QUALITROL®

AUTOMATION OVERVIEW AND CONCEPTS IN POWER GENERATION, TRANSMISSION AND DISTRIBUTION

Overview North America

THE SITUATION

Americas Electrical Utility Industry

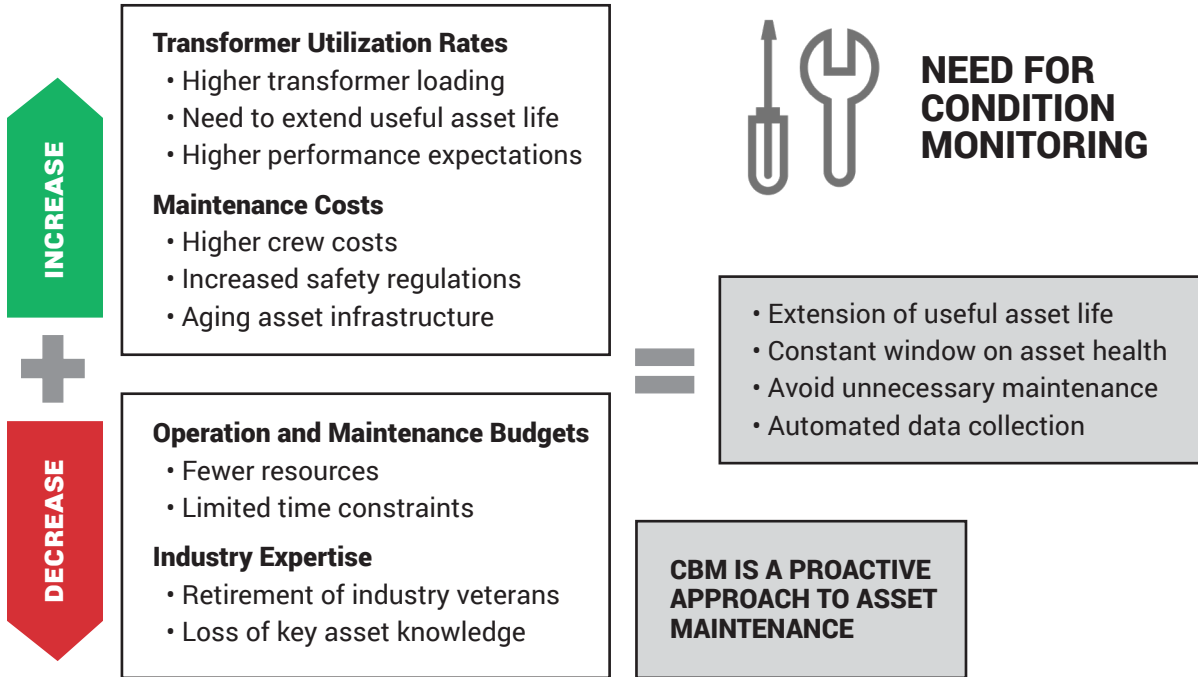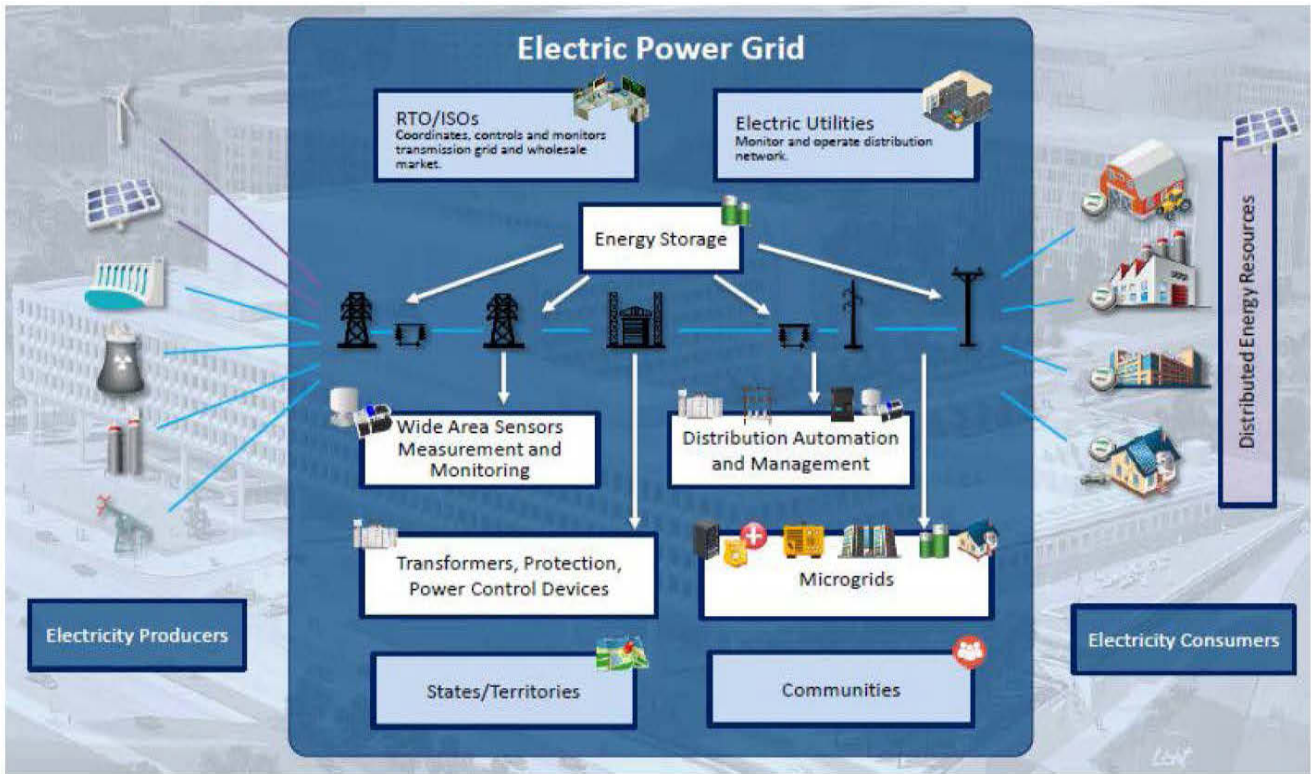|			
AGING AND INADEQUATE T&D INFRASTRUCTURE	**INCREASING DEMAND FOR OUTSOURCED SERVICE PROVIDERS**	**REGULATORY TAILWINDS**	**INCREASING DEMAND FOR RELIABLE POWER DELIVERY**
FOCUS ON RENEWABLE ENERGY PRODUCTION	**SHIFT FROM COAL TO NATURAL GAS GENERATION**	**PROLIFERATION OF NORTH AMERICAN OIL AND GAS PRODUCTION**	

CURRENT INDUSTRY TRENDS

INCREASE

Transformer Utilization Rates
- Higher transformer loading
- Need to extend useful asset life
- Higher performance expectations

Maintenance Costs
- Higher crew costs
- Increased safety regulations
- Aging asset infrastructure

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DECREASE

Operation and Maintenance Budgets
- Fewer resources
- Limited time constraints

Industry Expertise
- Retirement of industry veterans
- Loss of key asset knowledge

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NEED FOR CONDITION MONITORING

- Extension of useful asset life
- Constant window on asset health
- Avoid unnecessary maintenance
- Automated data collection

CBM IS A PROACTIVE APPROACH TO ASSET MAINTENANCE

UTILITY TRANSMISSION STRUCTURE

The challenge of integrating DER

UTILITY TRANSMISSION STRUCTURE

Integrated Technical Trust

| TECHNOLOGY INNOVATION		
	DESIGN AND PLANNING	create grid planning tools that integrate transmission and distribution system dynamics over a variety of time and spatial scales
	SYSTEM OPERATIONS, POWER FLOW AND CONTROL	design and test technologies that enhance/enable the capability to control and coordinate millions of assets for grid operations through EMS/DMS
	SENSING AND MEASUREMENTS	explore integrating advanced sensors, communications, visualization and analytics to enable 100% observability
	DEVICES AND INTEGRATED SYSTEMS	evaluate and develop new devices and components for improved reliability/resilience
	SECURITY AND RESILIENCE	develop resilient and advanced security (cyber and physical) solutions and real-time incident response capabilities for emerging technologies and systems
	INSTITUTIONAL SUPPORT	enable regulators and utility/grid operators to make more informed decisions and reduce risks on key issues that influence the future electric grid/power sector

THE SITUATION

Advanced components

| MARKET & SYSTEM IMPACT ANALYSIS	• understand system impacts of new technologies and functions • techno-economic analysis for cost/benefits of advances
COMPONENT DESIGN & DEVELOPMENT	• design and prototype components with enhanced features/functions • field validators to demonstrate and evaluate new capabilities
MONITORING, MODELING & TESTING	• develop embedded sensors and intelligence to improve reliability • testing and model validation to understand limits and performance
APPLIED MATERIALS R&D	• evaluate and develop new materials and devices that underpin advanced components

DIGITAL SUBSTATION
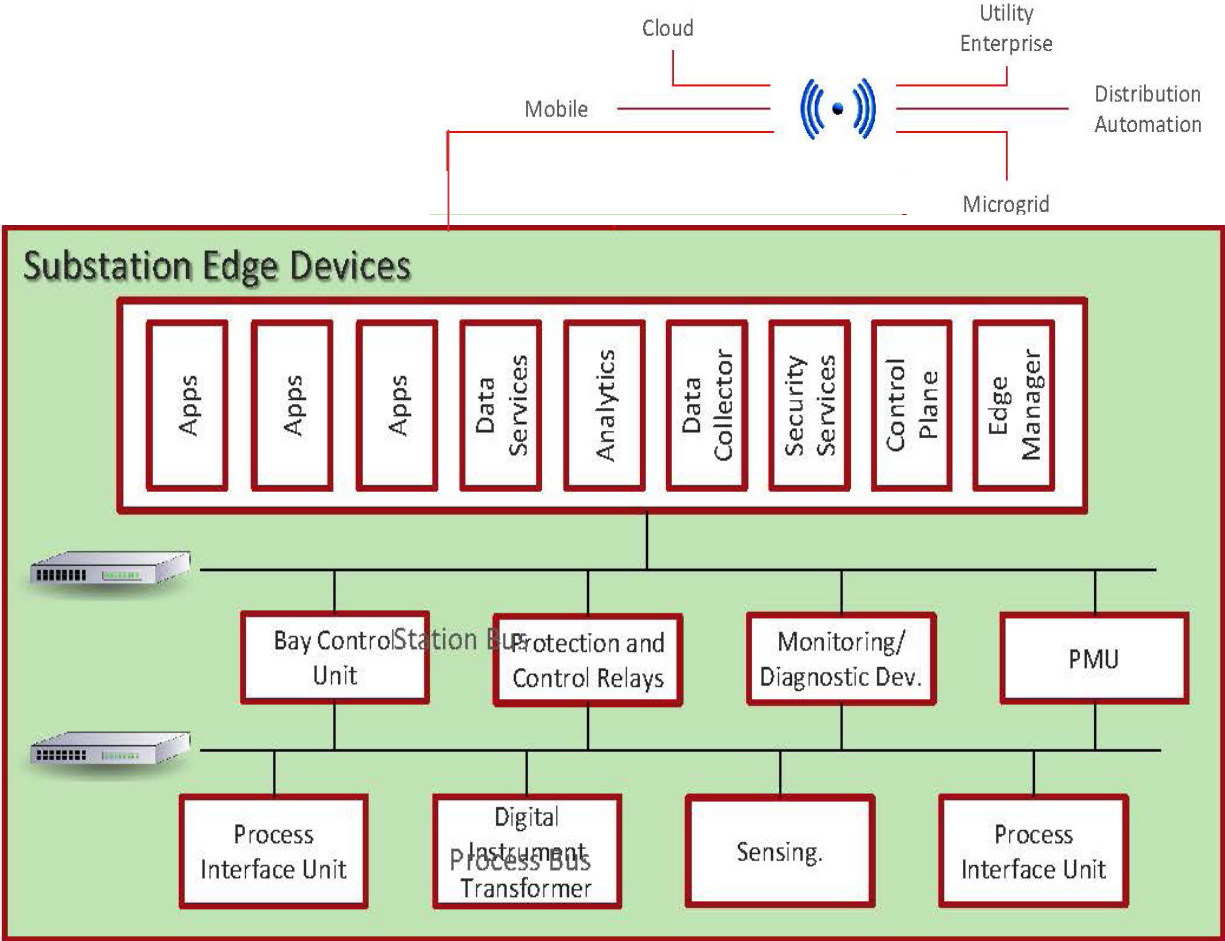
ASSET MANAGEMENT

Intelligent Asset strategy

• Evaluating risk of operating the asset
• Optimize maintenance strategy
• Dynamic evolution of strategy and analytics
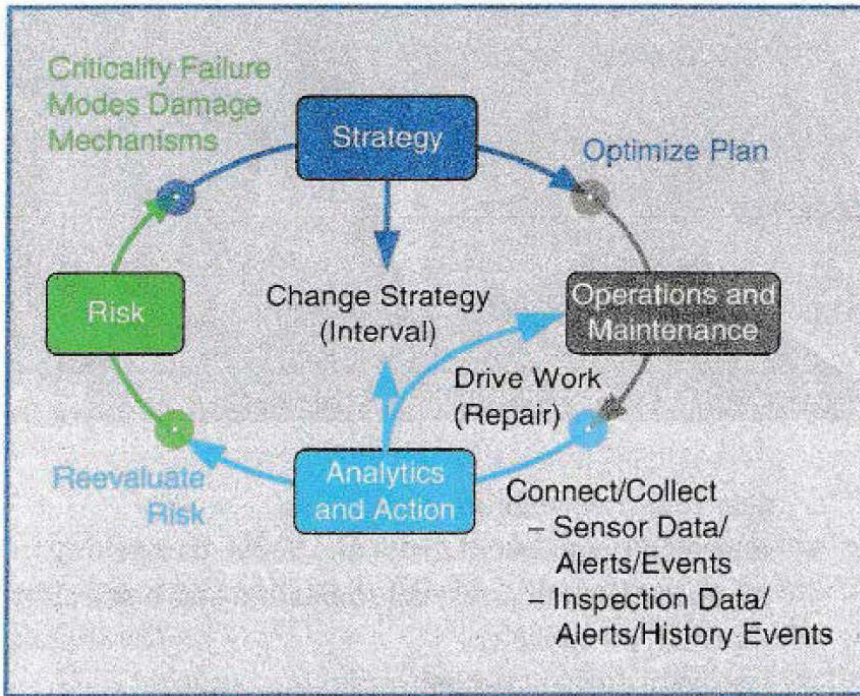
STANDARD PROTOCOLS

Supports Industry Standard Protocols & Integration Interfaces

SYSTEM INTEGRATION

- Standard Integration Interfaces –JSON, XML, CIM, CSV, PQDIF, COMTRADE
- Database Integration –ODBC, ORACLE, Sybase, SQL Server

OFFLINE TESTING INTEGRATION

- File integration Interface
- Manual entry of testing results

ONLINE MONITORING (IED) INTEGRATION

- Standard Integration Protocols –IEC61850, Modbus, DNP3.0, IEC60870-104
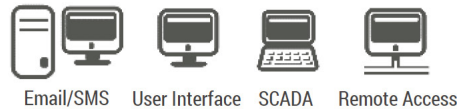- Custom Integration –Proprietary Protocols

DASHBOARDS
- Top 10 Critical Assets (Risk Index)
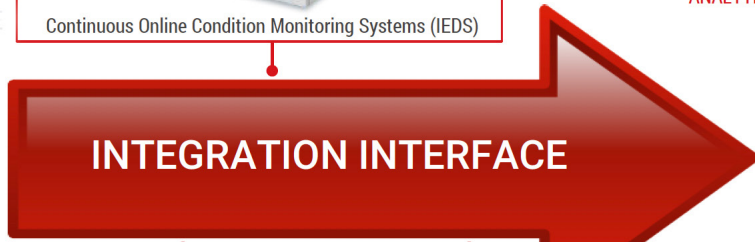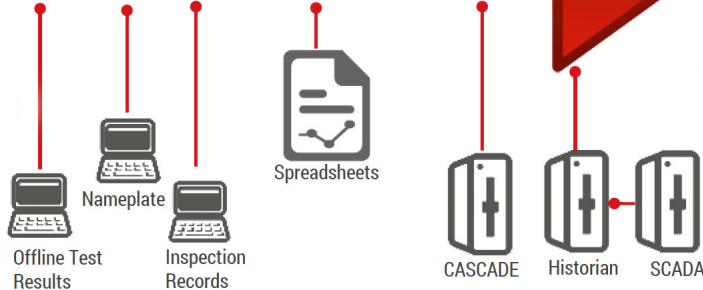- Top Critical Substations

ASSET MANAGEMENT SYSTEM

PRESENTATION LAYER

Email/SMS   User Interface   SCADA   Remote Access

ANALYTICS & REPORTING

Customer Specific Analysis Model

Enterprise Asset assessment

IEDS

Continuous Online Condition Monitoring Systems (IEDS)

INTEGRATION INTERFACE

Offline Test Results

Nameplate

Inspection Records

Spreadsheets

CASCADE   Historian   SCADA
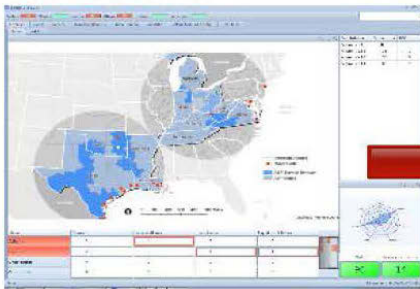
DATA LAYER

Database

AUTOMATED
- Asset Health Index List

USER INTERFACE

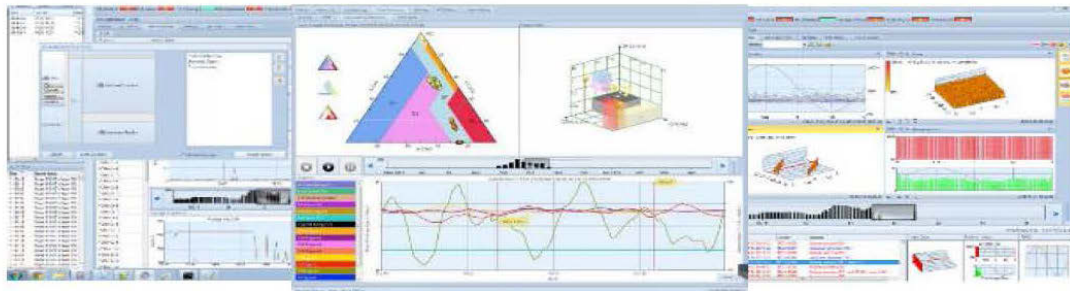Intuitive UI

QUICK FAULT IDENTIFICATION IN NETWORK

Country wide view: Showing all substations

Station level view: Line diagram showing assets

Asset Level View

Component level view: Showing all displays, data trends and other analysis for each parameter

TOP END ANALYTICS

Diagnosis vs. Analytics Models

RAW DATA	DIAGNOSIS	ANALYTICS

- Raw value from basic sensors
- Temperature Current, Pressure, etc
- Requires high level of expertise

- Diagnostic data from advanced sensors
- Duval Triangle, PD type and location, etc
- Requires some level of expertise

- Asset Health Index Models
- Fault identification diagnostic analytics
- Criticality Index Models
- Risk Index Models
- System-driven

WHY DOES THIS MATTER?

1. Current status is very manual when collecting data, indexing calculations and planning

2. Asset Health Index Models are widely used

      a. Asset Investment Planning (Long vs. Short Term)
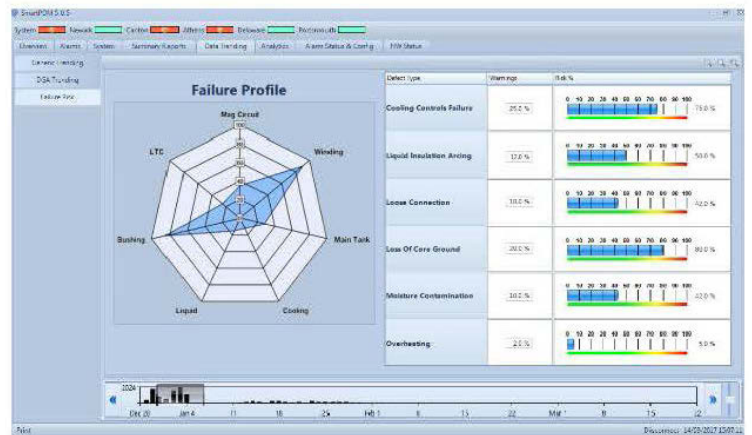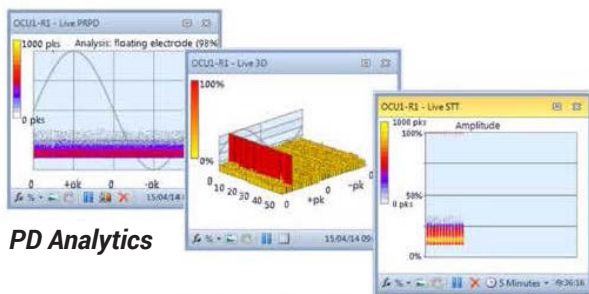
   b. Maintenance Planning (Long vs. Short Term)

ASSET RISK APPROACH

Machine; Deep Learning & Expert System Based Diagnostics

Benefits

- Pattern Analysis
- Automated Model Building
- Focus on Data Cleaning and Quality
- Expert System Based on Industry Standards & > 100 Years Asset Experience
- Co-relative Analysis Among Different Parameters and Assets

PD Analytics

Qualitrol Transformer Risk Diagnostics
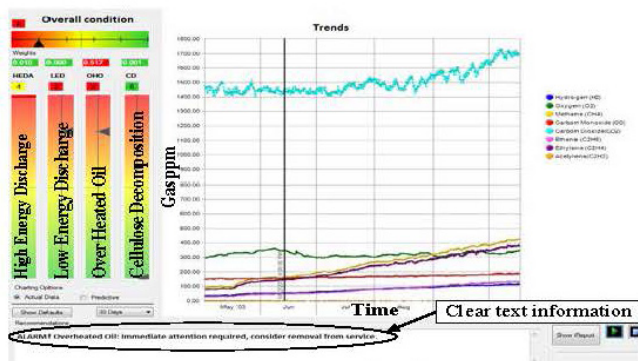
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Michael Pesin; Driving Grid Resilience; US Department of Energy, Office of Electricity -Advanced Grid R&D; 9. July 2018

QUALITROL®
Defining Reliability

FOR MORE INFORMATION ON
PRODUCTS AND SOLUTIONS

Contact us **info@qualitrolcorp.com**