Vehicle Data Acquisition Through Alternative Technologies

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Chief Operating Officer
EJ Ward Inc.
Not Everything That Counts Can Be Counted

and

Not Everything that can be Counted, Counts

Albert Einstein
Agenda

• Acquire a broad understanding of the fleet technology ecosystem

• Recognize opportunities for leveraging existing systems for data acquisition, reporting and action

• Discuss technology roadmap framework for fleet asset management
Fleet Asset Management has several focus areas and many Processes and Tools...

<table>
<thead>
<tr>
<th>Fleet Asset Management</th>
<th>Key Areas of Focus</th>
<th>Processes</th>
<th>Tools</th>
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</thead>
<tbody>
<tr>
<td></td>
<td>• Performance</td>
<td>• Fuel Management</td>
<td>• ERP</td>
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<tr>
<td></td>
<td>• Optimization</td>
<td>• Route Optimization and Scheduling</td>
<td>• Fleet Management Information Systems</td>
</tr>
<tr>
<td></td>
<td>• Utilization</td>
<td>• Vehicle Acquisition / Disposal</td>
<td>• Fuel Management</td>
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<tr>
<td></td>
<td>• Risk Management</td>
<td>• Depreciation</td>
<td>• AVL and GPS Systems</td>
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<td></td>
<td></td>
<td>• Dispatching</td>
<td>• Business Intelligence Systems</td>
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<td></td>
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<td>• Accident Management</td>
<td>• Enterprise Integration</td>
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<td></td>
<td></td>
<td>• Replacement Planning</td>
<td>• Report Writers</td>
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<td></td>
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<td>• Driver Training</td>
<td>• Document Management</td>
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<tr>
<td></td>
<td></td>
<td>• Procurement</td>
<td>• RFID</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Vehicle Utilization</td>
<td>• HID</td>
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<tr>
<td></td>
<td></td>
<td>• Mileage Capture / Reimbursement</td>
<td>• Etc.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Vehicle Specification / Selection</td>
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</table>
There are several emerging trends for Data Acquisition for Fleet Asset Management

<table>
<thead>
<tr>
<th>Vehicle Data Availability</th>
<th>Today</th>
<th>Future</th>
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<tr>
<td></td>
<td>• Vehicle sensors are available, but access to the data is often</td>
<td>• New models continually provide additional sensors and information</td>
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<tr>
<td></td>
<td>proprietary or difficult to interpret</td>
<td>across vehicle networks</td>
</tr>
<tr>
<td></td>
<td>• Data is non-standardized in Light Duty and in some instances</td>
<td>• Standardization is happening, but the OEM retains protocol</td>
</tr>
<tr>
<td></td>
<td>Heavy Duty Vehicles</td>
<td>to manage internal vehicle network.</td>
</tr>
<tr>
<td></td>
<td>• Discrete sensors readily available in after market</td>
<td></td>
</tr>
<tr>
<td>Wireless Technology</td>
<td>• Private Networks (e.g. Fuel Management Systems)</td>
<td>• Private Network bandwidth and adoption</td>
</tr>
<tr>
<td></td>
<td>• 802.11xx</td>
<td>• WiMax introduction</td>
</tr>
<tr>
<td></td>
<td>• Bluetooth</td>
<td>• Broadband services</td>
</tr>
<tr>
<td></td>
<td>• Cellular</td>
<td>• ASP models</td>
</tr>
<tr>
<td></td>
<td>• RFID</td>
<td></td>
</tr>
<tr>
<td>Telematics</td>
<td>• Internal Vehicle Electronics Integration</td>
<td>• Predictive and Prognostic Maintenance</td>
</tr>
<tr>
<td></td>
<td>• Preventive Maintenance</td>
<td>• Driver Behavior Monitoring</td>
</tr>
<tr>
<td></td>
<td>• Tracking and AVL</td>
<td>• Optimization and Utilization</td>
</tr>
<tr>
<td></td>
<td>• Communications</td>
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Predictive Maintenance

**Input**
- Vehicle Data Availability
- Accuracy
- Reliability
- Predictability
- System Integration

**Output Goals**
- Reduced Maintenance Cost
- Greater vehicle uptime performance
- Reduced Road Calls
- Increased Customer Satisfaction
- Risk Reduction

The Challenge – Identifying, collecting and reporting actionable information for Predictive Maintenance
While conventional time-based or rule-based vehicle maintenance strategies can serve as a starting point...

…It is anticipated that more complete vehicle information can be used to infer more intelligent and cost effective maintenance schedules.
Ward created the first OBD II / J1708 device for vehicle data capture and fueling automation…

Benefits
• Easy to install
• 100% Accurate Odometer Engine Hours
• Fully Automated Fueling = No Manual Entry
• Green Fleet Management

Additional Fleet Data
• Idle Time
• Engine Time
• Fuel Consumed
• Engine Oil Level
• PTO Time
• Diagnostic Trouble Codes
• VIN
• Stop Idle Time
• Max Speed
• + Many others…

Reliable
• Thousands of implementations
• Solid-State design

…and can be used as the data acquisition device for vehicle faults prior to failure
Asset Tracking

Common Features Today

- Tracking
- Reporting
- Idle Reduction
- Risk Mitigation
- Speeding
- After Hour Violations
- Geofence Violations

Enhanced Capabilities

- Driver Metrics and Performance
- Risk Profile Reduction
  - Insurance Premium Optimization
- Route and Schedule Optimization
- Accident Reduction
- Green House Gas Reductions
- Fleet Operating Expense Reduction
- Automated Exception Reporting
- Universal Fuel Management
- Enterprise Information Integration
- Navigation
- Traffic & Weather Info

The Challenge – Identifying, collecting and reporting actionable information for Predictive Maintenance
Fuel Management System for data acquisition...

Common Features Today

• Fuel Access Control
• Multiple Media Authorization
• Fuel Accountability
• Lubricant Accountability
• Employee Validation
• Vehicle Validation
• Odometer/Meter Capture
• Tank Level Interface
• Networking, Modem and Wireless Connectivity

Enhanced Capabilities

• Business Process Enforcement
• Data Acquisition Device for Telematics
• Distributed Network Interface
• Enterprise Information Integration

...Leveraging the Fuel Management System for enhanced capabilities brings a greater ROI to both new and future investments
WARD FLEET ASSET MANAGEMENT SYSTEM

OVERVIEW

1. Passive GPS + CANceiver Data via FCT Modem
2. Passive GPS + CANceiver Data via FCT TCP/IP
3. Real time GPS Download through cellular network

GPS and CANceiver DATA

Tank Level Sensing

In-Ground or Above Ground Tank

Ward FCT

Cell Tower

Internet

WARD AFMS

TCP/IP Connection

Network

Optional (Customer Hosted)

E/W Hosted GPS Application

Ward Track (GPS)

Enterprise Resources

- Fleet Maintenance
- ERP
- GIS System
- Other Applications

SQL or Oracle

SQL
## Passive vs. Real Time Data Acquisition

<table>
<thead>
<tr>
<th>Pros</th>
<th>Passive</th>
<th>Real Time</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>• High Data Bandwidth</td>
<td>• Near real time access to data</td>
</tr>
<tr>
<td></td>
<td>• Increased data elements and frequency</td>
<td>• 2-way communication and exchange</td>
</tr>
<tr>
<td></td>
<td>• Low or No Operating Expenses</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Secure Network</td>
<td></td>
</tr>
<tr>
<td>Cons</td>
<td>• After the fact data delivery</td>
<td>• Annual Operating Expenses can be significant depending on bandwidth</td>
</tr>
<tr>
<td></td>
<td>• No 2-way communication real time</td>
<td>required</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Requires internal staff to monitor activity in real time to achieve returns</td>
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Case Example: 70/30 Passive vs. Active tracking for 1300 vehicle fleet

Real Time vs. Ward Passive GPS

100% Real Time: $1,489,756
70/30 Real Time / Passive: $1,460,018
Annual Savings: $29,738

Implementation:
$100,000
$200,000
$300,000
$400,000
$500,000
$600,000
$700,000
$800,000
$900,000
$1,000,000
$1,100,000
$1,200,000
$1,300,000
$1,400,000
$1,500,000
$1,600,000

Annual Recurring:
$569,560
$228,668
$100,000
Technology Strategic Planning Framework
Strategic Planning Framework

Baseline

Assess Current State
- Develop IT Baseline (Fact base includes costs, key processes, FTEs, infra & app maps, KPIs, org views, etc…)
- Define Targeted IT Strategy Hypotheses (efficiency considerations, IT effectiveness)
- Conduct interview campaign for Business Demand Drivers – shared and by business unit

Vision

Establish a Vision
- Define Vision Statement
- Develop IT Guiding Principles – overarching and by defined areas to address needs of mature and maturing businesses:
  - Applications
  - Infrastructure
  - People
  - Processes
  - Governance

Prioritize

Identify Priority Areas & Conduct Deep Dives
- Compare to Best Practices (processes, service levels, skills, costs, capabilities, etc.)
- Opportunities sizing to improve efficiency & effectiveness in defined areas
- Capability Gap Analysis vs. current state
- Perform Selected Deep Dives (as needed)

Plan

Establish Overall Plan
- Prioritized set of improvement opportunities
- Demand Management
- IT Governance Model
- Action Plan

Activities

Understand & Align with Business Priorities
- IT Strategy Hypotheses and Baseline Discussion
- IT Vision and Preliminary Opportunity Discussion
- Final Recommendations
Opportunities for applications rationalization should be made when evaluating alternative technologies

Benefits of Portfolio Rationalization
- Reduced support & maintenance costs
- Decreased system complexities for both users and IT support staff
- Elimination of redundant and/or obsolete functionality
- Implementation of common, consistent support infrastructure
- Improved span of control and work flexibility

Inventory of Applications

<table>
<thead>
<tr>
<th>Level of Utility</th>
<th>Legacy</th>
<th>Modern</th>
</tr>
</thead>
<tbody>
<tr>
<td>Low</td>
<td>Retire end-of-life</td>
<td>Eliminate Redundant</td>
</tr>
<tr>
<td>High</td>
<td>Renovate Worthwhile</td>
<td>Consider Enhancement</td>
</tr>
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</table>

Portfolio Strategy Inputs
- Retain
- Eliminate Redundant
- Renovate Worthwhile
- Consider Enhancement

<table>
<thead>
<tr>
<th>Business Unit 1</th>
<th>Business Unit 2</th>
<th>Business Unit 3</th>
<th>Business Unit 4</th>
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<tbody>
<tr>
<td>[\text{Business Unit 1}]</td>
<td>[\text{Business Unit 2}]</td>
<td>[\text{Business Unit 3}]</td>
<td>[\text{Business Unit 4}]</td>
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An integrated framework for evaluating technology will assist in defending business case requirements...

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<thead>
<tr>
<th>Criteria</th>
<th>Weight</th>
<th>Definition / Subcategories</th>
<th>Scores</th>
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<tbody>
<tr>
<td>Strategic Importance</td>
<td>40%</td>
<td>- Competitive Edge&lt;br&gt;- Value to customer&lt;br&gt;- Window of Opportunity&lt;br&gt;- Sustainable&lt;br&gt;- Fleet Technology Roadmap</td>
<td>Very Low 80 Points</td>
</tr>
<tr>
<td>Initiative Cost</td>
<td>15%</td>
<td>- Cost of Implementing</td>
<td>Very High &gt;$1M 30 Points</td>
</tr>
<tr>
<td>NPV</td>
<td>15%</td>
<td>- Present value of the net benefits (3-year)</td>
<td>Very Low NPV&lt;3500K 30 Points</td>
</tr>
<tr>
<td>Elapsed Time</td>
<td>10%</td>
<td>- Implementation time period (conception to deployment)</td>
<td>Very Long &gt;16 Months 20 Points</td>
</tr>
<tr>
<td>Interdependencies</td>
<td>10%</td>
<td>- Degree to which the initiative is dependent on other initiatives</td>
<td>Very Interdependent 20 Points</td>
</tr>
<tr>
<td>Risk/Complexity to Implement</td>
<td>10%</td>
<td>- Operational Risk&lt;br&gt;- Technology Risk</td>
<td>Very Large Alpha 20 Points</td>
</tr>
<tr>
<td>Total</td>
<td>100%</td>
<td></td>
<td>Range for Initiative Total Scores: 200 - 1,000 Points</td>
</tr>
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Conclusions

• Emerging Trends for vehicle and asset data continue to increase
• Predictive Maintenance in concert with Preventative Maintenance continue to show promise for future adoption
• Opportunity exists to leverage existing and new technology for enhanced value and ROI
• Fleet Asset Management remains and will continue to drive requirements for technology enhancements
Troy Goldhammer
Chief Operating Officer

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