



Traveller Information – 6C

Technological Advancements in Acquisition of Weather Data and Detection of Road Surface Condition

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ITS Canada Annual Conference and General Meeting
Ottawa, Ontario June 16, 2010

New Intelligent Sensor Technology

“All in One”
atmospheric
measures



digital standard
Interface with
open protocol

UMB
Technology
= modular
= extendable
= low power



Comm.
Modem

radio- or line-
communication

Power
Supply

“All in One”
road condition
measures



digital standard
Interface with
open protocol

Complete
Road Weather Stations
built up with
a few elements

This technology makes it affordable to densify the data acquisition network in order to enhance the capability of providing optimal Road Weather Condition Information

Intelligent and compact device for atmospheric measures



WS600

Innovative principle (**R²S**) 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.

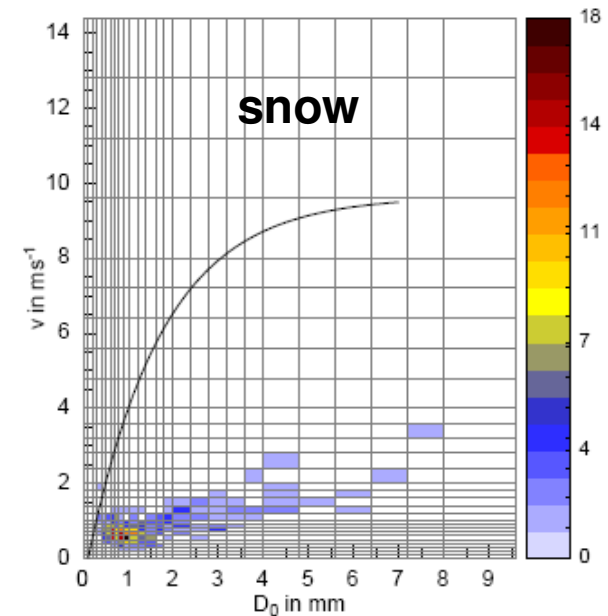
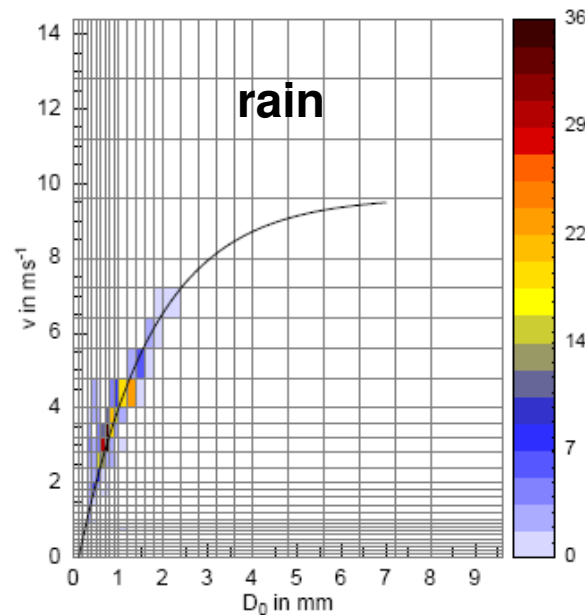
Digital communication with open protocol
Power supply in one cable

Doppler Radar Precipitation Detector Principle



24 GHz microwave doppler radar measures velocity and dimension of nucleus in order to detect type and intensity of precipitation

Examples of typical distribution of velocity and dimension of precipitation nucleus for different type of precipitation



Source: H. Mahlke, 2007, Distrometer 4

Intelligent and compact device for a complete road condition measurement

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 measuring the **dielectric** characteristic
→ dry, moisture, wet, ice, snow, slush

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

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

IRS31-
UMB

Active Measurement of Freeze Temperature by a compact Road Surface Sensor

Maintenance friendly
removable Sensor inlet



“Active” Measurement of Freezing Point Temperature by means of cooling down and heating up of a very small area in order to detect the “enthalpy change” of forming ice without a significant impact of the surface condition.

Surface condition detection by means of measuring the **dielectric** characteristic

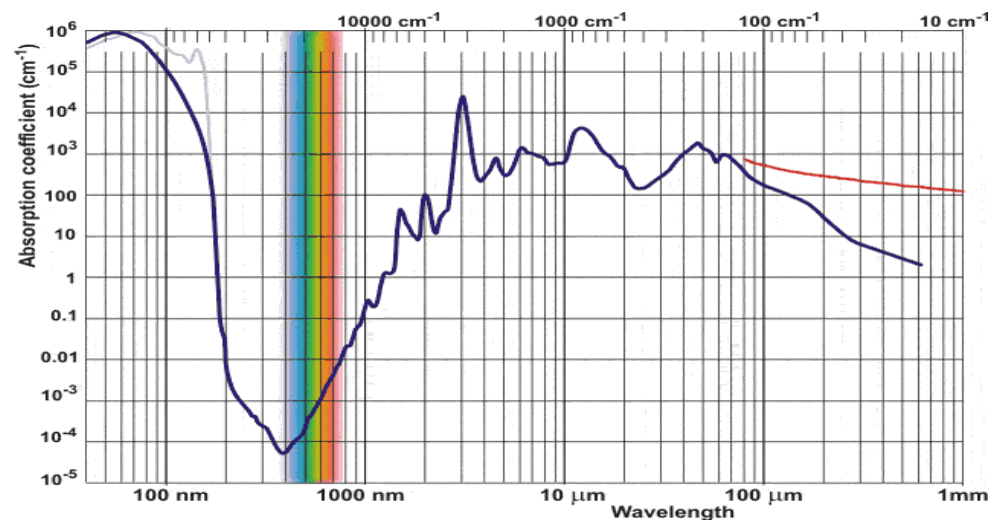
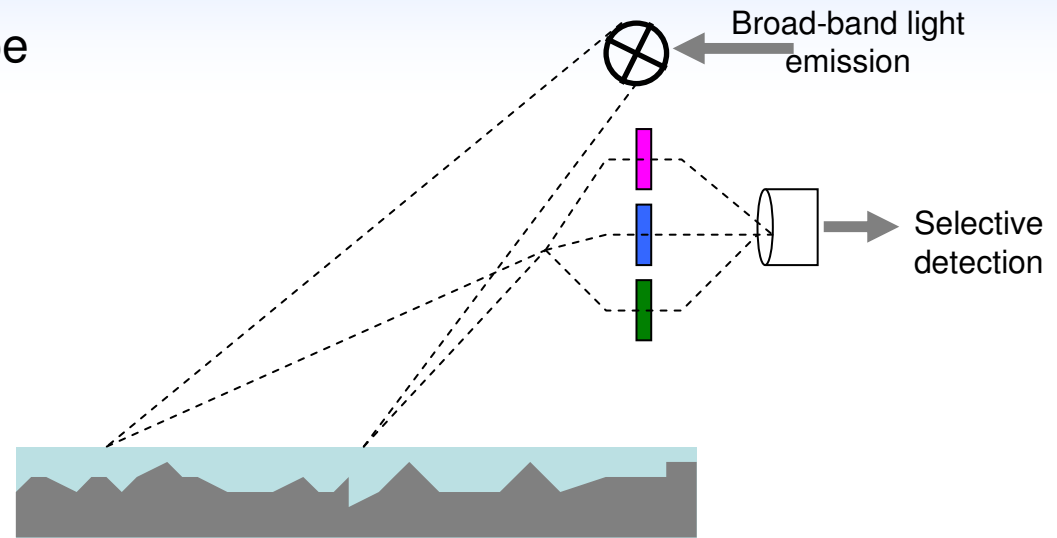
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Digital data communication Interface (RS485) with **open protocol**

Non-Invasive Detection of Road Surface Condition

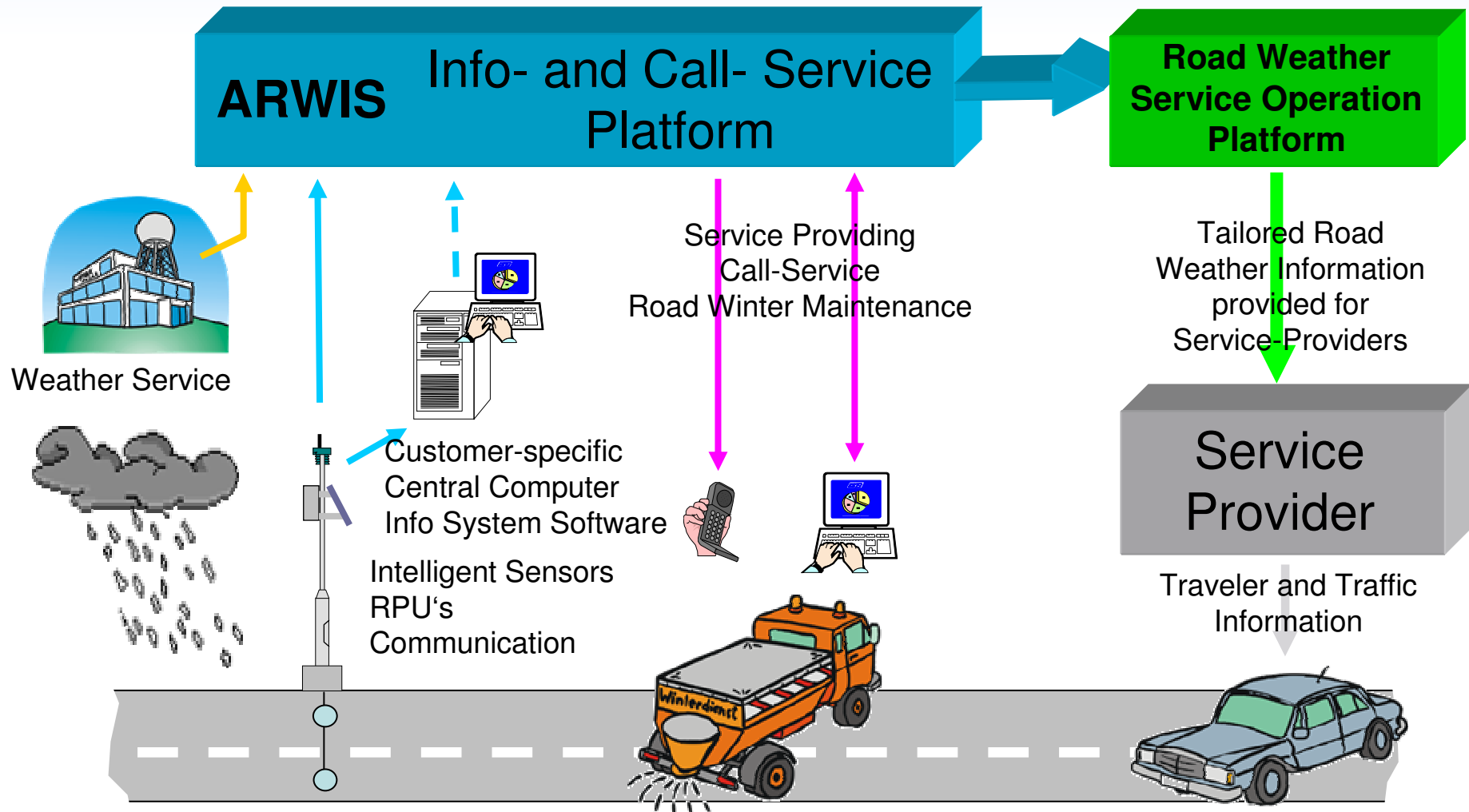


Prototype
NIRS



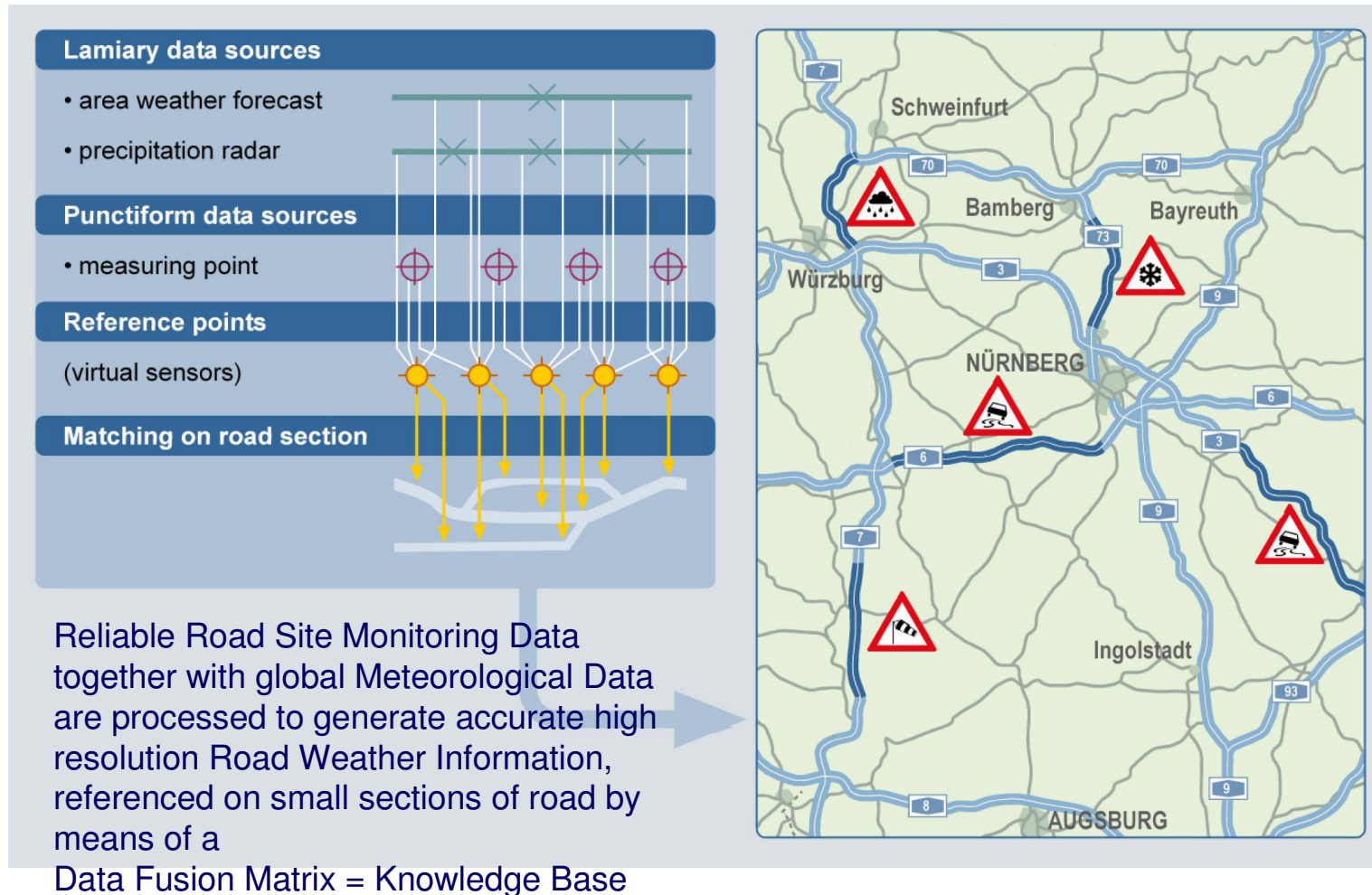
Adsorption
spectrum of
waterfilm

The Road Weather Information Policy



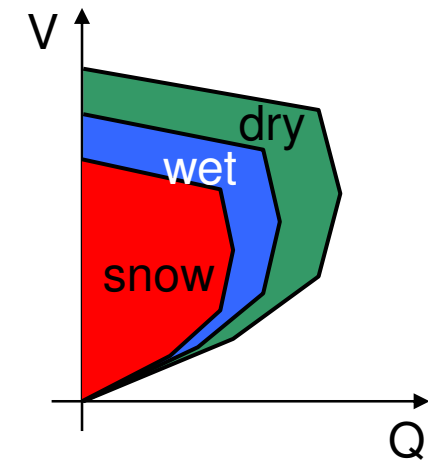
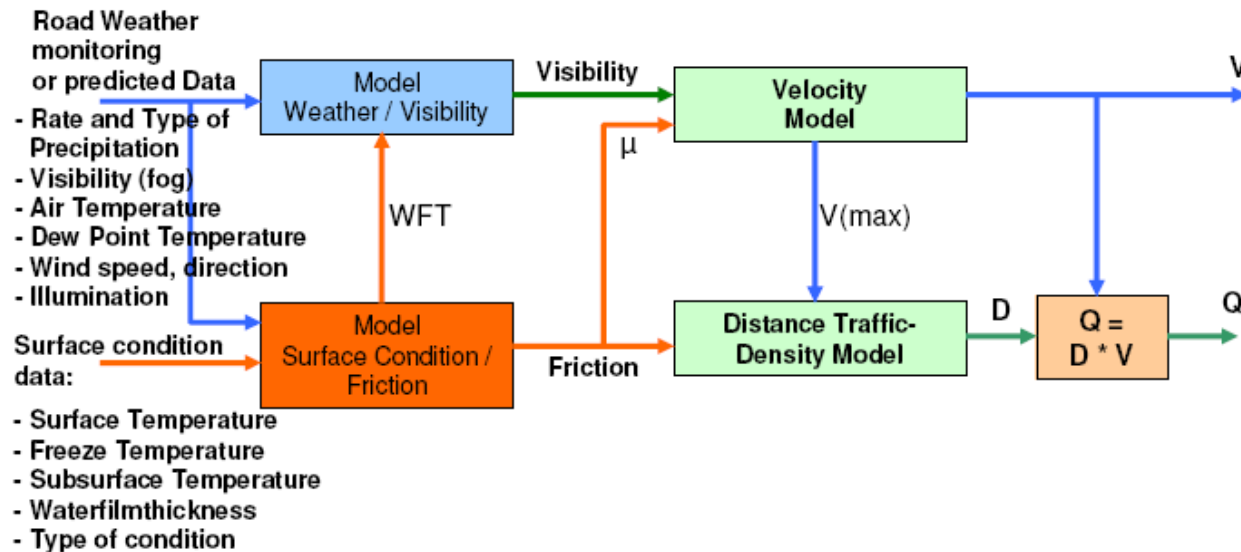
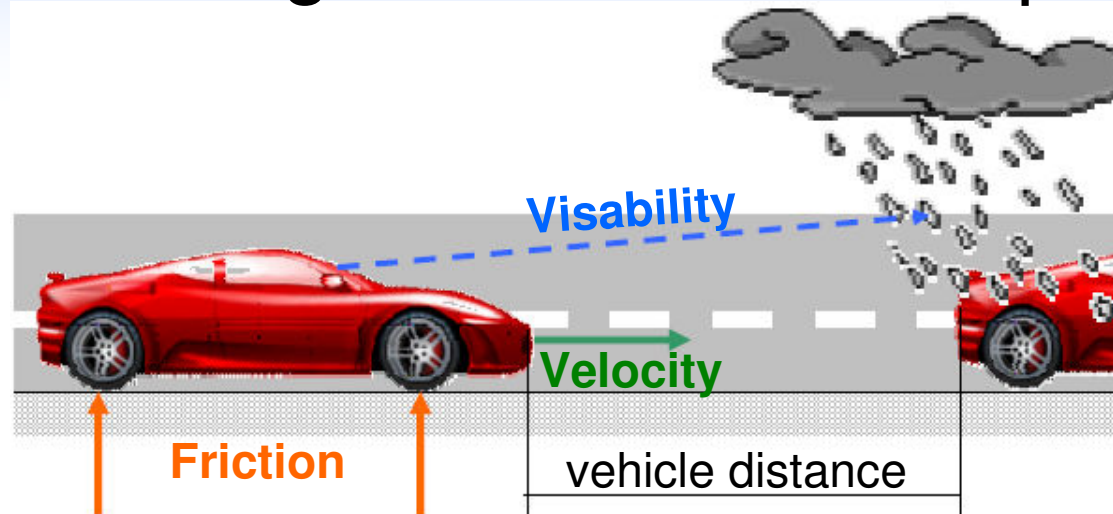
Road Weather Service Operation Platform

Road site weather monitoring data together with global Meteo Data
= road condition warnings on short road sections



Current work:

Modeling Road Weather impact on Traffic Flow



Thank you for your attention.

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