TOCS:
A Vision for a Single System to Manage Road Operations in Oregon
What is TOCS?

Transportation
Operation
Center
System
Oregon Challenge

• Challenges
  – 8000 Miles of Highway
  – Diverse Terrain
  – 2009 Population: 3,825,657
  – Multnomah County
    • 1518 people per square mile
    • 660,486 people total
  – Malheur County
    • 3 people per square mile
    • 31,615 people total
ODOT’s Pre-TOCS Environment

• 21 Different Software Applications
  – The Same Data was Being Manually Entered in Multiple Applications
  – New Dispatcher Training was Lengthy
  – Reporting was Difficult

• Portland Utilized Different Dispatching System than Salem, Medford & Bend

• Workload was Increasing (~5%/year)
The Vision

• Improve Operator Efficiency Through a Single, Integrated System
  – Automate Manual Processes
  – Eliminate Data Re-entry
  – Reduce Training Time
  – Standardize Highway Operations Statewide

• Improve Emergency Capabilities

• Improve Data Sharing
  – External Partners (Oregon State Police, etc.)
  – Internal Managers/Decision Makers

• Improve Data Quality for Reporting
Project Goals

• Consolidate and Replace Existing Applications Currently Used by Dispatchers
• Enhance ODOT Operations
  • Incident Management and Data Sharing
• Integrate Device Operation
• Create Expandable Platform for ITS Infrastructure
• Integration with Other Agencies and States
• Enhance Data Archiving and Reporting
• Enhance ITS Failure Detection and Maintenance
• Improve Center-to-Center Coordination and Communication
Key Innovations

- System Design Focused on Dispatcher Needs for Standardized Highway Operations
  - Incident Management
  - Resource Management
  - Travel Information Publishing
  - Dispatch

- Integration with Other Agencies
  - Oregon State Police
  - Local 911 Centers (next phase)
• Incident Management
  – Incident Details
  – Dispatch
  – Towing
• Resource Management
• Integration with Traveler Information System
• Integration with Oregon State Police
• Reporting Tools
• Fault Tolerance
  – Geographic/Server/Network Redundancy
### TOCS Event Overview

#### Find an Event

**Planned Events (1)**
- **Potential Events (0)**

<table>
<thead>
<tr>
<th>Sub-Type</th>
<th>Elap Time</th>
<th>Location</th>
<th>County</th>
<th>ID</th>
<th>CA</th>
<th>Priority</th>
<th>Source</th>
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</thead>
</table>

#### Pending Events (0)

<table>
<thead>
<tr>
<th>Sub-Type</th>
<th>Elap Time</th>
<th>Location</th>
<th>County</th>
<th>ID</th>
<th>CA</th>
<th>Priority</th>
</tr>
</thead>
</table>

#### Active Events (10)

**Filter by:**
- Type
- Sub-Type
- Location
- County
- Command Area

<table>
<thead>
<tr>
<th>Sub-Type</th>
<th>Units</th>
<th>Status</th>
<th>Crew</th>
<th>Elap Time</th>
<th>Location</th>
<th>County</th>
<th>ID</th>
<th>CA</th>
<th>Priority</th>
<th>Shared</th>
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<tbody>
<tr>
<td>Variable Mess...</td>
<td>2204</td>
<td></td>
<td></td>
<td>44:04</td>
<td>45.88 OR-18 ...</td>
<td>Yamhill</td>
<td>T0T026003</td>
<td>3</td>
<td>8</td>
<td></td>
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<tr>
<td>Message</td>
<td></td>
<td></td>
<td></td>
<td>07:40</td>
<td>NWTOC JON ...</td>
<td></td>
<td>T0T036395</td>
<td>3</td>
<td>9</td>
<td></td>
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<tr>
<td>Road Mainten...</td>
<td>3M15</td>
<td>Notified</td>
<td></td>
<td>21:01</td>
<td>23 - 25 OR-2...</td>
<td>Clatsop</td>
<td>T0T036417</td>
<td>1</td>
<td>6</td>
<td></td>
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<tr>
<td>Road Constru...</td>
<td>22944A</td>
<td>Arrived</td>
<td></td>
<td>21:04</td>
<td>73.5 - 74 US ...</td>
<td>Tillamook</td>
<td>T0T036403</td>
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<td>Road Constru...</td>
<td>20947</td>
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<td></td>
<td>21:04</td>
<td>82.8 US-101 ...</td>
<td>Tillamook</td>
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<td>Crash</td>
<td>3883</td>
<td>En Route Code</td>
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<td>00:30</td>
<td>32.79 OR-99 ...</td>
<td>Yamhill</td>
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<td>1</td>
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<tr>
<td>Message</td>
<td>3M13</td>
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<td></td>
<td>00:56</td>
<td>siverfalls ltten...</td>
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<td></td>
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<td>251 1-5 Nns P ...</td>
<td>Marion</td>
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<td>3</td>
<td>6</td>
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<td>3M225</td>
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<td>3M250</td>
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<td></td>
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<td>3M290C</td>
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<td>2502</td>
<td>97.44</td>
<td>182.5 1-5 P ...</td>
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<td>T0T033389</td>
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</tbody>
</table>

### Messages and Communication

#### Timers

<table>
<thead>
<tr>
<th>Time</th>
<th>Type</th>
<th>Description</th>
</tr>
</thead>
</table>

#### Alarms

- Variable Mess...
- Crash
- Road Mainten...
- Message

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**User and System Information**

- Profile: AutoDefault
- Commanding: 1, 3, 4, 5, R2
- Monitoring: SP

**TOCS User Information**

- View All

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**Exit TOCS**
TOCS Future

- Screen-to-Screen Messaging
- 911 Center Integration
- Road & Weather Data Capture
- Integration with Paging/Notification
  - Internal and External
- Integration with VMS Control
- Automated Response Plans
- Incident Map
Development Experience

• ODOT as Integrator
  – Multiple Contractors
    • Concurrent Development
    • ODOT Team Responsible for Architecture, Functional Design, Reviews, Testing, and Integration
  – Innovative Partnership with Oregon State University
    • ODOT Servers at OSU
    • Student Developers
Key Technologies

- **Microsoft Team Foundation Server**
  - Allows ODOT to Maintain Control of Source Code During Development
  - Allows for “Single Source” distribution of Development Tasks and Resources

- **Microsoft .NET Framework 3.0**
  - Allows for Real-Time Updates of Dispatcher Consoles
Inter-Agency Integration Considerations

- **Start with What You Know**
  - An example: Oregon State Police
    - **Common Language**
      - IEEE1512 Standard for Inter-Agency Communications
      - Incident Types, Priorities, etc.
    - **Limit Integration to Incidents That Impact Oregon Highways**
      - No Domestic Violence, etc.
  - **Key Resources**
    - ODOT and OSP Operators
    - OSP CAD Vendor
Maintenance Considerations

• Involve Maintenance Team in the Design, Development and Deployment

• Prepare End-User Training Materials (Help)

• Plan for System Failure
  – “But, that will never happen!” – Famous Last Words
  – An example: TOCS
    • Allows Server Components to be Run out of Salem or Bend
    • Ensures the Backup Servers are Ready
    • Runs on Redundant Networks
    • Allows One Center to Cover for Another in a Emergency
Lessons Learned
(Opportunities for Growth)

• Juggling Can Be Dangerous
  – Multiple Concurrent Contracts
    • Management is a Challenge

• Scope, Schedule, and Budget
  – Pick two.

• Customer Buy-In is Necessary

• Get Developers Involved in Design
Conclusion

Key Points

- Inter-Agency Communication Has Been Done!
  - You Don’t Have to be a Trail Blazer
- Benefits of Statewide Consistency
  - Consistent Information Provided to the Public
  - Ease of Compiling Agency Performance Data
- Innovative Relationships with Contractors Can Provide a New Way to do “In-House” Development
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