Shameless Plug

- Articles
- Interesting Topics
- Projects

Scott Smith
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Real Time Data

Friend

Foe
Discuss

I could have e-mailed you my PowerPoint deck, and you could have read it in five minutes.

But I prefer making you sit here for an hour while I read each bullet point in slow motion.

Point number one...

Yank this as hard as you can.

Dilbert (c) Scott Adams

Define
Manage
Use

Real Time Data
OSIsoft Leads the Market in Critical Operations

- 39+ Years
- 140+ Countries
- 21,000 Sites
- 2B Data Streams
- 24/25 of our first customers are still with us

Sample Facility Customers:
- PayPal
- NASA
- University of Maryland
- US Navy
- University of California, Davis
- Massachusetts Institute of Technology
- Harvard University
- eBay
- Eli Lilly
- Toyota
- Purdue University
- Milwaukee Medical Center
Where are you today?

- Do you all have data?

- Have you created a platform or system to allow for two key principal requirements:
  - Collect all mission critical data
  - Separate read access from read-write access (Cybersecurity Architecture)
Not Exactly Like Any Place Else

Fuel Storage/Pipelines

Power Generation

Manufacturing

Thermal Energy

Water/Wastewater

Buildings

Mixed Use

Renewable Energy

Distribution Utility

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What is Airport Real Time Operational Data

- CHP Power Generation
- Renewable Generation
- SCADA/Substations/Distribution
- Steam and Hot Water
- Chilled Water
- Water/Waste Water System
- Energy Monitoring/Metering
- Building Automation (HVAC)
- Fire Control
- Elevators & Escalators
- Emergency Generators/Fuel
- Lighting (Building, Field, Parking)
- Passenger Boarding Bridges
- Baggage Handling
- Fuel Tank Storage
- Gas Compressors/Pumps
- Electric Service Vehicle Charging
- Light Rail
- Lift Pumps, Sump Pumps, Motors, Fans, Occupancy Sensors, VFD, Vibration Sensors Dampers, Flows, Pressures, Temperatures, Voltage, kW, Breakers, Air Quality, weather forecasts, water chemistry, utility data, grid data, outsourced services....
<table>
<thead>
<tr>
<th>What are your needs?</th>
</tr>
</thead>
<tbody>
<tr>
<td>Energy demand growing annually</td>
</tr>
<tr>
<td>Energy Resilience</td>
</tr>
<tr>
<td>Aging Systems</td>
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<tr>
<td>New technology demands</td>
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<tr>
<td>Cybersecurity threats</td>
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<tr>
<td>Fewer resources</td>
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<tr>
<td>Greater need for real-time operational data</td>
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</tbody>
</table>
Historical Balance vs. New Balance

Balancing Availability, Performance against __________* requires a transition to proactive/real-time operations from reactive responses.

- Fill-in the blank
  - Efficiency
  - Reliability
  - Resilience
  - Sustainability.
A Recent Case Study:

NASA recently using IOT real-time collection and analytics and condition-based monitoring capabilities, to prevent system failures, optimize operations and increase the life of their mission critical facilities and assets.

NASA realized substantially improved system reliability with the avoidance of $5.3 million in maintenance costs in from 2015-2018, and have averted all unplanned downtime on monitored assets since 2015.

We created more maintenance requests in the last 6 months than ever before since we did not have access to real time data.

Brandon Herbert, Energy Analyst, NASA Langley Research Center
How?
Connectivity

Directly connects to disparate data sources

- BACnet
- OBIX
- File Loaders/RESTful API
- Tridium
- OPC
- RDBMS
- Modbus
- IEEE 37.118
- Rockwell, Siemens, DeltaV, Schneider, JCI, ALC, IOT
- + Hundreds of others
Secure Access to Operations Data

CRITICAL SYSTEMS

- Distribution SCADA
- Plant DCS
- PLCs
- Environmental Systems
- Other critical operations systems

Limit direct access to critical systems while expanding the value use of information.

Data Infrastructure

Security Perimeter
Store Data/Data Quality

<table>
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<th>TAG</th>
<th>TIME</th>
<th>VALUE</th>
<th>STATUS</th>
</tr>
</thead>
<tbody>
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<td>3/11/2020 5:51:31 PM</td>
<td>125.2871</td>
<td>GOOD</td>
</tr>
</tbody>
</table>
Core Capabilities

- System of Record
- Real-time Processing
- High Volume
- Long History
- Secure
- Configurable

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<thead>
<tr>
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<td>31M Values/Yr</td>
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<tr>
<td>5 Minute Tag</td>
<td>131K Value/Yr</td>
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<td>10.5M Values/Yr</td>
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<tr>
<td>150,000 Tag Campus</td>
<td>959B Values/Yr</td>
</tr>
</tbody>
</table>
Future Data

- Future Data: capability to **store predicted data** and easily **relate it to actual process data**
Analysis

- TAG: P01.BT.PV
- TIME: 3/11/2020 5:51:31 PM
- VALUE: 125.2871
- STATUS: GOOD

Calculated Efficiency: 36.49358%
Maintenance Date: 9/1/2016 11:00:00 PM
Horsepower: 45 hp
Manufacturer: PumpsXStream
Bearing Temperature: 125.2871 °F
Managing Events

Calculated Efficiency < Limit

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Deliver
Integration for Awareness & Intelligence

Operational Intelligence
- Condition-Based Maintenance
- Machine Learning
- Critical Power Readiness
- Continuous Monitoring

OUTCOMES
- Risk Mitigation;
- Efficiency;
- Resilience.

Intelligence is built upon Awareness

Situational Awareness
- BAS Systems
- Maintenance Management
- Critical Power Systems
- Utility Metering Systems
- SCADA Systems
- Lighting Systems
- Diagnostic Systems
- Security, Fire, & Life Safety Systems
- Geospatial Systems

OUTCOMES
- Data Access;
- Real-time Information;
- Operational Insights.
The Future = Data Analytics

- **Business Intelligence**
  - Optimization
    - What’s the best that can happen?
  - Predictive Modeling
    - What will happen next?
  - Forecasting
    - What if these trends continue?
  - Statistical Analysis
    - Why is this happening?
  - Alerts
    - What actions are needed?
  - Query Drill Down
    - Where exactly is the problem?
  - Ad hoc Reports
    - How Many, How Often, Where?
  - Standard Reporting
    - What Happened?

- **Operational Intelligence**

**Complexity of Intelligence**

**Distance from Operations**
Where Do Facilities Find Value?

OPERATIONAL AWARENESS
- Greater real-time awareness from central plant to buildings
- Global centralized monitoring
- Real-time notifications

REPORTING
- Energy Star reporting
- Environmental monitoring
- EUI/PUE
- Governmental reporting

ENERGY MANAGEMENT
- Energy balance
- Monitoring and managing energy use
- Predict energy demand to generation decisions

ASSET PERFORMANCE
- Condition-based maintenance
- Reliability
- Fault detection
- Predictive maintenance
- Efficiency models

CAPACITY PLANNING
- Master plan support
- Real-time space and data center planning support
- Benchmarking & comparison

SUSTAINABILITY
- Measurement & Verification
- Building Modeling
- Benchmarking & comparison
Where are you going?

- How many of you have integrated different control and business systems (for example: BAS, metering, asset management, etc.,) to achieve situational awareness?

- How many you have implemented CBM, predictive maintenance or continuous monitored based commissioning?

- How many have geospatial views of the Steam, Chilled Water and Electrical Distribution to look for potential issues?

- How many have automated data to provide value: alarms, control or dispatch changes or work management from condition-based triggers instead of time-based triggers?
THANK YOU