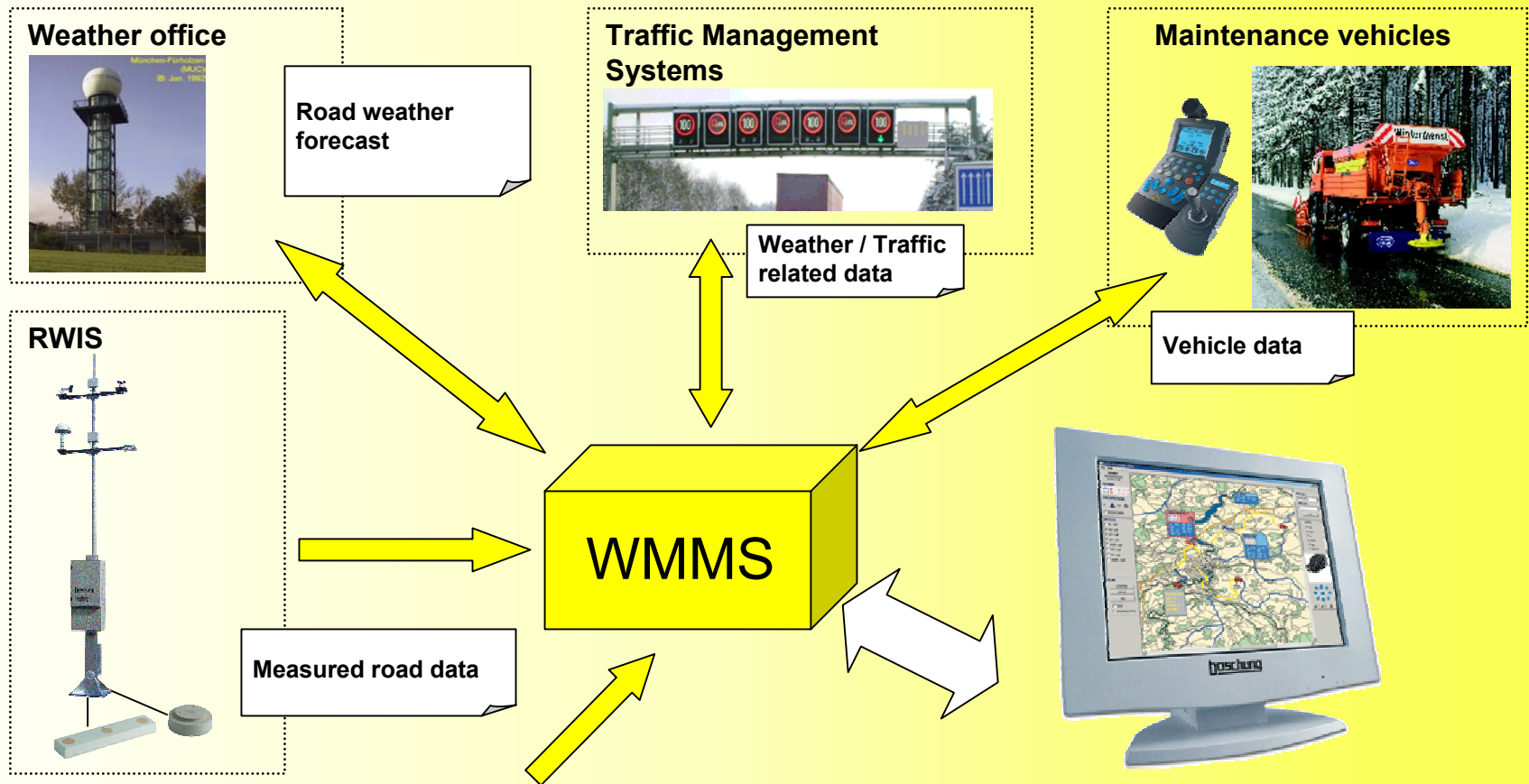
Surface Treatment Devices

Vehicles

**BORRMA web**

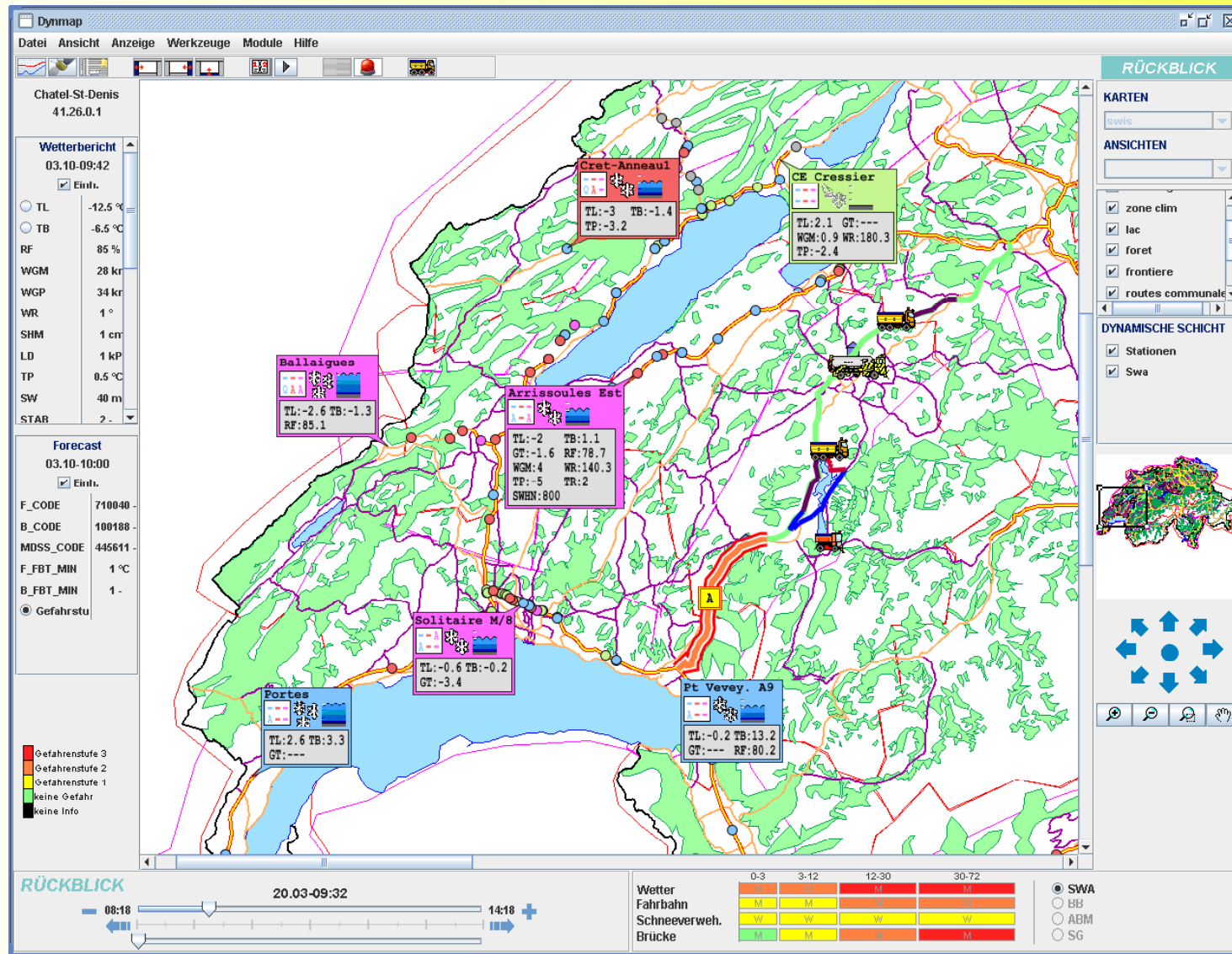
Surface Data Management

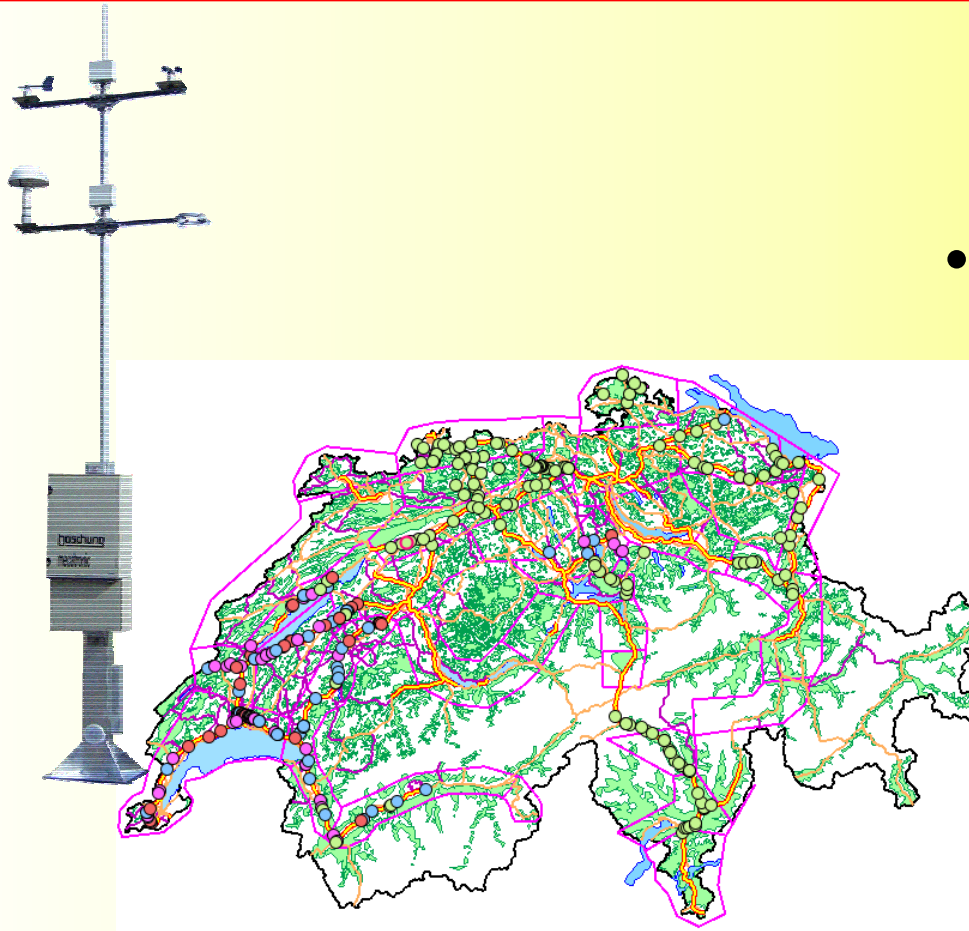
Vpad



**Information for educated decision making**

- Centralised database
- Visualised information
- Appreciate prognoses

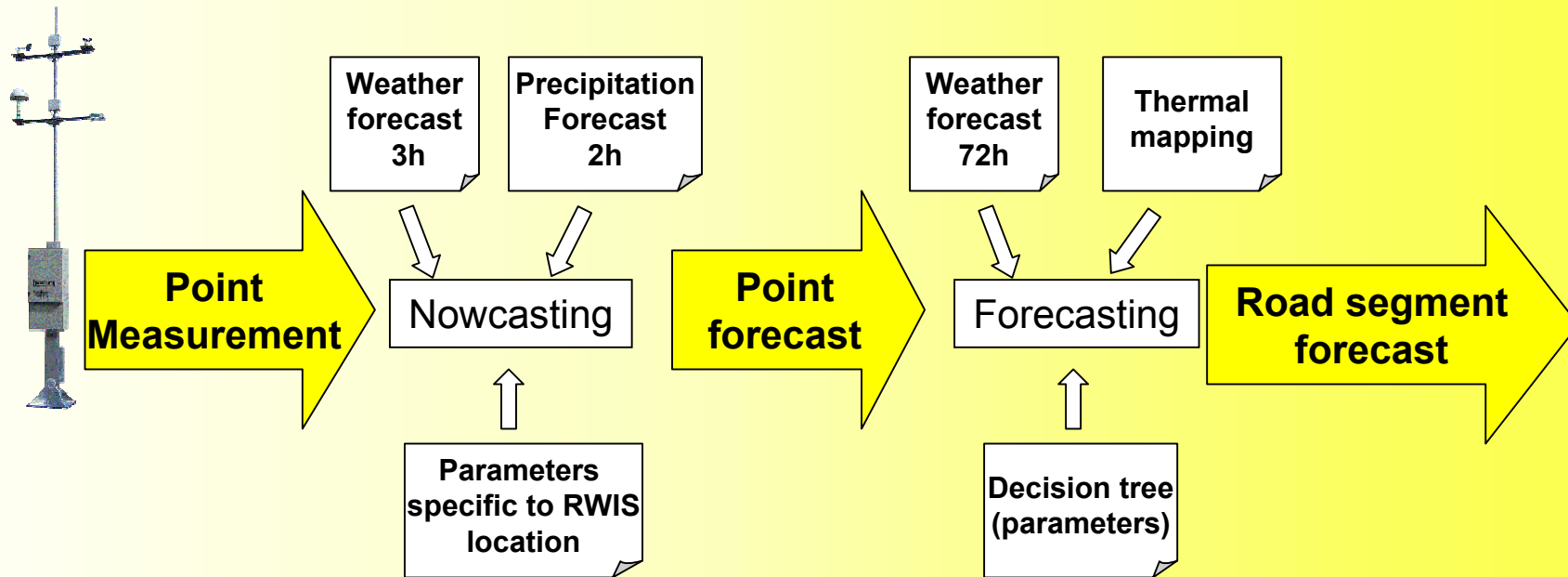


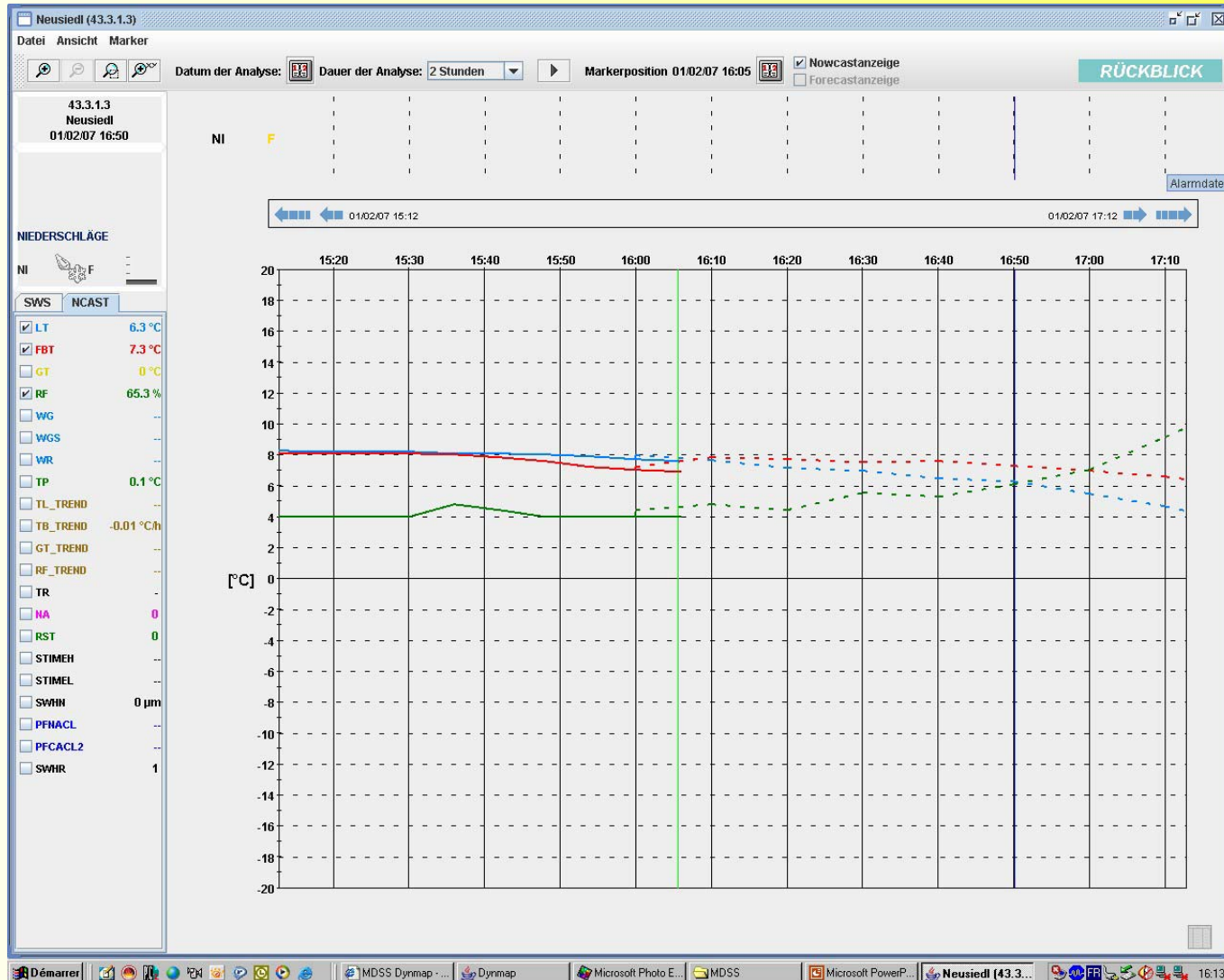


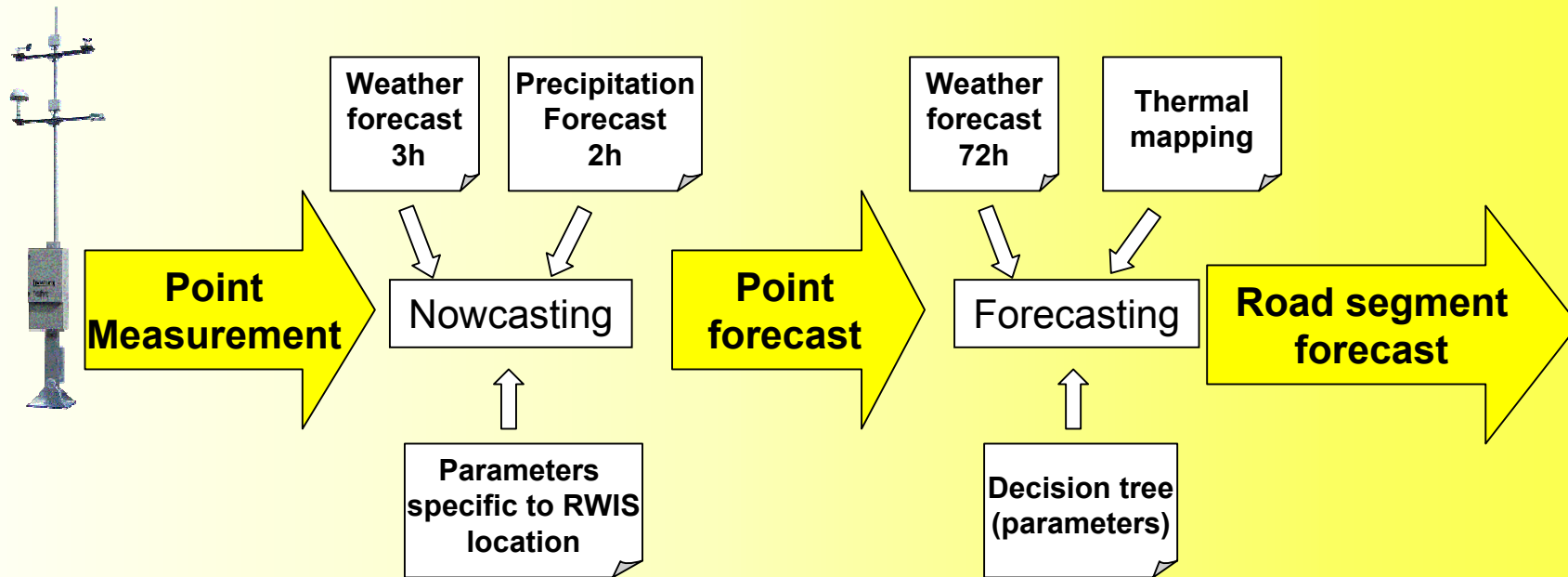
- Measured data : real time status of the road network
  - Pavement status
  - Temperatures
  - Precipitation
  - Freezing point temperature
  - ...

*Map of Switzerland with more than 300 RWIS  
Source : Boschung SWIS Central*





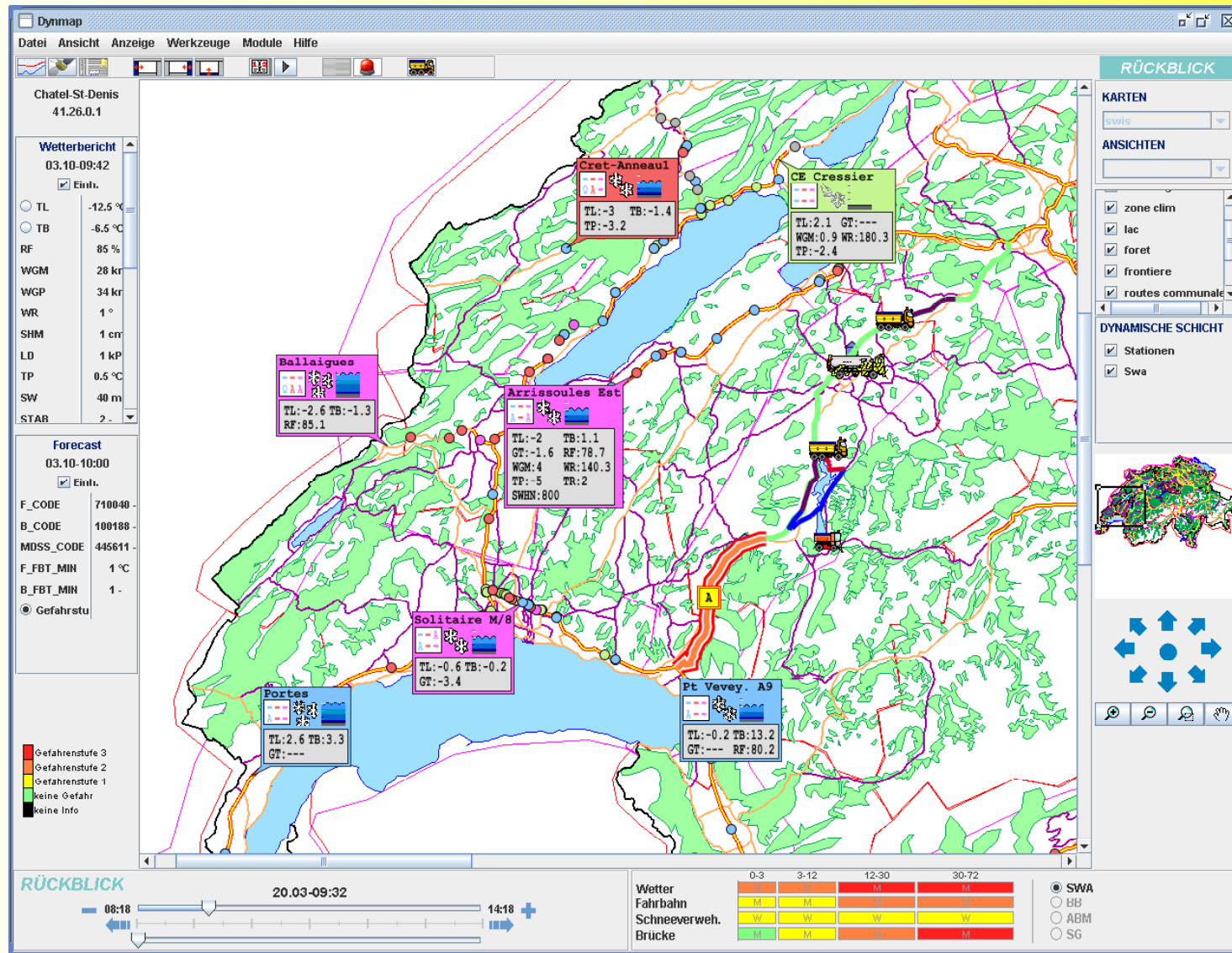


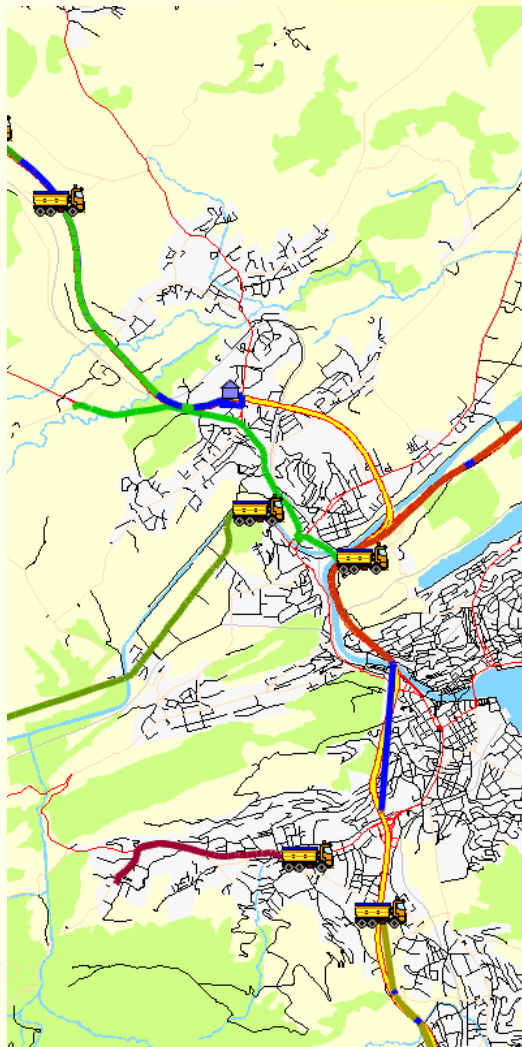




	0-3	3-12	12-30	30-72	
Wetter	W	W	W	W	<input checked="" type="radio"/> SWA
Fahrbahn	W	W	W	W	<input type="radio"/> BB
Schneeverweh...	W	W	W	W	<input type="radio"/> ABM
Brücke	M	M	M	M	<input type="radio"/> SG

- Road Weather Segments are colored against 4 levels of danger
- Warnings about oncoming dangerous events are issued (escalation at -12h, -6h, -2h, -1h)
- Information is broken down into 4 areas (weather, pavement, snow drift, bridges)
- Information is summarized over 72 hours



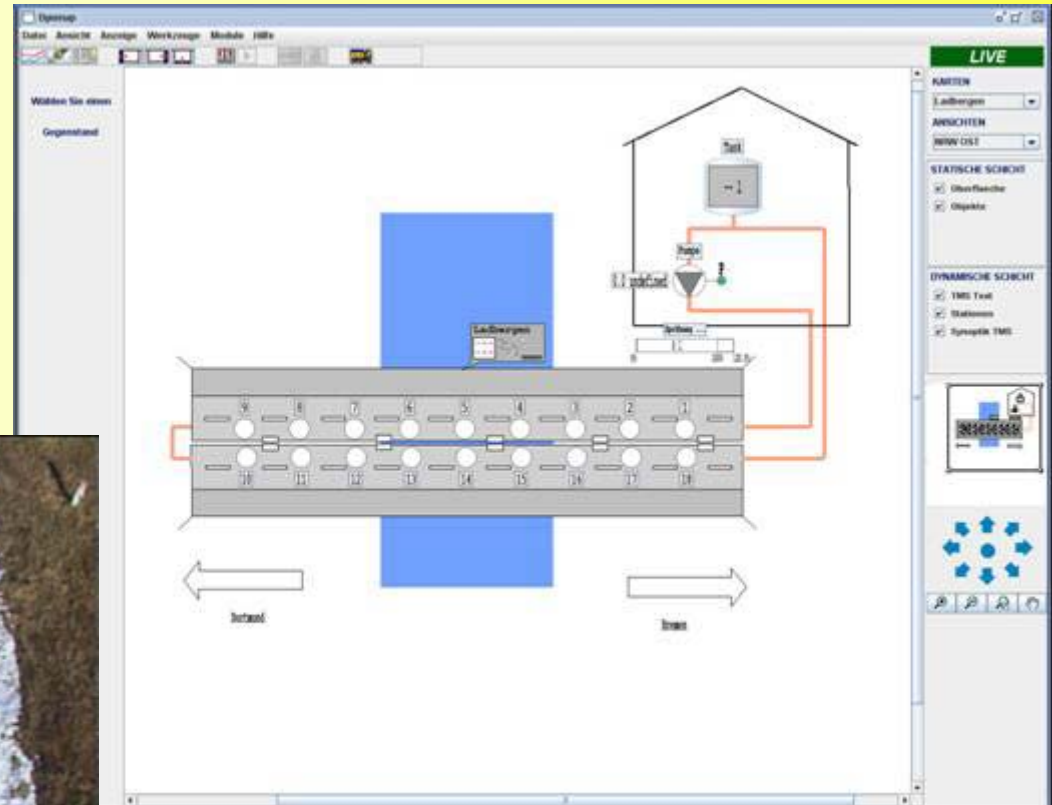


*Winter maintenance operations*

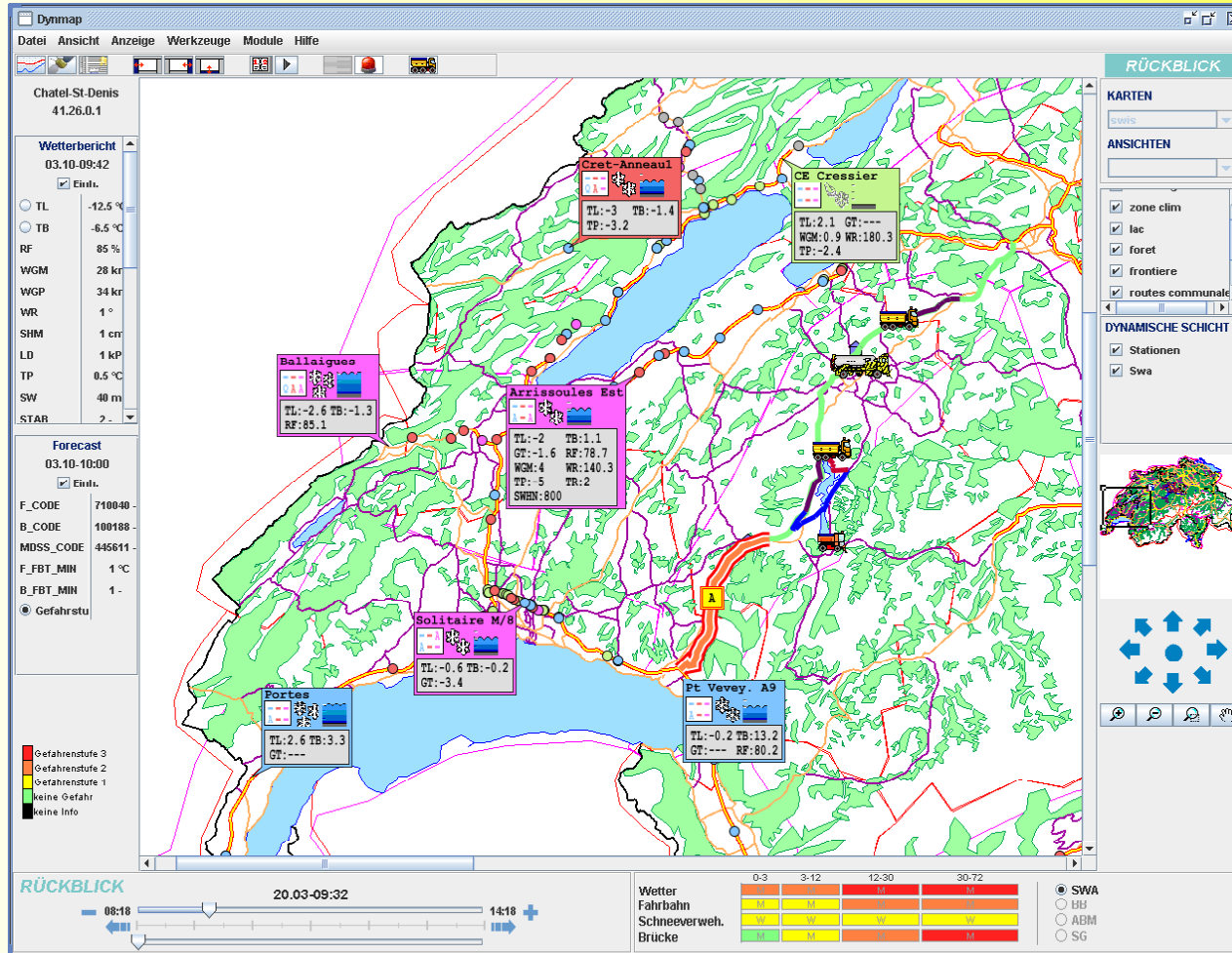
*Source : BORRMA-web Lucerne (Switzerland)*

- Data acquisition and transmission (real-time)
  - Current status of tools
  - Colored trail showing used tools
  - Current position of vehicles (GPS-based)
    - ➔ dynamic management of operations
    - ➔ Knowledge base for further recommendations
- Measurement of operations (off-line)
  - Operation reports, statistics, etc.









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