Performance Management in the Private Sector

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• Private Sector Examples
  – WalMart – Reduced costs through change in shipping method
  – United Airlines – Operational savings by providing pilots with real time weather information
  – Samsung – Reduce manufacturing time and cost by using metrics for each step in cycle
  – Clorox – Developed production planning algorithm based on demand and inventory data to manage inventory and streamline manufacturing process
  – Connected Vehicle Data – New technology with multiple uses
Walmart – Environmental Footprint

– Use logistics analysis to reduce environmental footprint

– Goals
  • 100% renewable energy
  • Zero environmental waste
  • Sustainable products

– Crate/rack system used for shipping milk provided opportunity for savings
  • Evaluation of storage and shipping cost data led to use of crateless containers
  • 9% reduction in volume reduced number of trips translated to $0.20 per gallon cost reduction
United Airlines

• United Airlines
  – August 2011 initiated program to provide all pilots with iPad dedicated to real-time weather and navigation information
  – 1.5 pound device replaced 38 pound flight bags with paper data
  – iPads provide real-time weather data superimposed on flight route
    • 15 minute forecasts
  – Air Traffic Control previously routed planes entirely around adverse weather
    • Pilots able to use data to suggest more direct routes
    • Proactive approach to routing
United Airlines (continued)

- Impacts
  - Reduced maintenance due to weather-related damage
  - Fewer turbulence-related injuries
  - Faster flight times = improved customer service
  - Reduced fuel costs due to shorter flight paths
  - 25 minute time savings translates to 2100 pounds of fuel saved
• Samsung
  – Use of data for operational optimization of silicon wafer production
    • Break into components of cycle time
      – Wafer fabrication
      – Intermediate sorting
      – Assembly
      – Testing
    • Schedules intermediate goods for specific process steps based on process completion time
      – Inventory levels
      – Steps required to move goods to machine
      – Scheduling of machine time – use for multiple steps
• Samsung (continued)
  – Impacts
    • Greater utilization of existing equipment
    • Drop in late production deliveries from 26% to 3%
    • Estimated additional sales of $1 billion in 4 year period
    • 4% increase in market share
Clorox

- Production planning algorithm
  - Optimize inventory levels
  - Ensure on-time delivery
  - Minimize production, shipping and inventory costs
- Used demand data and cycle time data to assure production line was fully supplied
- Reduce production when inventories are high
• Clorox (continued)
  – Impacts
    • Reduce inventory levels by 29%
    • Allow scheduling of production down time
      – Reduced inventory costs
      – Allowed for maintenance scheduling
### Sample Connected Vehicle Applications

<table>
<thead>
<tr>
<th>Safety</th>
<th>Mobility</th>
</tr>
</thead>
<tbody>
<tr>
<td>Electronic Brake Lights</td>
<td>Traveler information</td>
</tr>
<tr>
<td>Traffic Signal Violation Warning</td>
<td>Weather Information</td>
</tr>
<tr>
<td>Stop Sign Violation Warning</td>
<td>Navigation</td>
</tr>
<tr>
<td>Curve Speed Warning</td>
<td>Ramp Metering</td>
</tr>
<tr>
<td>Display Local Signage</td>
<td>Signal Timing Optimization</td>
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<tr>
<td><strong>Electronic Payment</strong></td>
<td>Corridor Management</td>
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<tr>
<td>Tolling</td>
<td><strong>Infrastructure Management</strong></td>
</tr>
<tr>
<td>Parking</td>
<td>Weather Information</td>
</tr>
<tr>
<td><strong>Automotive</strong></td>
<td>Winter Maintenance</td>
</tr>
<tr>
<td>Vehicle Diagnostics</td>
<td>Pothole Detection</td>
</tr>
<tr>
<td>Software Updates</td>
<td>Automated Mapping</td>
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</tbody>
</table>
Data Are Critical (and Potentially Lucrative)

- Data drive connected-vehicle applications and services

<table>
<thead>
<tr>
<th>Entities Interested in Data…</th>
<th>May Create Markets for</th>
</tr>
</thead>
<tbody>
<tr>
<td>DOTs</td>
<td>Probe data, asset management data, road-weather information</td>
</tr>
<tr>
<td>Auto manufacturers</td>
<td>Vehicle diagnostics and prognostics, driver behavior</td>
</tr>
<tr>
<td>OE Suppliers</td>
<td>Component diagnostics and prognostics</td>
</tr>
<tr>
<td>Drivers and passengers</td>
<td>Real-time route guidance, map updates, media downloads, infotainment…</td>
</tr>
<tr>
<td>Marketers and providers of location-based services</td>
<td>Driver behavior, vehicle location</td>
</tr>
<tr>
<td>Insurance industry</td>
<td>Driver behavior</td>
</tr>
</tbody>
</table>
Connected Vehicle Data

Data Challenges & Opportunities

- Data security
- Threats to personal privacy
- Data analytics and aggregation
Connectivity and Communications Concerns

• Privacy
  – Always an issue when information is shared or tracked over a network
  – Solutions seems to be available (cellular phone providers face similar challenges)

• Driver distraction
  – A significant challenge, and both USDOT and the NTSB have been vocal about this (as has AAA and others)
  – Communications are not the only distraction
  – Hands-free technology becoming more common
  – Could the vehicle drive itself?
Conclusions

• Characteristics of success stories
  – Tie measures closely to objectives and make sure they remain linked
  – Use measures that are meaningful, easily understood and few in number
  – Keep improvement efforts focused on specific functions
  – Encourage employees at all levels to have a stake in the process and bring forward ideas for continuous improvement
  – Recognize that when one bottleneck is solved the next one will show itself – keep looking
  – Build and maintain knowledge database over time
Conclusions

• Applicability to WisDOT Functions
  – Linkages between asset management and maintenance data to reduce inventories, reduce maintenance costs and plan life cycle investments
  – Evaluate component stages of incident response to identify opportunities for faster response and more efficient deployment of resources
  – Continuous feedback on work zone delay with tool to adjust both configuration and timing