How Software adds Intelligence to Smart Grids

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Agenda

- Introduction
- Essential Characteristics of a Smart Grid: The Three Is
- Turning Data into Information
- Examples of Smart Grid Solutions
- Smart Grid example
- Summary
Essential Characteristics of a Smart Grid
Essential Characteristics: The Three Is

**Intelligence**
- Unlocking wealth of new data along with existing knowledge to drive actions and automation, i.e. transformation of raw data into information
- Data from all sources combined with KPIs, algorithms, in-house expertise

**Integration**
- Optimize entire electrical value chain in a responsive and responsible manner.
- Convergence of IT and OT
- Integration of data from existing automated systems

**Innovation**
- Required to overcome seemingly insurmountable challenges.
- Incorporate new technology as it becomes available in an agile manner and recognize possibilities as additional knowledge is gained from current implementations
A Smart Grid Challenge
Turning Data into Information

- Utilities experience an overflow of data from various sources
- Data is collected, stored and processed, but in silos
- Information remains hidden and not made visible
Smart Grids are dynamic and rich in information
Sources and Formats of Asset Data today

Interpretation of data reliant on human experts for manual review and trend identification

- Time/usage based
- Equipment sensor alarms
- Without sensors some tests are infrequent and labour intensive
- Data both structured and unstructured
- Inspections using a mix of paper based records, spread sheets or mobile devices
- Industrial Enterprise systems
Examples of Smart Grid Solutions

- Asset Health
- Outage Lifecycle Management
- (Distribution System Optimization)
Asset Health - Challenge & Opportunity

- Aging Infrastructure
- Aging workforce
- High reliability expectations
- Reliability and availability standards
- Increasing fleet of assets
- Flat O&M budgets
State of the Industry

Ageing Assets

Example of a transformer fleet at a leading large utility in the USA:
- 30% at least 50 years old
- 20% at least 60 years old

Higher ROI

Typical manufacturer lifetime indicated 40 years.

How to reduce risk but get longer life?
Catastrophic failure of a large transformer can costs 3-10 times the cost of the unit.

Other consequences:
- Work crew safety
- Outages
- Company reputation
- Overall system reliability
Sources and Formats of Asset Data today

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Enter Asset Health Centre

Operational Technology + Information Technology

Loads
Planning
Inspections
Equipment sensors

Not just alerts when nearing failure:

- *Proactively* to anticipate issues
- *Automate actions* to reduce risk
Asset Health Centre Value

AHC provides a complete asset management picture:

- Codify expertise of staff and optimize O&M spend
- Predictive insights prioritize response to reduce risk of failure
- Build business case for repair/replace decisions
Asset Health Centre

- Reduce risk of critical asset failure
- Deploy capital most effectively
- Optimize O&M spend where it is most needed

Collect comprehensive asset data

Optimize O&M spend and asset replacement

Asset Health Centre

Predict and prioritize response and resources

Identify trends using industry models
Typical Asset Health Centre Dashboard

**Asset Health Center**

*(EXECUTIVE SUMMARY)*

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Typical Asset Health Centre Screens
Outage Management - Challenge & Opportunity

- Customers expect and demand a reliable service
- Aging Infrastructure
- Pressure from customers, regulators, watchdog bodies
- Flat O&M budgets
- Information challenges
Outage Management Lifecycle

- Outage playback simulation
- Damage prediction
- Resource planning

- Pre-event communications
- Resource identification
- Resource staging

- Compliance reporting
- Incident closeout
- Resource report

- Communications
- Fault location, isolation and restoral
- Crew coordination
# Outage Reduction Solution

## Ongoing Preparation
- BI Storm Management/ Prediction Scenarios
- Storm Playback and Operator Training Simulator
- Annual Stress Testing

## Pre-event Planning
- BI Web clients for decentralized Centres
- OMS/DMS web and thin clients for decentralized Centres
- BI Storm Management Damage Prediction

## Restoration
- Field Devices
- AMI Interface
- Outage Notifications Via Texts and Web
- Integrated SCADA/OMS/DMS
- Damage Assessment Desk
- Resource Scheduling / Optimization
  - Damage Assessment
  - Restoration
- Outage Restoration
- Mobile Damage Assessment

## Close-out
- BI Reports And Storm Analysis
- Outage Incident Completion

### Network Manager (DMS/OMS)
- BI Storm Management/ Prediction Scenarios
- Storm Playback and Operator Training Simulator
- Annual Stress Testing

### FocalPoint (BI)
- BI Web clients for centralized Centres
- OMS/DMS web and thin clients for centralized Centres
- BI Storm Management Damage Prediction

### Service Suite Mobile Workforce Management (MWFM)
- Configuration of Damage Assessment Forms
- Identification of Resources
- Activation of Resources
- Outage Restoration

### Communications / Awareness
- Customer registration for e-mail / text alerts
- Centralized External Contact List
- Configure dashboard to track storm materials inventory

### Pre-Event Communications
- Pre-Event Communications
- External Communications and Portals
- Internal Communications and Dashboards

### BI Reports To Regulators
- Work Performed and Inventory Used
Intelligent Outage Management
OMS vs SCADA/DMS

Typical SCADA View

Typical OMS View
Utility Smart Grid Example
Optimized grid operation with forecasts
Scenario – Optimized grid operation with forecasts

- Create pro-active functions
How it works – Flowchart

1. Weather Data (Historical & Forecast)
2. Load and Generation Forecast
3. Network Topology and Simulation
4. Predicted Events and Corrective Suggestions
Summary
How intelligent software systems can make your smart grid even smarter

- Asset Health – turn data into actionable information

- Outage Lifecycle Management – Take control of outages and enhance network reliability and customer engagement
Beyond Smart Global Roadshows Kick Off
Accelerating Demand and Increasing Pipeline

In September, we launched our 10-city global roadshow **BEYOND SMART – reinventing energy in an empowered world.** We are partnering closely with ABB to bring decision-maker level customers and prospects together with our global executives and subject matter experts.

**EVENT AGENDA:**
- International energy think-tank VaasaETT unveils the Smart Grid Global Impact Report – the first ever comprehensive research outlining how utilities around the world are achieving better ROI from their smart grid projects
- Jeff Ray, Andy Bane, Daryl Rolley and Chris Warrington share the Ventyx vision for a collaborative, responsive, highly efficient energy model that unlocks human potential.
- Rick Nicholson, Clinton Davis, Gary Rackliffe and Randy Schreiber discuss how information technology (IT) and integration of operational technology (OT) can uniquely empower utilities to make more informed decisions across the grid.
- Customers such as Duke Energy, AEP and Transgrid share industry trends and challenges and how they are transforming data into actionable insights on the health of their assets.

**UP NEXT:**
- October 15 - Amsterdam
- October 17 - Moscow
- November 5 - Johannesburg
- November 7 - Cape Town
- November 8 – on-demand version with Smart Grid Global Impact Report
Thank you!

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