Boschung’s MDSS solution

Issues in tactical weather support

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The objective of incorporating weather forecast in MDSS is to be able to predict future road dangers.
Issues in tactical weather support

First task

• Define a common grid between maintenance’s perspective (road segments, RWIS location) and weather’s perspective (micro-climatic regions)
  ➔ Road weather segments

• Define « bridges » between the measurement capabilities and the weather forecast
  ➔ Reference RWIS within Road weather segment

• Keep in mind the distinction between weather forecast (air) and pavement status (road) : these are two different worlds !
  ➔ Combination of expertise provides the best result
1. Determine the future pavement status
2. Have the system react correctly
• First area of interest is the short term (2 – 3 hours) for deciding on road treatment

  – The evolution of the pavement conditions within that period of time is mostly influenced by the preceding hours (inertia)
   ➔ define this evolution for the location where measurements were performed (RWIS)

  – Precipitation can change the situation
   ➔ use detailed precipitation forecast for the area (weather services)
Determine the future pavement stat.

(First step: point forecast)

1. Precipitation forecast
2. Measurements (point)
3. Local parameters
4. Thermal + hydrological balance algorithms
5. Nowcasting (point)
6. Every 10 minutes
7. Weather services
8. Nowcasting (point)
9. Precipitation forecast

Time

RWIS
Determine the future pavement stat. (second step: road segment forecast)

Weather services

Regional weather forecast

Forecasting (road weather segment)

Nowcasting (point)

Temperature offsets ➔ Most critical spot

Time

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Determine the future pavement stat.

Translation from point measurement to road forecast

- **Point Measurement**
  - Weather forecast 3h
  - Precipitation Forecast 2h
  - Parameters specific to RWIS location

- **Nowcasting**

- **Point forecast**
  - Weather forecast 72h
  - Thermal mapping
  - Decision tree (parameters)

- **Road segment forecast**
Determine the future pavement stat.

Available information for each individual road weather segment:

- High accuracy short term forecast (0 – 3 hrs)
- Hourly medium term forecast (3 – 30 hrs)
- Long term forecast (30 – 72 hrs)
Issues in tactical weather support
Have the system react correctly

- Each road segment forecast period is summarized into a 6 digit code:

XX YY z Z

- Modification of pavement status
- Weather conditions, precipitations
- Wind conditions
- Temperature conditions
Issues in tactical weather support
Have the system react correctly

• Each individual code (up to about 2’800 combinations) can trigger a specific behavior of the system (coloring the corresponding road segment, alerting, etc.) by means of parameters: decision tree

→ The system can be tuned to react the same way your most experienced expert would do.

→ This reaction is no more depending on who is sitting in front of the screen.
Issues in tactical weather support
Have the system react correctly

- Winter road 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

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Thank you!