Leveraging Big Data for Intelligent, Utility Management

Watermatex Conference 2015
Crowne Plaza Surfers Paradise, 16th June, 2015

Presented by Michael Luo, Systems Engineer (Water)
OSIsoft, LLC.
Presentation Outline

• Utility Challenges
• Big Data / Operations Data Management Systems
• Case Studies
• Near Future
• Closing Thoughts
OSIsoft – The PI System

- Founded in 1980
- 20% of revenue invested in R&D
- 65% of Global Fortune 500
- 16,000 sites
Utility Challenges

Managing Costs

Environmental Protection & Compliance

Delivering Reliable Service / Product

Enabling Sustainable Infrastructure

Technology plays a critical role
Technology Megatrends

A new era of opportunity for Cities to innovate & prosper

Mobility

By 2016 smartphones and tablets will put power in the pockets of a billion global citizens.

Social

Millenials will make up 75% of the American workforce by 2025.

Cloud

70% of organisations are either using or investigating cloud computing solutions.

Big data

Digital content will grow to 2.7ZB in 2012, up 48% from 2011, rocketing toward 8ZB by 2015.

Source: Microsoft CityNext 2013
Data & Information Challenges

1. Need a Programmer to Extract / Calculate Data
2. Need to Call I.T. or Someone for Data and Reports.
3. Every New Report Leads to Stress of the Operative Staff
4. Reports Take a Long Time to Run
5. Different and Isolated Reporting Systems
6. Multiple Data Acquisitions
7. Different Security Models
8. Different Time Stamping Rules
9. No Real-time or Granular Data
10. Big Data Silos
Integration Nightmare
One Source of the Truth
Common Infrastructure
Operations Data Management Systems

• More than a Data Historian.
• Spans operations and corporate domains.
• Trans Enterprise – 3rd party data exchange.
• One Source of the Truth.
• Common Set of Tools & Technology.
• Out of the Box.
• No archaic coding or programming.
• Trustworthy and Secure Data.
• Independent of Operations and Business Systems.
• Real-time, Scalable and Fast.
• End users have easily, accessible data.
• Future Data.
CASE STUDIES
## ODMS Time Series Performance

<table>
<thead>
<tr>
<th></th>
<th>Before (RDBMS)</th>
<th>After (COTS Time Series)</th>
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<tbody>
<tr>
<td><strong>Data Storage Size (Gigabytes)</strong></td>
<td></td>
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</tr>
<tr>
<td>Las Vegas Valley Water District</td>
<td>1000</td>
<td>15</td>
</tr>
<tr>
<td>Metro Vancouver</td>
<td>100+</td>
<td>6</td>
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<tr>
<td><strong>Daily Data Loading (minutes)</strong></td>
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<tr>
<td>Las Vegas Valley Water District</td>
<td>150</td>
<td>15</td>
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<tr>
<td>Metro Vancouver</td>
<td>180</td>
<td>Real-time</td>
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<tr>
<td><strong>Report Query (seconds)</strong></td>
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<tr>
<td>Las Vegas Valley Water District</td>
<td>360</td>
<td>20</td>
</tr>
<tr>
<td>Metro Vancouver</td>
<td>10,000+</td>
<td>5</td>
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</table>
Moulton Niguel Saves on Energy

15% or $400,000 Annual Energy Savings
Save $3/person served each year

### Moulton Niguel Water District
Energy Management Report

#### May 2008

<table>
<thead>
<tr>
<th>Facility</th>
<th>Efficiency</th>
<th>Calc Rate</th>
<th>Cost</th>
<th>Tot Flow</th>
<th>Tot Energy</th>
<th>Energy per AF</th>
<th>Run Time</th>
<th>Avg head</th>
<th>Schedule</th>
<th>Est Utility Bill</th>
<th>Act Utility Bill</th>
<th>Bill Date</th>
<th>Bill Days Billed</th>
<th>Billed Pwr</th>
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<td>$121</td>
<td>$128</td>
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<td>32</td>
<td>705</td>
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<td>$308</td>
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<td>75</td>
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<td><strong>Total (Average)</strong></td>
<td><strong>46%</strong></td>
<td><strong>$54.63</strong></td>
<td><strong>1879</strong></td>
<td><strong>842,591</strong></td>
<td><strong>592</strong></td>
<td><strong>97</strong></td>
<td><strong>911,725</strong></td>
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<td><strong>419,530</strong></td>
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<td><strong>419,530</strong></td>
<td><strong>$0.01035</strong></td>
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</table>

**MNWD Key Energy Indicators**

<table>
<thead>
<tr>
<th>Efficiency</th>
<th>Calc Rate</th>
<th>Cost</th>
<th>Tot Flow</th>
<th>Tot Energy</th>
<th>Energy per AF</th>
<th>Run Time</th>
<th>Sys Head</th>
<th>Est Using Bill</th>
<th>Act Using Bill</th>
<th>Bill Inc/Dor</th>
<th>Billed Per Bill Rate</th>
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<tbody>
<tr>
<td>Dec</td>
<td>55</td>
<td>$47.07</td>
<td>822</td>
<td>$342,463</td>
<td>416</td>
<td>97</td>
<td>3%</td>
<td>$38,696</td>
<td>$43,423</td>
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<tr>
<td>Jan</td>
<td>53</td>
<td>$45.37</td>
<td>848</td>
<td>$362,033</td>
<td>427</td>
<td>98</td>
<td>-3%</td>
<td>$38,465</td>
<td>$43,238</td>
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<tr>
<td>Feb</td>
<td>50</td>
<td>$46.18</td>
<td>744</td>
<td>$317,760</td>
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<td>89</td>
<td>-12%</td>
<td>$34,343</td>
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<td>$0.01014</td>
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<td>Mar</td>
<td>56</td>
<td>$44.85</td>
<td>1574</td>
<td>$816,860</td>
<td>433</td>
<td>102</td>
<td>14%</td>
<td>$70,607</td>
<td>$72,990</td>
<td>767,675</td>
<td>$0.00591</td>
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<tr>
<td>Apr</td>
<td>53</td>
<td>$44.10</td>
<td>1847</td>
<td>$825,628</td>
<td>447</td>
<td>99</td>
<td>17%</td>
<td>$81,451</td>
<td>$78,292</td>
<td>848,073</td>
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<td>May</td>
<td>46</td>
<td>$54.63</td>
<td>1879</td>
<td>$842,591</td>
<td>592</td>
<td>97</td>
<td>-3%</td>
<td>$91,725</td>
<td>$84,851</td>
<td>914,141</td>
<td>$0.00228</td>
</tr>
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</table>
Veolia’s Unified Control Center

- ODMS allows us to have a SCADA combining our three territories of production and distribution
- ODMS met the data sources from water supplies, network, customer service, data context for the implementation of the unified services
- Data is collected real-time data (2'30 / 5/10/15/60 minutes depending on equipment).

A single control center for three territories

A unique vision for an efficient control

For safety of the water supply

Creating interactive screens for real-time monitoring
Operational Intelligence: Space & Time
Operational Intelligence: Space & Time
Current - Benefits

- Data instantly available, One version of the truth
  4500 hrs, freed up for other business processes
- Higher data quality, Detect problems in the network faster
- 3000 hrs, not needed for corrections of reports
- Data infrastructure for future projects priceless......😊
Water Loss Calculator

- Quickly account for NRW
- Validate Back-charges
THE NEAR FUTURE
Reading Meters Manually

The reader would stand on the back of a truck and look over the fence to read the meters.
Real-time Consumption Management

“Sustainability, both sides of the meter.” Carl Yates, GM of Halifax Water

Real time water consumption dashboards for largest consumers

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In the Future – Connect Everything

- Corporate Site
- Smart Devices
- Foreign Systems
- Production Sites
- Market Place
- Business Systems
- Partners
Thank You!

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