Issues in Tactical Support for MDSS

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PFS MDSS Architecture

**Maintenance Actions**

- Modifications to Standard Practices
- Results Expected from Proposed Treatment

- Road Condition Observations / Analyses
- Propose Alternative Treatment
- 'Optimal' Treatment & Expected Results

**Resources Used / Available**

- Roadway & Environment Characterization Database
- RWIS
- High Resolution Gridded Weather Forecast Database
- Maintenance Practices and Activities Databases

**MDSS Processing & Integration System**

**Observed & Analyzed Roadway State Databases**

**Available Resources Database**

**Database**

- Maintenance Practices and Activities Databases
- High Resolution Gridded Weather Observations Database
- High Resolution Gridded Weather Forecast Database
- Roadway & Environment Characterization Database

**Legend**

- BLUE: Forecast / Theoretical
- RED: Real-Time / Actual
- BLACK: Applies to Both
- SOLID: Automatic or Semi-Automatic Process
- DASHED: User-Driven Process
Maintenance Actions

Optimal' Treatment & Expected Results

Maintenance Practices and Activities Databases

MDSS Processing & Integration System

WEATHER INPUTS

High Resolution Gridded Weather Forecast Database

High Resolution Gridded Weather Observations Database

MAINTENANCE ACTIVITIES

'Maintenance Actions & Expected Results

Observed & Analyzed Roadway State Databases

ROAD CONDITION OBSERVATIONS
Tactical Support: Weather Information

- **Wintertime precipitation observations**
  - real-time information on intensity / rate lacking
  - significant distances between observations
  - consistency between sensors
  - QC needed, but difficult

- **Radiation information**
  - very few observations available, vitally important

- **Drifting snow**
  - Not well observed by existing networks
  - Not easily modeled due to lacking info on snowpack conditions

- **Weather forecast update frequency**
  - forecast needs to reflect current conditions, project evolution
  - labor intensive if done by forecaster, difficult to automate in light of lacking precipitation observations
Tactical Support: Road Condition Information

- **RWIS**
  - Limited coverage
  - Accuracy is suspect in some cases, QC difficult
  - Some conditions more usable than others

- **Agency**
  - Existing feeds don’t update frequently
    - Can still get time-lagged value using pavement model
  - Dictionary conversions, spatial variability

- **MDC/AVL**
  - Consistency of data entry between drivers
  - Picking most appropriate condition out of varying entries
  - Meshing with maintenance activity information, i.e. don’t want to undo the corresponding maintenance action in the model
**Tactical Support: Maintenance Data Collection**

- **Consistency of entry**
  - We presently must rely on the driver to input some information, such as lane, material, and/or application rate.

- **Interfacing with truck**
  - Gathering data from spreader controller can be difficult.
  - Sensing plow positions.

- **Standards would be beneficial**
  - At the controller interface.
  - At the point of distribution outside the system.

- **Interpretation is complex**
  - MDC/AVL yields GPS-based measurements of conditions.
  - Agencies generally want aggregated information for maintenance routes.
In-Vehicle MDSS

(IWAPI system working with PFS MDSS)

Two way MDSS - MDC / AVL data flow maximizes tactical value
Tactical Support: MDSS Processing

- Keeping up with the flow of data
  - Weather information
    - New observations (nearby METAR, RWIS, radar data, etc.)
    - New forecasts
  - Road condition information
    - Prioritization needed. If a report comes from a user, push it through quickly. If not, push it through on a (frequent) schedule.
  - MDC/AVL information
    - Always coming in, piece by piece. How often does MDSS readjust to account for this changing picture?
    - How much of a maintenance run should be finished before MDSS processes its effects?