SIRWEC

International Road Weather Conference
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Intelligent UMB Road Sensors and Advanced Road Weather Information System (ARWIS)

by

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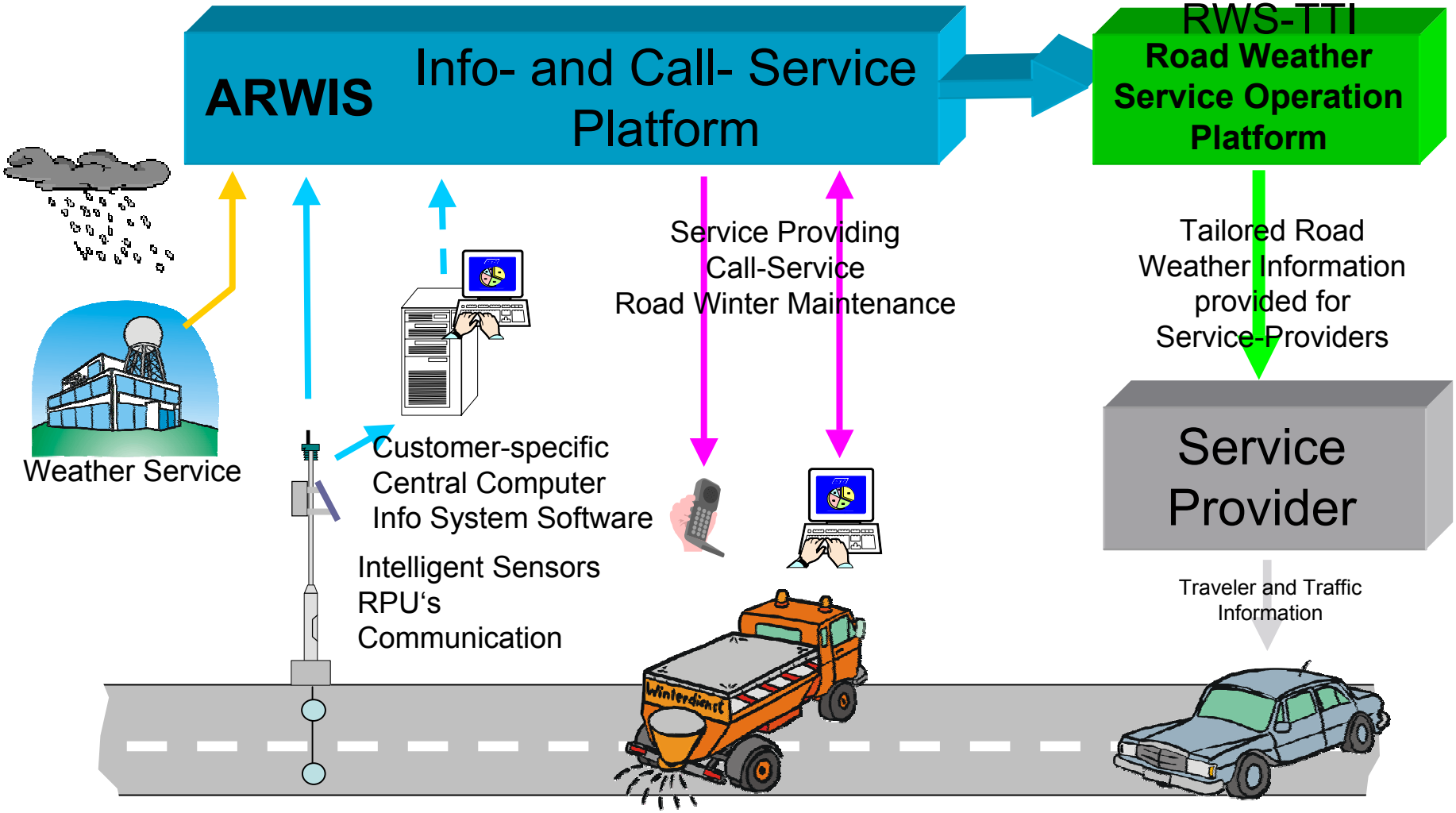
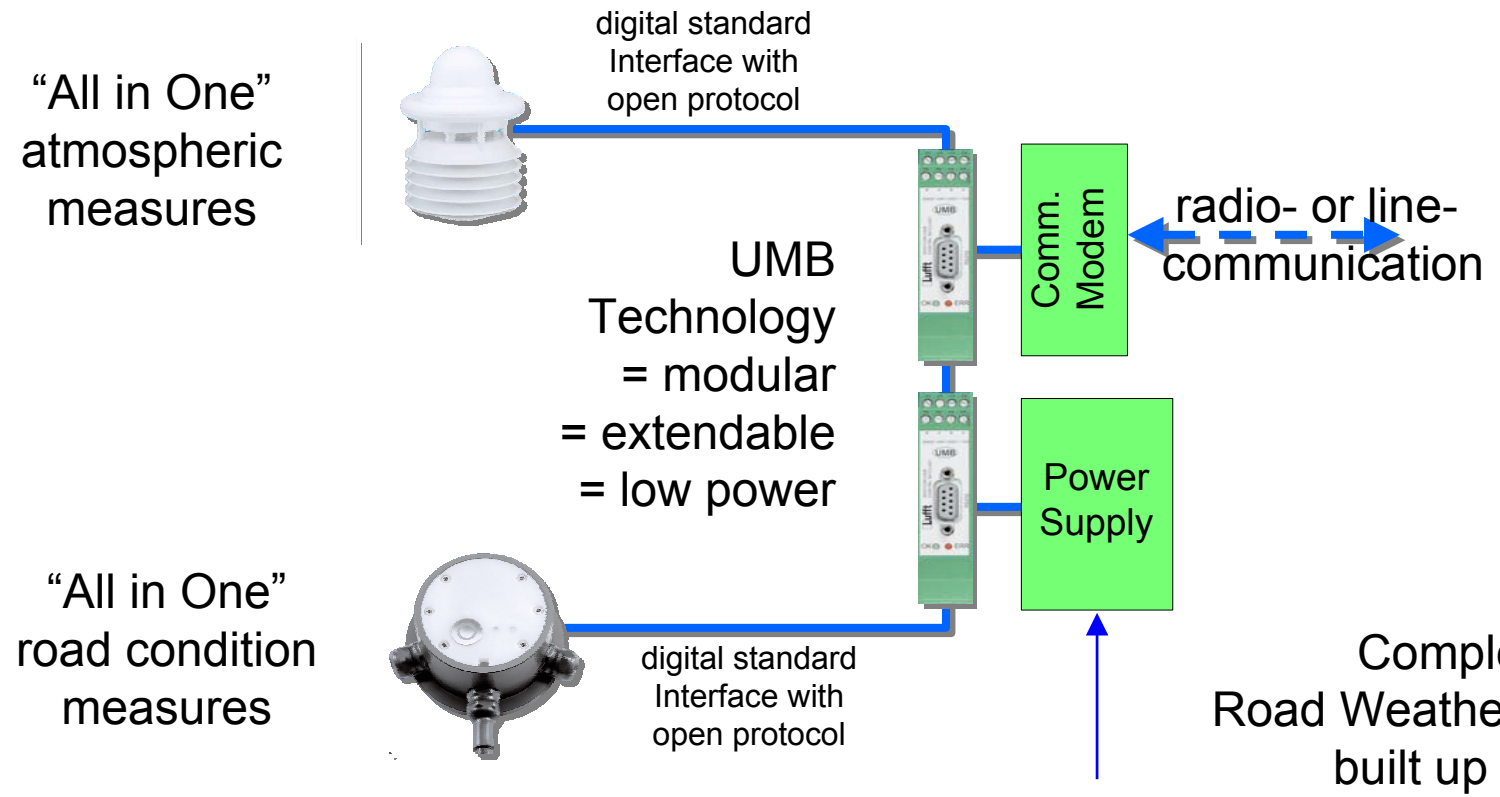
The Road Weather Information Policy

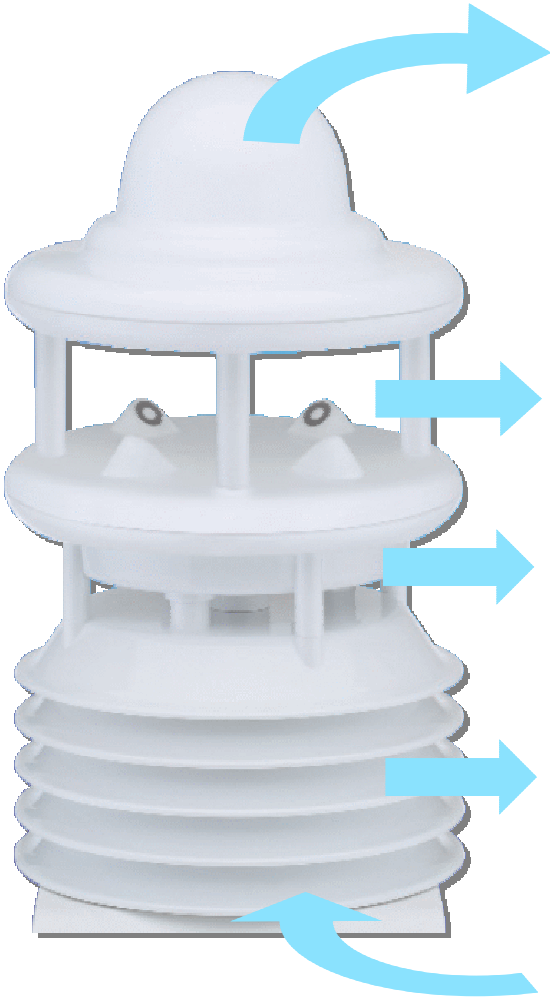


New Intelligent Sensor Technology



This technology makes it affordable to densify the data acquisition network in order to enhance the capability of providing optimal maintenance decision support systems

Intelligent and compact device for atmospheric measures



Innovative principle **(R^2S)** of measuring precipitation by means of **microwave doppler radar**.

- Type of Precipitation (Hail, rain, snow, drizzle)
- Intensity of Precipitation (mm/h)

Measurement of wind direction and wind speed by means of **ultra sonic** principle.
= precise measurement without mechanical moving parts.

Measurement of air pressure

Protection shield and active ventilation for measurement of air temperature and relative humidity.

Digital communication with open protocol
Power supply in one cable

Intelligent and compact device for road condition measures

Maintenance friendly removable Sensor inlet

Innovative **microwave radar** measurement of waterfilm depth up to 4 mm
- Resolution: 0,01 mm
- Accuracy: 0,1 mm + 20%

Passive Measurement of salt concentration and Freeze Temperature by means of **conductivity** allow for waterfilm depth

Surface condition detection by means of **capacity** measurement
→ dry, moisture, wet, ice, snow, slush

Surface Temperature and also 2 Sensor Interfaces for Subsurface Temperature (30 cm)

Digital data communication Interface (RS485) with **open protocol**

Makes OEM solutions easy!

Proof of the Quality and Calibration Certificates

LUFFT Mess- und Regeltechnik GmbH

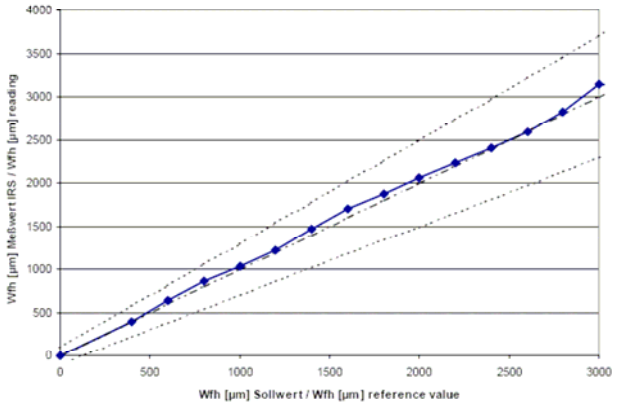
Seite/*Page*: 2/2

Herstellerprüfzertifikat M nach DIN 55350-18-4.2.2
Manufacturer test certificate M according to DIN 55350-18-4.2.2
Sensornummer / *Sensor number*: 1234

Kalibrierung Leitfähigkeit / *Calibration conductivity*

Verwendete Salzlösung *Used saline solution*	Sollwert reference value	Messwert reading
H_2O + NaCl	2,0 %	2,0 %
H_2O + NaCl	4,0 %	4,0 %
H_2O + NaCl	12,0 %	12,1 %

Kalibrierung Wasserfilmhöhe / *Calibration water film height*



Funktionstest / *Function test*

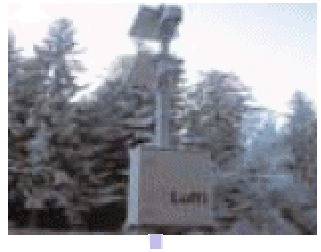
Prüfpunkt *Test point*	Prüfbedingung *Test conditions*	Bestanden *Passed*	
		Ja *Yes*	Nein *No*
Temperaturzyklus von –30°C…+70°C *Temperaturecycle from –30°C...+70°C*	Alle Messwerte korrekt *All measured values correctly*	X	

Accurate measure of Waterfim depth is important not only for road condition but also for passive measure of Freeze Temperature!

Every Sensor is shipped with a test certificate

Stand Alone solutions with SmartView central computer Software





Data collection / polling / GPRS

MYSQL Database

Third party software

Additional calculations

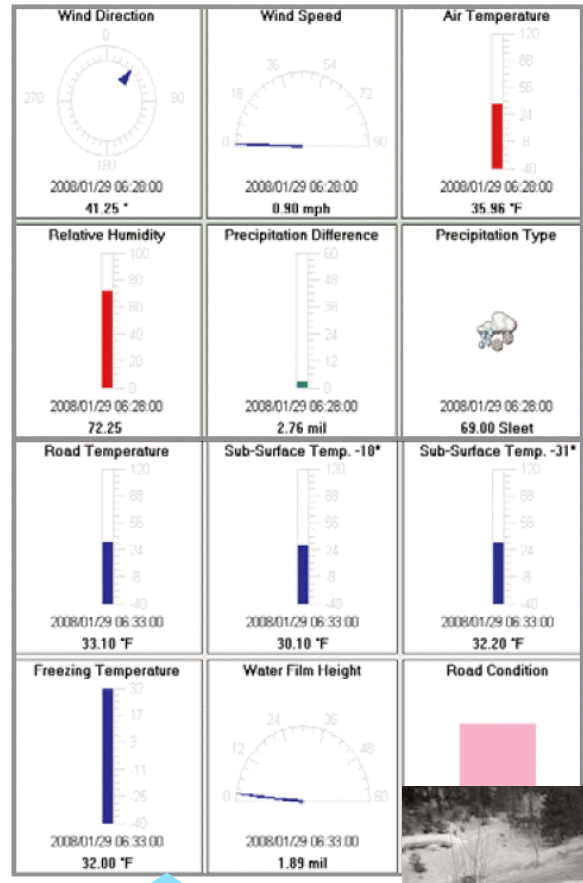
Weather forecast nowcast

SmartCom Communication Module

Warnings Alarms

SmartView3 Configuration

SmartWeb Visualisation



Indicator display of Measurements

Camera pictures of road condition

ARWIS Advanced Road Weather Information System

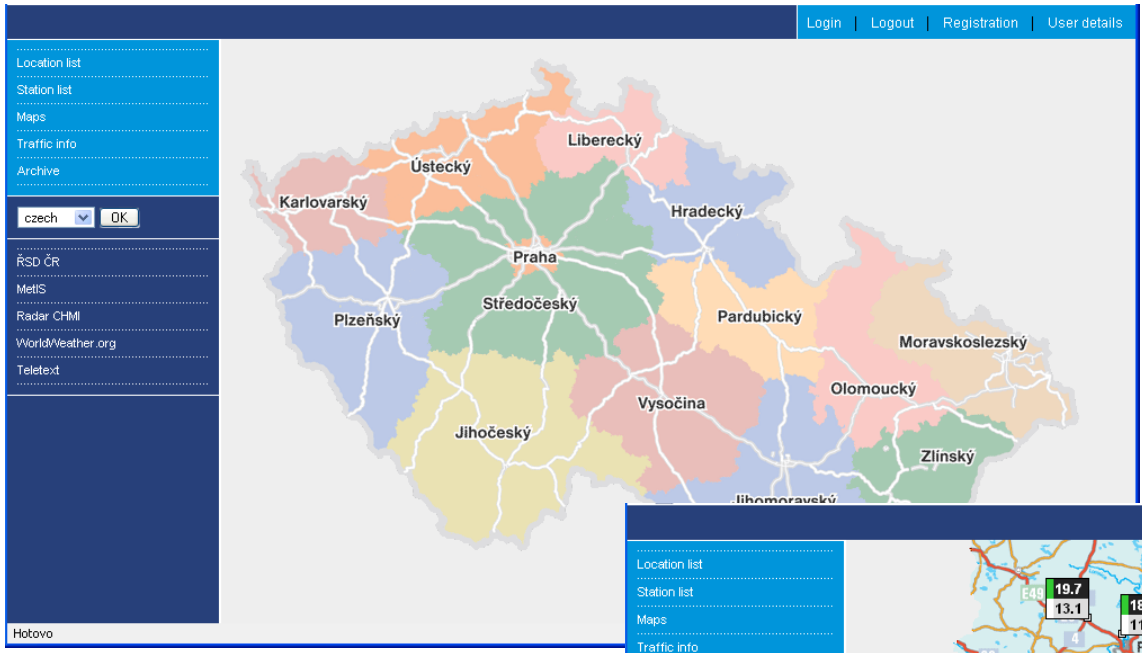
Features

- Highly modularized
- Object oriented
- Data source independent
- Data output independent
- Really quick and up-to-date
- SH70 data protocol
  = Data from all suppliers in the Czech Republic and foreign countries
- FTP, HTTP, SOAP data input/output

WWW pages

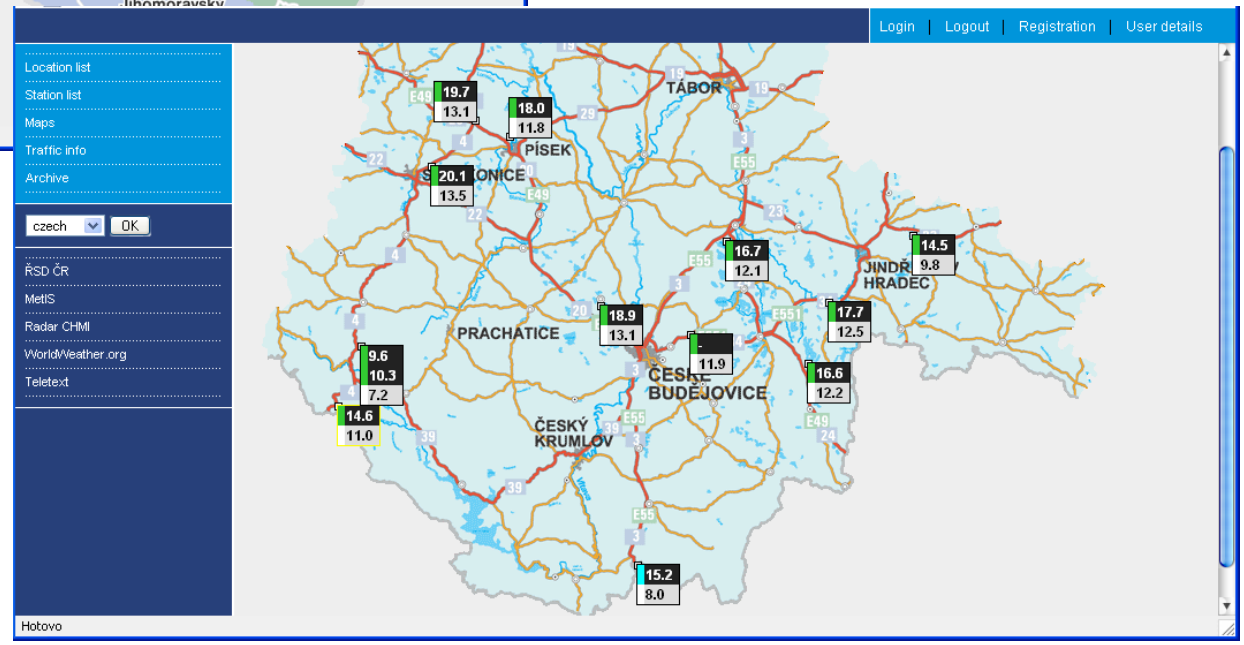
- Quick themed interface
- Viewable on mobile phones, PDA etc.
- Aimed for quick-take-in
- User configurable

ARWIS Advanced Road Weather Information System



Main Map

Regional Map



ARWIS Advanced Road Weather Information System

regional stations overview

Login | Logout | Registration | User details

Location list
Station list
Maps
Traffic info
Archive

czech OK

ŘSD ČR
MetIS
Radar CHMI
WorldWeather.org
Teletext

Map Meteorologist's messages Int. meteorologist's messages

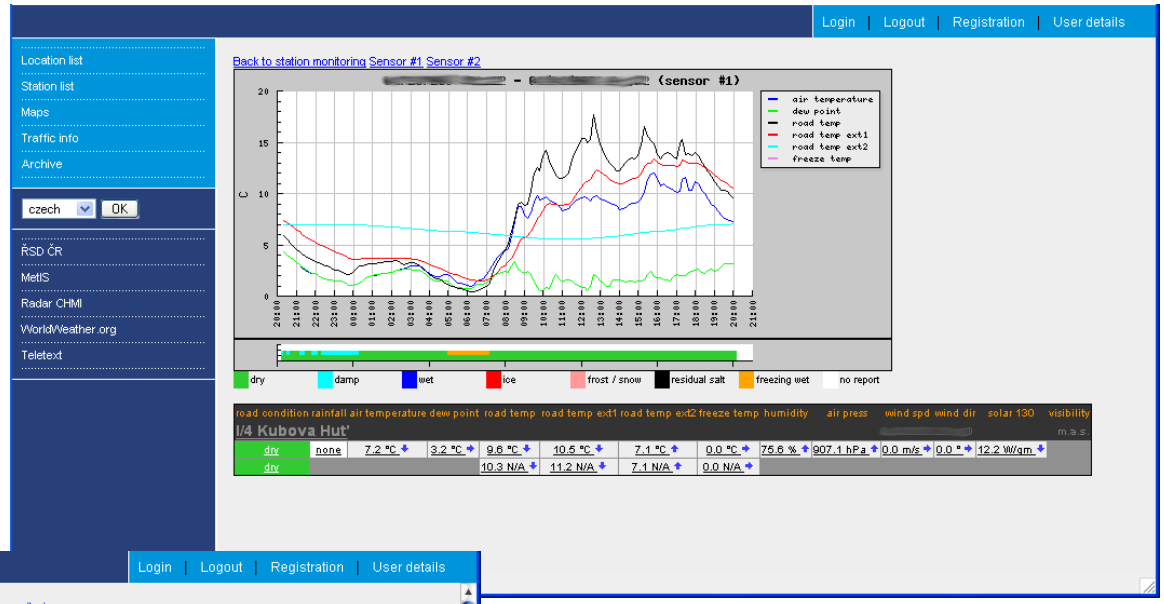
road condition	rainfall	air temperature	dew point	road temp	road temp ext1	road temp ext2	freeze temp	humidity	air press	wind spd	wind dir	solar 130	visibility
I/34 Na Babě													551 m.a.s.
dry	none	11.9 °C	2.7 °C				0.0 °C	52.9 %	956.1 hPa	0.0 m/s	0.0 °	19.4 W/qm	
I/4 Strážný													844 m.a.s.
dry	none	11.0 °C	2.5 °C	14.6 °C	15.3 °C	9.5 °C	0.0 °C	55.5 %	924.5 hPa	0.0 m/s	0.0 °	46.5 W/qm	
I/3 Horusice													422 m.a.s.
dry	none	12.1 °C	-1.3 °C	16.7 °C	15.0 °C	21.1 °C	0.0 °C	39.5 %	968.2 hPa			3.9 W/qm	
I/23 Jarošov													577 m.a.s.
dry	none	9.8 °C	0.2 °C	14.5 °C	18.6 °C	13.8 °C	0.0 °C	51.0 %	953.2 hPa	4.8 m/s	270.0 °	2.4 W/qm	
I/4 Strakonice													402 m.a.s.
dry		13.5 °C	3.9 °C	20.1 °C	-17.6 °C	5.7 °C	-4.2 °C	52.3 %	975.4 hPa	0.0 m/s	0.0 °	13.8 W/qm	
I/24 Majdalena													m.a.s.
dry	none	12.2 °C	4.3 °C	16.6 °C	18.6 °C	13.6 °C	0.0 °C	58.5 %	970.1 hPa	0.0 m/s	0.0 °	7.2 W/qm	
I/20 Písek													m.a.s.
dry	none	11.8 °C	5.9 °C	18.0 °C	14.0 °C	20.7 °C	0.0 °C	67.3 %	978.8 hPa	0.0 m/s	0.0 °	12.6 W/qm	
I/4 Kubova Hut'													m.a.s.
dry	none	7.2 °C	3.2 °C	9.6 °C	10.5 °C	7.1 °C	0.0 °C	75.6 %	907.1 hPa	0.0 m/s	0.0 °	12.2 W/qm	
dry				10.3 N/A	11.2 N/A	7.1 N/A	0.0 N/A						
I/3 Dolní Dvořiště													m.a.s.
damp	none	8.0 °C	7.5 °C	15.2 °C		18.0 °C		96.0 %		0.0 m/s	0.0 °		
II/105 Temelín													m.a.s.
dry	none	13.1 °C	0.9 °C	18.9 °C			0.0 °C	43.0 %					
I/34 Stráž nad Nežárkou													m.a.s.
dry	none	12.5 °C	-0.8 °C	17.7 °C	20.3 °C	15.0 °C	0.0 °C	40.0 %	967.8 hPa	0.4 m/s	96.7 °	18.2 W/qm	
I/20 Nová Hospoda													m.a.s.
dry	none	13.1 °C	1.6 °C	19.7 °C	21.7 °C	16.1 °C	0.0 °C	45.4 %	963.3 hPa	0.0 m/s	0.0 °	16.4 W/qm	

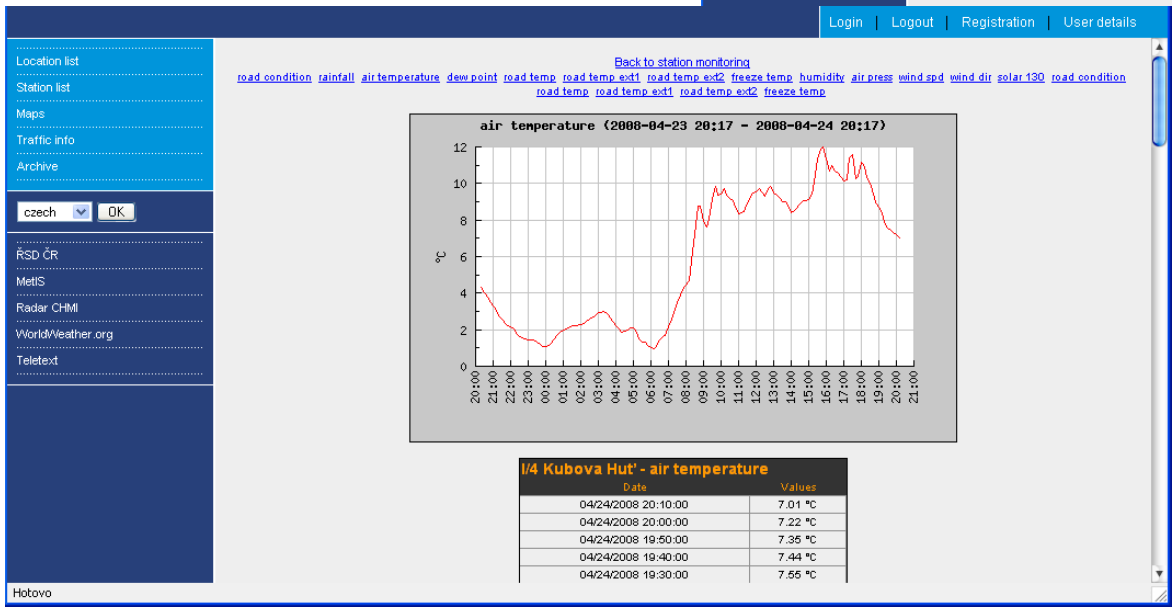
station, which is yellow-highlighted, has data older than 30 minutes

Hotovo

ARWIS Advanced Road Weather Information System

detailed graph of station





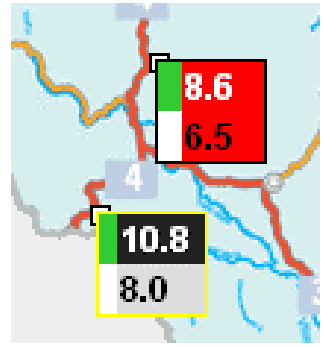
detailed graph of sensor

ARWIS Advanced Road Weather Information System

Alarm settings

I/27 Gerlova Hut'			
Location	Sensor name	Unit	Alarms
Plzeňský kraj	road condition	N/A	Set/edit
Plzeňský kraj	rainfall	l/qm	Set/edit
Plzeňský kraj	air temperature	°C	Set/edit
Plzeňský kraj	dew point	°C	Set/edit
Plzeňský kraj	road temp	°C	Set/edit
Plzeňský kraj	road temp ext1	°C	Set/edit
Plzeňský kraj	road temp ext2	°C	Set/edit
Plzeňský kraj	freeze temp	°C	Set/edit
Plzeňský kraj	humidity	%	Set/edit
Plzeňský kraj	air press	hPa	Set/edit
Plzeňský kraj	wind spd	m/s	Set/edit
Plzeňský kraj	wind dir	°	Set/edit
Plzeňský kraj	solar 130	W/qm	Set/edit
Plzeňský kraj	visibility	m	Set/edit

In-map alarm detection



ARWIS Advanced Road Weather Information System

Other features

- WX70 protocol support (Weather warning)
- Receiving/sending data for Integrated Rescue System
- Display of traffic complications (crashes, work on road etc.)

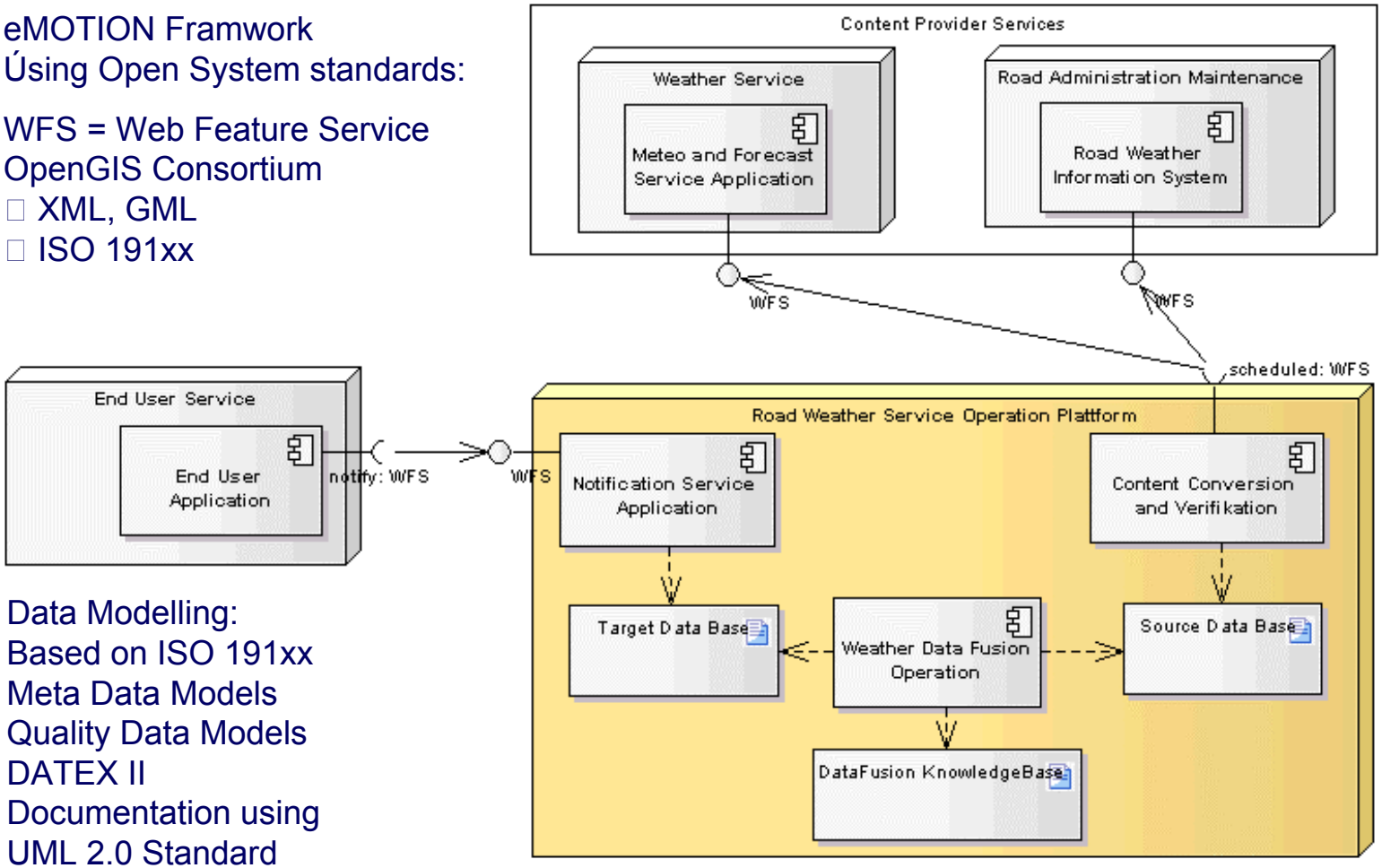
Maintained and developed for ChanGroup s.r.o. by IT Developers s.r.o.

www.itdevelopers.cz

RWS-TTI Road Weather Service Operation Platform for Traveler and Traffic Information

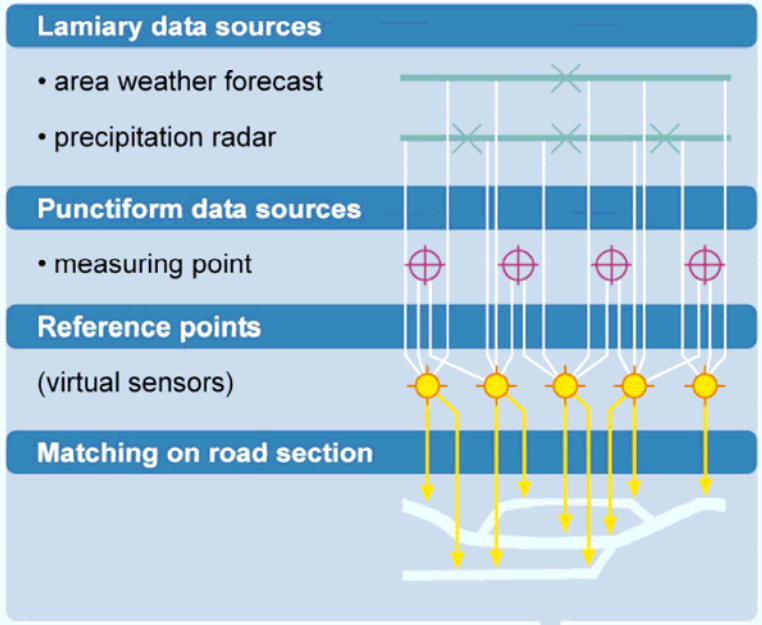
eMOTION Framwork
Úsing Open System standards:

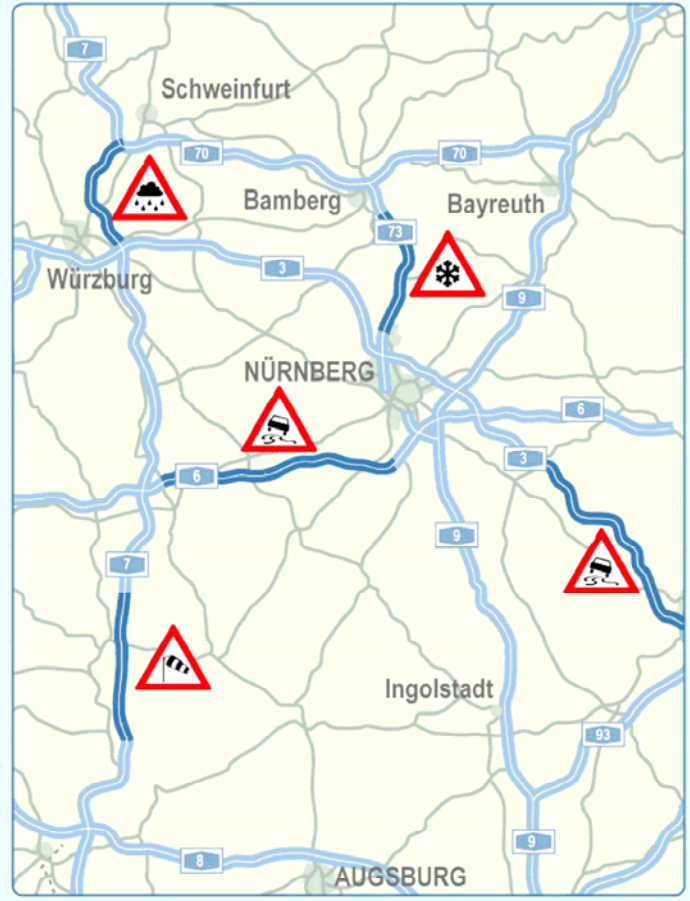
WFS = Web Feature Service
OpenGIS Consortium
- XML, GML
- ISO 191xx



Data Modelling:
Based on ISO 191xx
Meta Data Models
Quality Data Models
DATEX II
Documentation using
UML 2.0 Standard

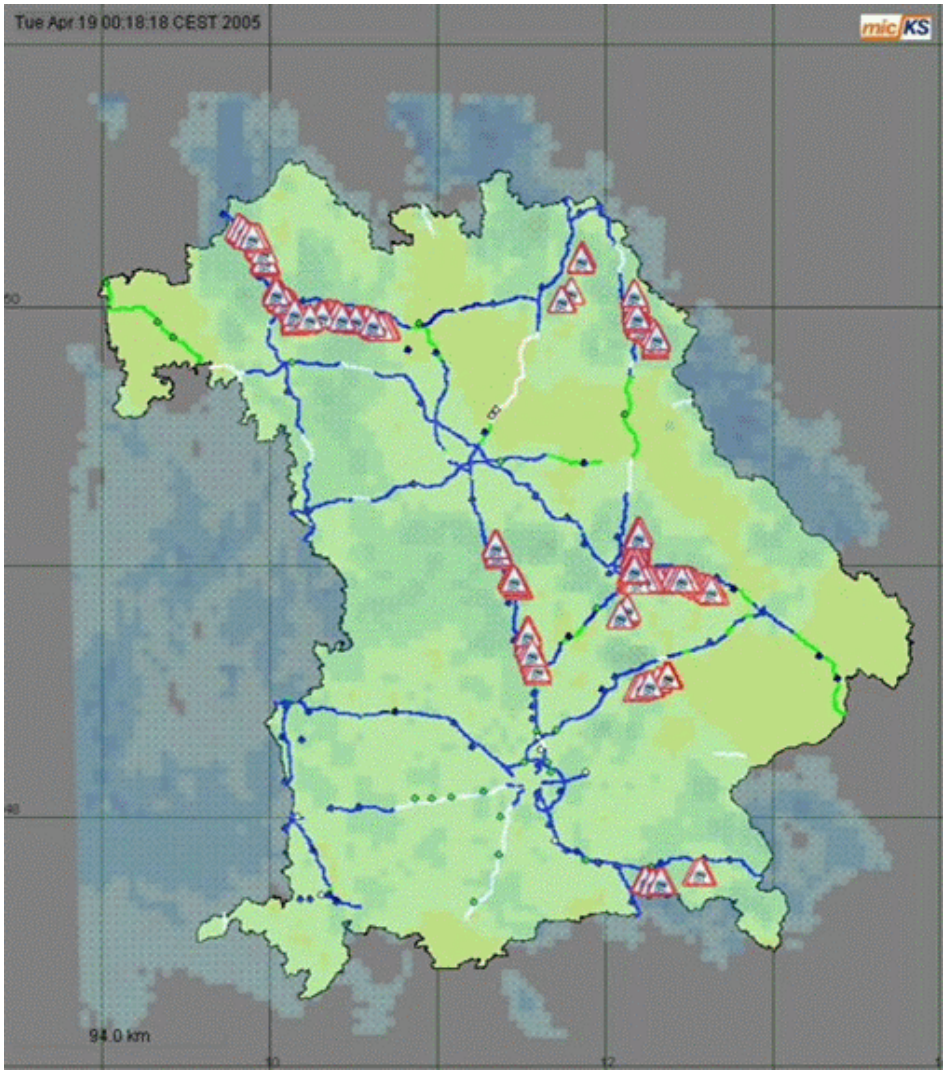
Geographical and Meteorological Data Fusion Knowledge Base





Different geographical referenced (lamiary, punctiform, etc) Weather and Road Condition Data Sources with different actualization time schedules as well as event driven Data are processed to generate accurate high resolution Road Weather Information by means of a Data Fusion Matrix = Knowledge Base

Example of Service Data Output on Highways in Bavaria



Messages coded in TMC ALERT-C

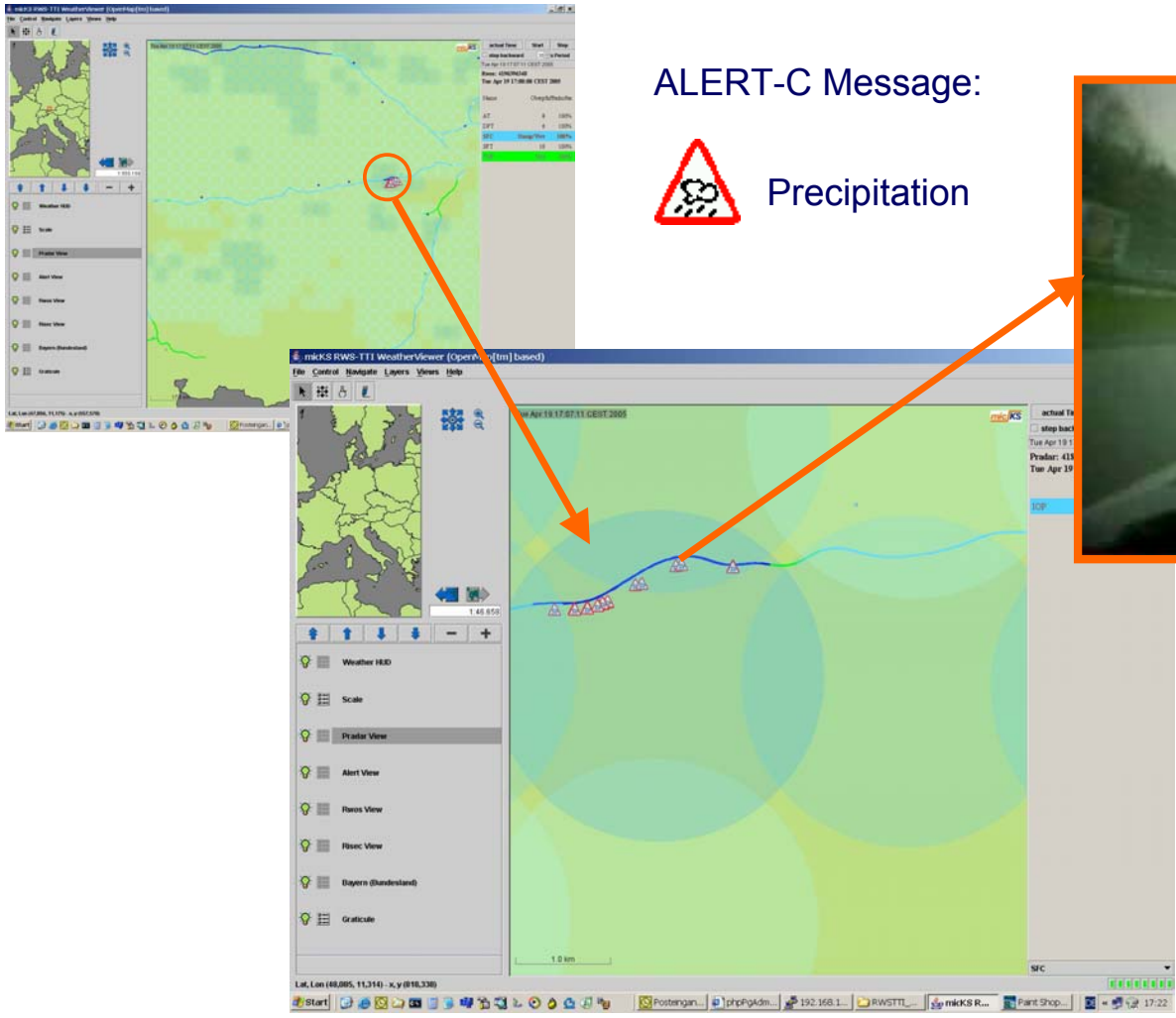

Aquaplaning Slippery


Ice Slippery Road


Strong Wind


Strong Precipitation

Example of an authentic situation

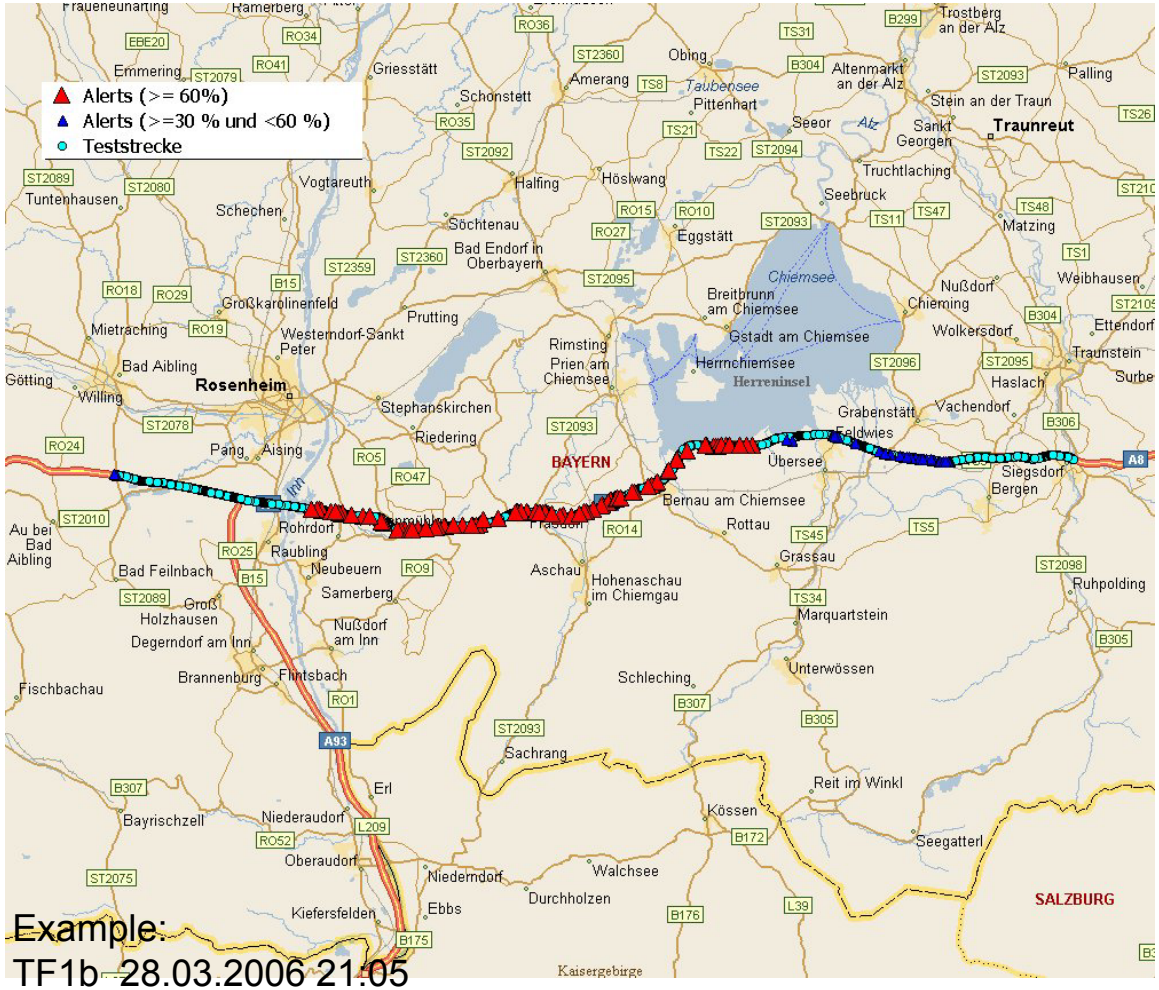


ALERT-C Message:

Precipitation

2005 April 19. 17:00
A96 / Oberpfaffenhofen

Quality management by means of XFCD observation tours



Example:
TF1b 28.03.2006 21:05

To meet the high requirements of a premium service, a constant, automatic quality measurement and evaluation takes place which is based on defined quality scores for message and service quality. For that purpose, data from surveying and probe collecting tours by XFCD vehicles from BMW are summoned.

	Idealwert	Q-Kennzahlen 30% Aquaplaning	Q-Kennzahlen 30% Regen
K	100%	99%	83%
KE	100%	100%	83%
KF	0%	0%	17%

Thank you very much

for your attention