Maintenance Decision Support System (MDSS) Statewide Implementation: Change and Progress

SIRWEC 2010: 15th International Road Weather Conference
February 2010
Melody A. Coleman, Tony McClellan & Paul Boone - INDOT
Presented by Curt Pape, Minnesota DOT
MDSS: What is it?

• An automated tool for providing decision support to winter road maintenance managers

• A multi-layered information system that provides forecasts, predictions, reports on observed weather and road conditions, serves as a training tool, and becomes a management support system that can be utilized year round.
Organizational Change - It’s Cultural

“There are two basic rules of life: Change is inevitable and everybody resists change”

- Author Roger Von Oech
How is our work affected by change?

**Change Curve**

- **Normal** Functioning
  - Shock & Denial
    - Avoidance
    - Confusion
    - Fear
    - Numbness
    - Blame
  - Anger
    - Frustration
    - Anxiety
    - Irritation
    - Embarrassment
    - Shame
  - Depression & Detachment
    - Overwhelmed
    - Lack of Energy
    - Helplessness
  - Acceptance
    - Exploring options
    - A new plan in place
  - Dialogue & Bargaining
    - Reaching out to others
    - Desire to tell one’s story
    - Struggling to find meaning for what has happened

- **Return to meaningful life**
  - Empowerment
  - Security
  - Self-esteem
  - Meaning

**Time**

**Competence**
Let’s Remember...not all change is bad!
How does change affect the way we view ourselves & our jobs?

The Stages of Change

1. Shock
   - Numbness, immobilisation. Mismatch between expectation and reality.

2. Disbelief
   - Denial/minimisation of the change or event. Carries on as before.

3. Self Doubt
   - Reality bites - bringing uncertainty, frustration, anger and depression.

4. Acceptance
   - Letting go of old attitudes and behaviours.

5. Experimentation
   - Dealing with new reality. Energy as new attitudes and behaviours are tested.

6. Search for Meaning
   - The new situation becomes real. Questioning: what has happened and why?

7. Integration
   - Internalisation and incorporation of new attitudes and behaviours into everyday life.
Executive support and employee buy-in is key in initial and ongoing success with the changes that MDSS present.
Similar conditions resulted in a very different outcome by using technology and managing resources.
Salt Usage - All Districts

ALL DISTRICTS - STATEWIDE SALT USAGE

Tons

0 100,000 200,000 300,000 400,000 500,000 600,000

NOV DEC JAN FEB MAR APR

Months

5 Year Ave.
FY 2008
70% of FY 2008
FY 2009
## Salt Usage

<table>
<thead>
<tr>
<th></th>
<th>3 Year Ave.</th>
<th>5 Year Ave.</th>
<th>10 Year Ave.</th>
<th>FY 08</th>
<th>FY 09</th>
<th>Variation 3 yr ave to 09</th>
<th>Variation 10 yr ave to 09</th>
<th>Variation from 08 to 09</th>
</tr>
</thead>
<tbody>
<tr>
<td>Crawfordsville</td>
<td>58,313</td>
<td>58,324</td>
<td>51,484</td>
<td>95,318</td>
<td>41,402</td>
<td>-29.0%</td>
<td>-19.6%</td>
<td>-56.6%</td>
</tr>
<tr>
<td>Fort Wayne</td>
<td>70,389</td>
<td>71,946</td>
<td>66,993</td>
<td>100,762</td>
<td>71,674</td>
<td>1.8%</td>
<td>7.0%</td>
<td>-28.9%</td>
</tr>
<tr>
<td>Greenfield</td>
<td>74,067</td>
<td>74,886</td>
<td>78,863</td>
<td>110,670</td>
<td>60,686</td>
<td>-18.1%</td>
<td>-23.0%</td>
<td>-45.2%</td>
</tr>
<tr>
<td>LaPorte</td>
<td>86,387</td>
<td>98,830</td>
<td>103,021</td>
<td>132,039</td>
<td>89,546</td>
<td>3.7%</td>
<td>-13.1%</td>
<td>-32.2%</td>
</tr>
<tr>
<td>Seymour</td>
<td>62,212</td>
<td>53,174</td>
<td>45,398</td>
<td>66,726</td>
<td>40,250</td>
<td>-35.3%</td>
<td>-11.3%</td>
<td>-39.7%</td>
</tr>
<tr>
<td>Vincennes</td>
<td>35,355</td>
<td>32,997</td>
<td>29,059</td>
<td>52,759</td>
<td>26,246</td>
<td>-25.8%</td>
<td>-9.7%</td>
<td>-50.3%</td>
</tr>
<tr>
<td><strong>All Districts</strong></td>
<td><strong>386,723</strong></td>
<td><strong>390,157</strong></td>
<td><strong>374,818</strong></td>
<td><strong>558,274</strong></td>
<td><strong>329,804</strong></td>
<td><strong>-14.7%</strong></td>
<td><strong>-12.0%</strong></td>
<td><strong>-40.9%</strong></td>
</tr>
</tbody>
</table>

### Notes:
- Variation 3 yr ave to 09 represents the percentage change from the 3-year average to the FY 09 salt usage.
- Variation 10 yr ave to 09 represents the percentage change from the 10-year average to the FY 09 salt usage.
- Variation from 08 to 09 represents the percentage change from FY 08 to FY 09.
## Diesel Fuel Usage

### Diesel Fuel Usage (Nov - Apr)

<table>
<thead>
<tr>
<th>Location</th>
<th>FY 08</th>
<th>FY 09</th>
<th>Variation from 08 to 09</th>
</tr>
</thead>
<tbody>
<tr>
<td>Crawfordsville</td>
<td>348,252</td>
<td>257,265</td>
<td>-26.1%</td>
</tr>
<tr>
<td>Fort Wayne</td>
<td>374,262</td>
<td>325,324</td>
<td>-13.1%</td>
</tr>
<tr>
<td>Greenfield</td>
<td>441,017</td>
<td>338,783</td>
<td>-23.2%</td>
</tr>
<tr>
<td>LaPorte</td>
<td>422,230</td>
<td>388,931</td>
<td>-7.9%</td>
</tr>
<tr>
<td>Seymour</td>
<td>248,040</td>
<td>237,950</td>
<td>-4.1%</td>
</tr>
<tr>
<td>Vincennes</td>
<td>156,679</td>
<td>170,089</td>
<td>8.6%</td>
</tr>
<tr>
<td><strong>All Districts</strong></td>
<td><strong>1,990,480</strong></td>
<td><strong>1,718,342</strong></td>
<td><strong>-13.7%</strong></td>
</tr>
</tbody>
</table>
## Overtime Hours - Snow & Ice

<table>
<thead>
<tr>
<th>Location</th>
<th>FY 08</th>
<th>FY 09</th>
<th>Variation from 08 to 09</th>
</tr>
</thead>
<tbody>
<tr>
<td>Crawfordsville</td>
<td>38,240</td>
<td>17,971</td>
<td>-53.0%</td>
</tr>
<tr>
<td>Fort Wayne</td>
<td>44,896</td>
<td>35,603</td>
<td>-20.7%</td>
</tr>
<tr>
<td>Greenfield</td>
<td>36,614</td>
<td>32,074</td>
<td>-12.4%</td>
</tr>
<tr>
<td>LaPorte</td>
<td>50,961</td>
<td>51,743</td>
<td>1.5%</td>
</tr>
<tr>
<td>Seymour</td>
<td>33,240</td>
<td>19,027</td>
<td>-42.8%</td>
</tr>
<tr>
<td>Vincennes</td>
<td>22,533</td>
<td>11,792</td>
<td>-47.7%</td>
</tr>
</tbody>
</table>

**All Districts** 226,484 168,210 -25.7%
<table>
<thead>
<tr>
<th>Location</th>
<th>Tons/Sn Hour 3 Year Ave</th>
<th>Tons/Sn Hour 08</th>
<th>Ton/SnHr 09</th>
<th>Diff from 3 Yr Ave</th>
<th>Diff from 08</th>
</tr>
</thead>
<tbody>
<tr>
<td>Crawfordsville</td>
<td>192</td>
<td>244</td>
<td>124</td>
<td>-35.4%</td>
<td>-49.3%</td>
</tr>
<tr>
<td>Fort Wayne</td>
<td>168</td>
<td>201</td>
<td>145</td>
<td>-13.8%</td>
<td>-28.2%</td>
</tr>
<tr>
<td>Greenfield</td>
<td>244</td>
<td>284</td>
<td>182</td>
<td>-25.4%</td>
<td>-36.0%</td>
</tr>
<tr>
<td>LaPorte</td>
<td>328</td>
<td>401</td>
<td>226</td>
<td>-31.2%</td>
<td>-43.7%</td>
</tr>
<tr>
<td>Seymour</td>
<td>523</td>
<td>412</td>
<td>314</td>
<td>-39.9%</td>
<td>-23.7%</td>
</tr>
<tr>
<td>Vincennes</td>
<td>453</td>
<td>436</td>
<td>380</td>
<td>-16.1%</td>
<td>-12.8%</td>
</tr>
<tr>
<td>All Districts</td>
<td>260</td>
<td>295</td>
<td>188</td>
<td>-27.8%</td>
<td>-36.4%</td>
</tr>
</tbody>
</table>
$SAVING$ - Overtime

An effort has been made to try to normalize the data using the observed hours of snow and freezing rain. In order to compare savings to FY 08, which had 7.2% more observed hours of snow and freezing rain than FY 09, the FY 08 salt usage and overtime hours have been reduced by 7.2%. This reduction normalizes the winters.

<table>
<thead>
<tr>
<th>Overtime Hours</th>
<th>FY 08 (Reduced by 7.2%)</th>
<th>FY 09</th>
<th>Difference (Hours)</th>
<th>Savings @ $23.33/hour</th>
</tr>
</thead>
<tbody>
<tr>
<td>All Districts</td>
<td>210,177</td>
<td>168,210</td>
<td>41,967</td>
<td>$979,136</td>
</tr>
</tbody>
</table>
• One load of salt is approximately $600 (in Indiana for FY 10) in materials.

• There are over 1100 Snow Trucks in the INDOT fleet.

• One extra trip per event is over $600,000 in material. One trip saved could result in significant reductions in salt usage.
$SAVING$ - Salt Usage

An effort has been made to try to normalize the data using the observed hours of snow and freezing rain. In order to compare savings to FY 08, which had 7.2% more observed hours of snow and freezing rain than FY 09, the FY 08 salt usage and overtime hours have been reduced by 7.2%. This reduction normalizes the winters.

<table>
<thead>
<tr>
<th></th>
<th>FY 08 (Reduced by 7.2%)</th>
<th>FY 09</th>
<th>Difference (Tons)</th>
<th>Savings @ $53/Ton</th>
</tr>
</thead>
<tbody>
<tr>
<td>All Districts</td>
<td>518,078</td>
<td>329,804</td>
<td>188,274</td>
<td>$9,978,536</td>
</tr>
</tbody>
</table>
QA/QC and Communications

- Provides a two way street where all levels within the organization can communicate how the system is working

- Strategic Rather than Tactical Approach
QA/QC Should be Easy and Automated
Communications Should be Timely and Informative

- Give credit when/where credit it is due
- Admit real problems and failures & make plans to correct them
- QA/QC provides a structured feedback for two-way communication
Something to Talk About
Something to Talk About
To Implement MDSS You Need:

- Strong Executive Support
- Organizational Change Management Plan
- Comprehensive Training Plan
- Equipment and Software Super Users strategically located in your areas
- A good Communication plan - QA/QC is an excellent way to make this happen
- A good project management team
Maintenance Decision Support System (MDSS):

Indiana Department of Transportation (INDOT)

Statewide Implementation

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Questions?

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