Integrated Modeling for Road Condition Prediction (IMRCP)

Phase III Update
June 25, 2019
Nancy Powell
So...What is it?

IMRCP: An Integrated Predictive System

Sponsored by FHWA, working with MoDOT, KDOT, KC Scout and local agencies
IMRCP Development

IMRCP-1: Tech Survey
ConOps, Architecture

IMRCP-2: Model Deployment
Kansas City Study Area

IMRCP-3: Model Enhancement
Operations Focus

Current Phase
TRUE TSMO INNOVATION
“Time Travel” tool for Operations
IMRCP User Interface

- The IMRCP system uses a web-based interface
  - Time-variable map
  - Notifications
  - Reports

- Administrators send user names, passwords and instructions to authorized users

Please login to access the system.

Username

Password

Login
Simplicity of the Map Interface with “Time Travel” Slider Bar

Zoom Controls

View Weather Condition Data

View Alerts

Create a Report or Subscription

View Road Condition Data

Time Selector

1 min. Refresh

Notifications

Date/Time Function
Expanded IMRCP Study Area for Phase III
Viewing Road Condition Data

Road Condition Layers
- Road Network Model
- Pavement State
- Pavement Temperature
- Pavement Flood Depth
- Pavement Snow Depth
- Traffic
- Traffic Speed
- Traffic Density
- Traffic Flow
- Routes
### Viewing Road Condition Specifics

<table>
<thead>
<tr>
<th>ObsType</th>
<th>Source</th>
<th>Start Time</th>
<th>End Time</th>
<th>Value</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>pavement state</td>
<td>METRO</td>
<td>04-16 04:26 pm</td>
<td>04-16 04:28 pm</td>
<td>dry</td>
<td></td>
</tr>
<tr>
<td>average density of vehicles on each link</td>
<td>TREPS</td>
<td>04-16 04:27 pm</td>
<td>04-16 04:28 pm</td>
<td>21</td>
<td>%</td>
</tr>
<tr>
<td>snow inundation depth</td>
<td>METRO</td>
<td>04-16 04:26 pm</td>
<td>04-16 04:28 pm</td>
<td>0</td>
<td>in</td>
</tr>
<tr>
<td>predicted flow category</td>
<td>BAYES</td>
<td>04-16 04:25 pm</td>
<td>04-16 05:25 pm</td>
<td>very-high</td>
<td></td>
</tr>
<tr>
<td>predicted occupancy category</td>
<td>BAYES</td>
<td>04-16 04:25 pm</td>
<td>04-16 05:25 pm</td>
<td>very-low</td>
<td></td>
</tr>
<tr>
<td>predicted speed category</td>
<td>BAYES</td>
<td>04-16 04:25 pm</td>
<td>04-16 05:25 pm</td>
<td>high</td>
<td></td>
</tr>
</tbody>
</table>
Winter 2018-19

Temperatures

Obs. Pavement Temp.
Freezing

Observed Daily Precip

Observed Daily Precip
1/11/19, 4:30 p.m.
1/11/19, EB I-435 at Nall

![Graphs showing precipitation rate, precipitation liquid accumulation, visibility, detected speed, TrEPS speed, and MLP speed over time on 1/11/2019.]

- **Precipitation Rate**
- **Precip (Liquid) Accum.**
- **Visibility**
- **Detected Speed**
- **TrEPS Speed**
- **MLP Speed**
2/21/19, EB I-435 at Nall
Real Time Road Condition

2/21/19 at 17:35 hrs
<table>
<thead>
<tr>
<th>Stakeholder Activity</th>
<th>Timeframe</th>
<th>Outcome</th>
</tr>
</thead>
<tbody>
<tr>
<td>CWG IMRCP-3 Kick-off Meeting</td>
<td>Early July 2018</td>
<td>Describe accomplishments through Phase 2 and set up Phase 3</td>
</tr>
<tr>
<td>NOCoE webinar</td>
<td>August 2018</td>
<td>Increase awareness of opportunities and applications</td>
</tr>
<tr>
<td>CWG IMRCP Design Consultation Meeting</td>
<td>Late August 2018</td>
<td>Obtain guidance and feedback on system</td>
</tr>
<tr>
<td>Road Weather Management Stakeholder Meeting</td>
<td>September 2018</td>
<td>Increase awareness of opportunities and applications</td>
</tr>
<tr>
<td>CWG Pre-winter Operational Planning</td>
<td>January 2019</td>
<td>Plan for system use, performance measures, and reporting</td>
</tr>
<tr>
<td>CWG IMRCP Operational Experience Review 1</td>
<td>Spring 2019</td>
<td>Review experience and solicit feedback for evaluation</td>
</tr>
<tr>
<td>Broad stakeholder webinar</td>
<td>Summer 2019</td>
<td>Increase awareness of capabilities and experience</td>
</tr>
<tr>
<td>CWG Pre-winter Operational Planning</td>
<td>Nov-Dec 2019</td>
<td>Plan for system use, performance measures, and reporting</td>
</tr>
<tr>
<td>CWG IMRCP Operational Experience Review 2</td>
<td>Spring 2020</td>
<td>Review experience and solicit feedback for evaluation</td>
</tr>
<tr>
<td>Broad stakeholder webinar</td>
<td>Summer 2020</td>
<td>Increase awareness of IMRCP capabilities and experience</td>
</tr>
<tr>
<td>Final CWG Meeting</td>
<td>Summer 2020</td>
<td>Describe accomplishments, evaluation results, and final deliverables; solicit concepts for further deployment and next steps</td>
</tr>
</tbody>
</table>
Summary

- Integrated Modeling for Road Condition Prediction can extend operational awareness from the “now” to the “what next”
- The Kansas City deployment has demonstrated the flexibility and extensibility of the models and framework
- Operations throughout 2019-20 provide an opportunity for planning and evaluation of prediction-based operations and maintenance strategies