Runway Weather Information Systems & Grip

FPAW, Las Vegas
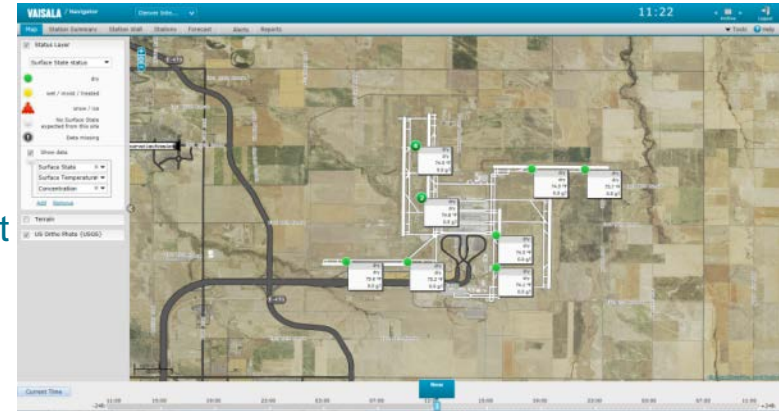
Paul Bridge, November 2015

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RWIS – Runway Weather Information System

- Surface Temperature
- Surface State
- Freeze Point
- Chemical presence & amount
- *Black Ice*

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Non-invasive pavement sensors

- Measure:
    - Pavement Temperature
    - Pavement State (dry, moist, wet, frost/snow, ice
        - Layer thickness of above
    - Grip

Grip – measuring slipperiness

- DSC111 measures independently
  - Snow/Frost (crystalline ice)
  - Ice
  - Water
- Different combinations have been correlated to actual friction conditions
- A single index is output which is termed GRIP
- A simple way of expressing all that complexity with one number

GRIP

0.8

0.7

0.6

0.4

0.1

This is what DOT folk have learnt from years of observing the grip readings……..

Above .6 mobility is good

.5 to .6 slush or ice forming

.4 to .5 snow pack or icy

Below .4 cars may start sliding off

.3 and lower multiple slide offs possible; mobility greatly affected

TALPA–Take-off and Landing Performance Assessment ?

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Lost Trail Pass, Idaho : Guess the driving (landing!) conditions on the following days?

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Did you get them right? The weather sensors did!

Air Temp: 25ºF
Road Temp: 30ºF

Road State: Slush
Grip: Good

Air Temp: 25ºF
Road Temp: 50ºF

Road State: Dry
Grip: Excellent

Air Temp: 28ºF
Road Temp: 43ºF

Road State: Wet
Grip: Good

Air Temp: 20ºF
Road Temp: 28ºF

Road State: Ice
Grip: Poor

Air Temp: 23ºF
Road Temp: 43ºF

Road State: wet
Grip: Good

Air Temp: 24ºF
Road Temp: 28ºF

Road State: Ice
Grip: Very poor

Salt
Residue

Air Temp: 36ºF
Road Temp: 39ºF

Road State: Dry
Grip: Excellent

Air Temp: 23ºF
Road Temp: 28ºF

Road State: Ice
Grip: Poor

Salt
Residue

Air Temp: 14ºF
Road Temp: 21ºF

Road State: Dry
Grip: Excellent

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How can Non-intrusive sensors be used at airports?

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DSP310 Components

Vaisala Database

Viewing Data Over the Internet

Smart Phone In-vehicle Display

Air Temperature Dew Point Pavement Temperature

Surface Condition Friction/Grip Layer Thickness

Interface Unit

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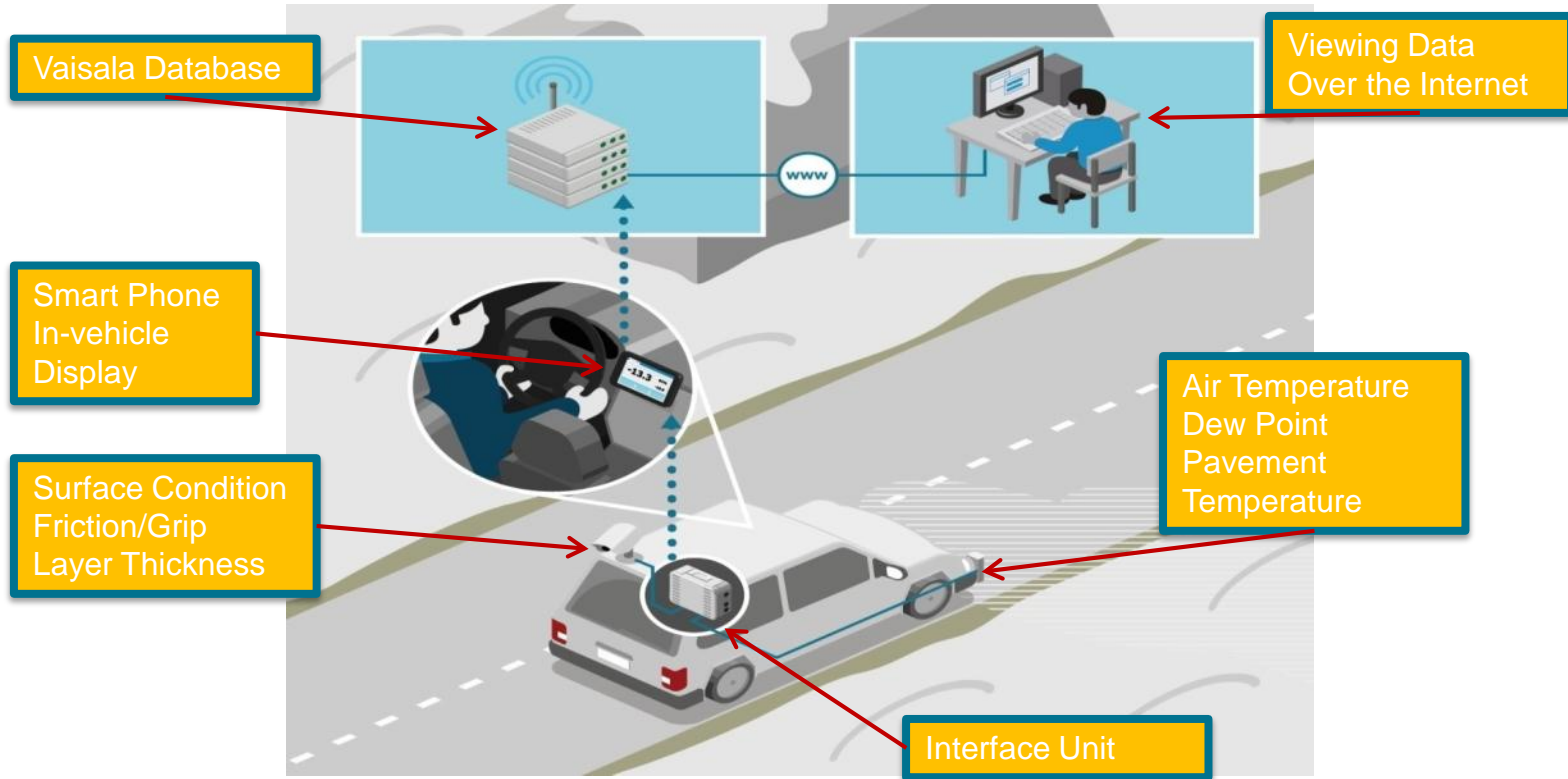
How Does Non-intrusive Sensor compare with 'regular' friction testing systems?

- Index of grip, is scaled to the value of friction of a typical road surface and a car tire

- Tests with FINRA using a decelometer in all types of slippery conditions

- RMS error in friction units is 0.07

- Nuebert Aero Corp tested DSC111 with trailer based friction system – results unknown
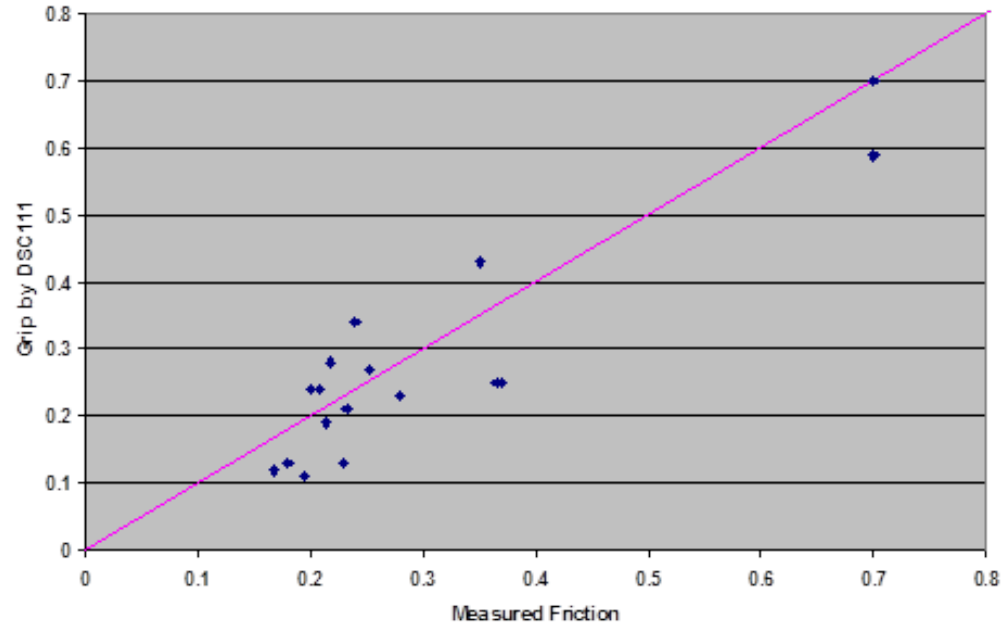
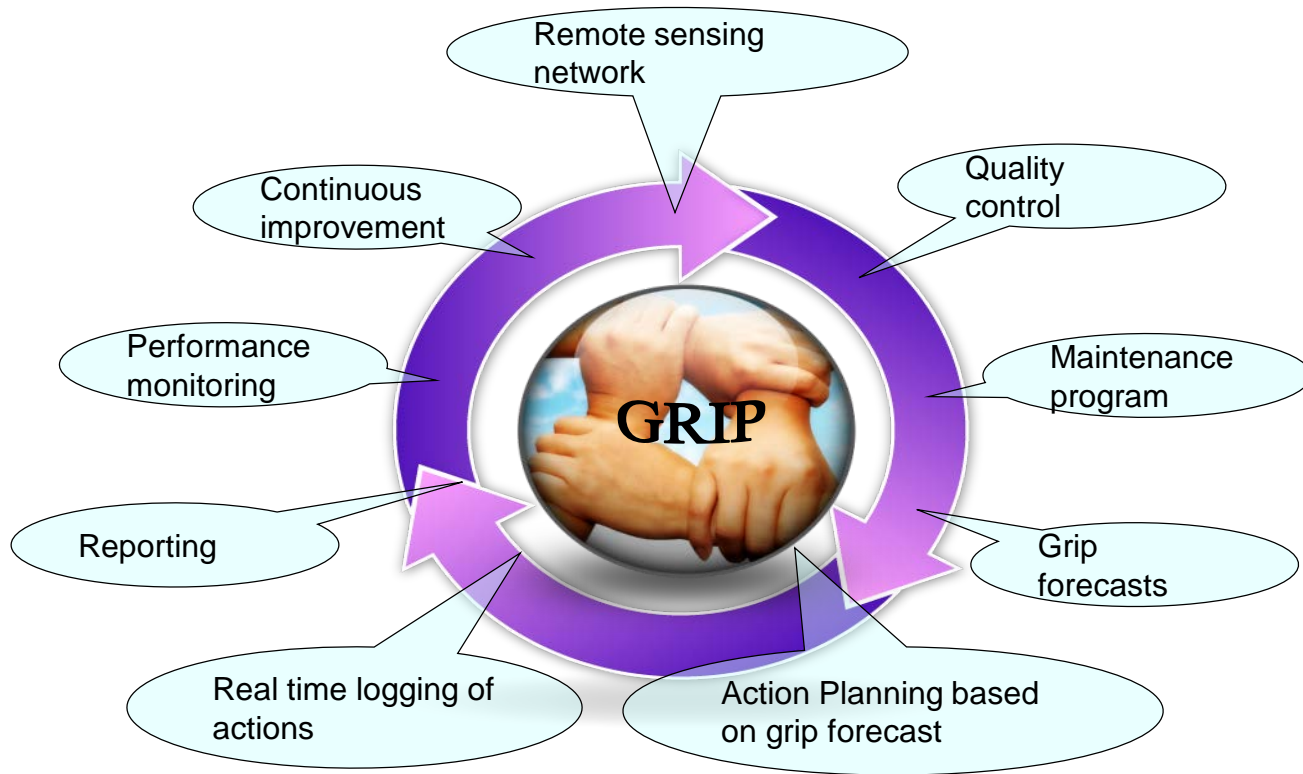# Integrated into RoadDSS Navigator
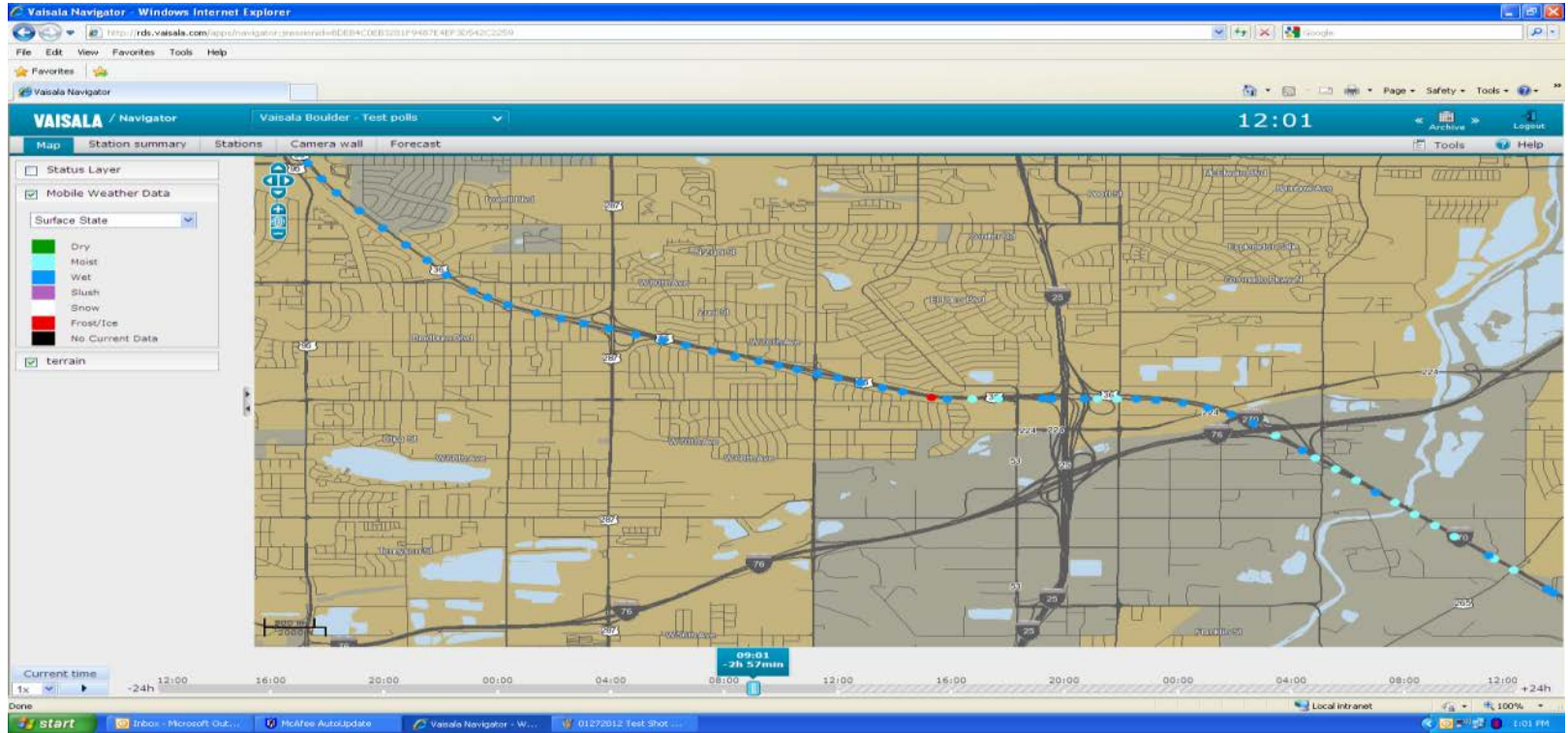
Grip Forecasts
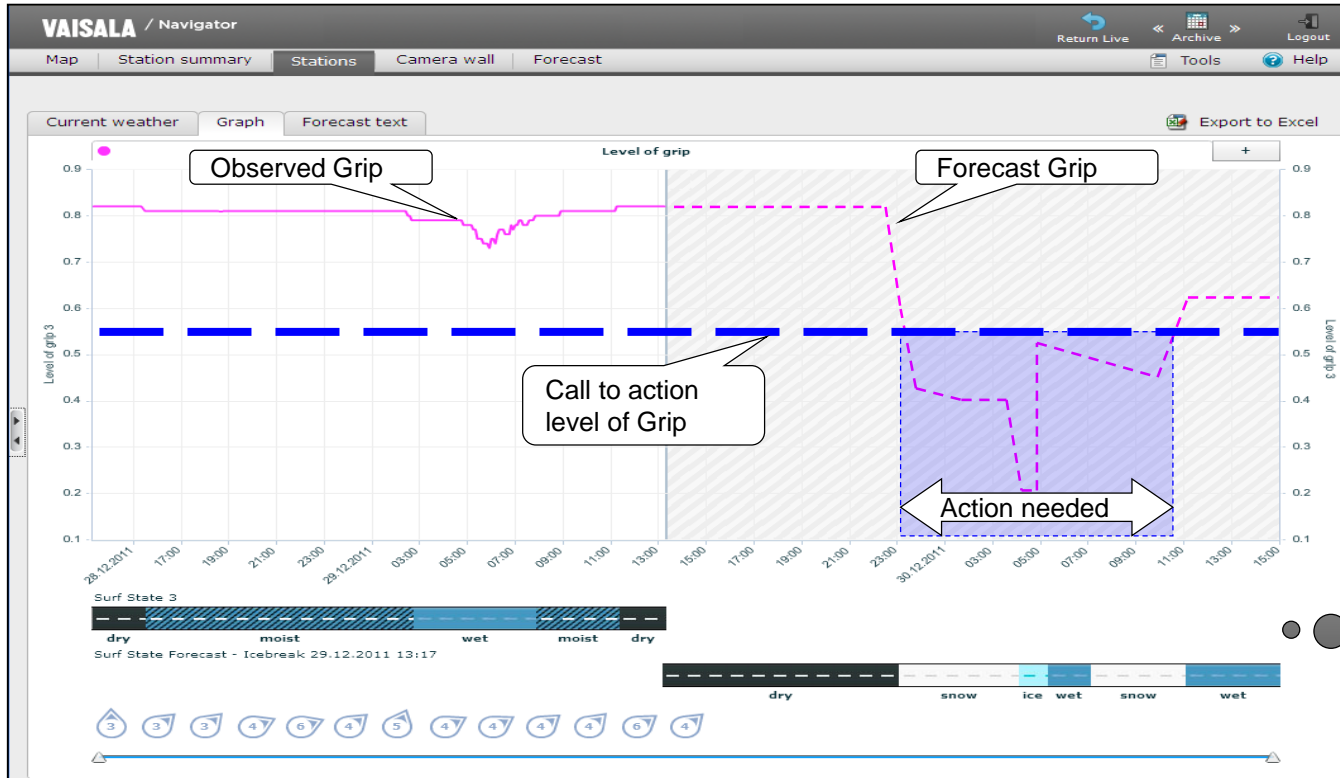
- Planning made easy by introducing a call to action level of grip
- Clear period of concern from forecasts of Grip

Multiple weather reasons for a slippery road condensed into one Grip reading

Grip based winter maintenance/operations system

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Thank You