

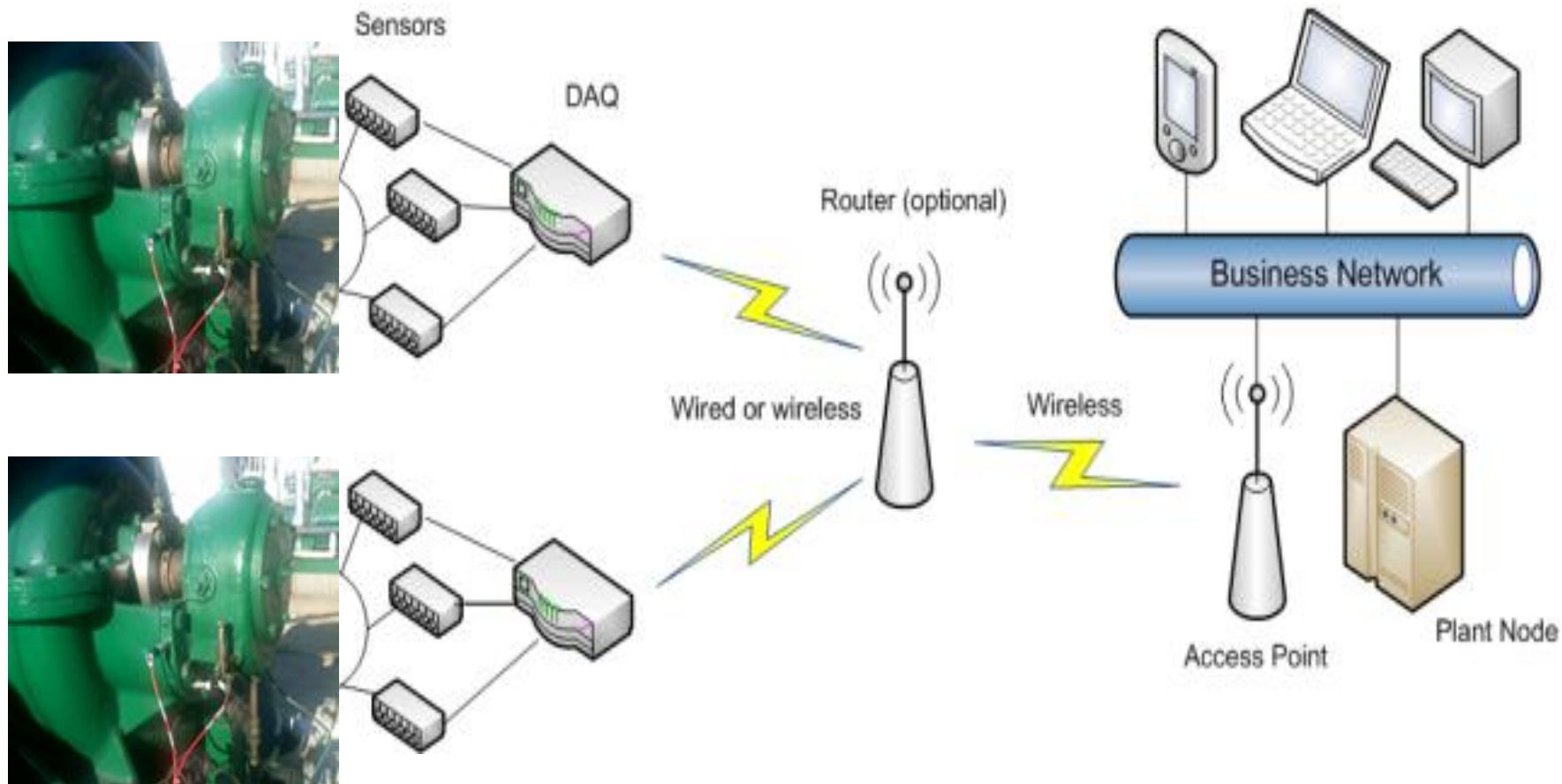


# Big Analog Data™ Challenge

Preston Johnson

Global Program Manager, Asset Monitoring Systems

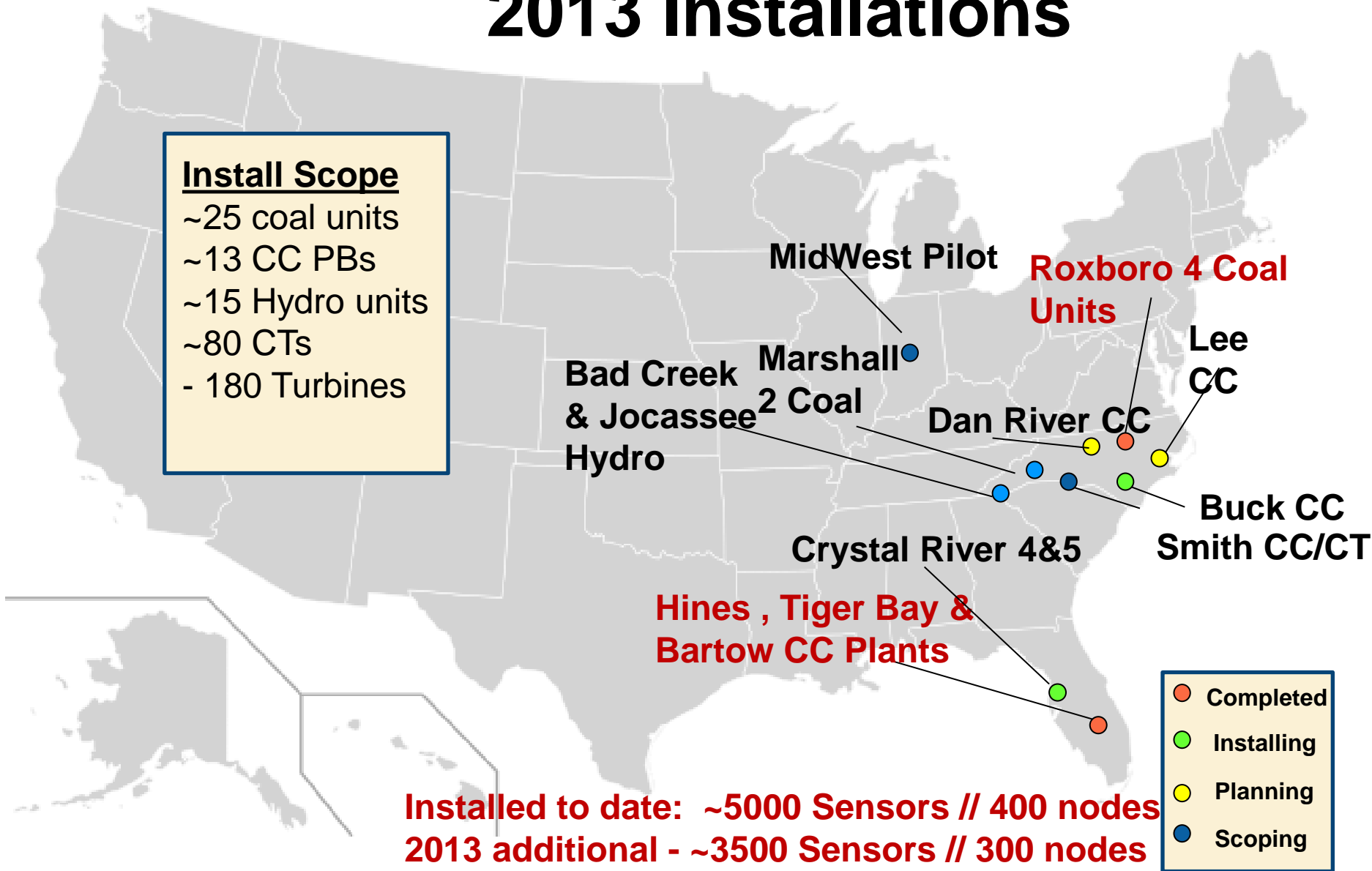
# Case Study, Power Generation: Smart Monitoring and Diagnostics



# 2013 Installations

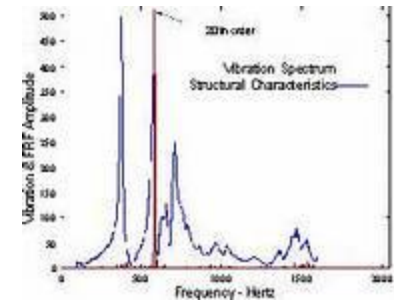
## Install Scope

~25 coal units  
~13 CC PBs  
~15 Hydro units  
~80 CTs  
- 180 Turbines



# Sensor Technologies

- Vibration Monitoring
- Temperature
- Electromagnetic Interference (EMI)
- Motor Diagnostics
- Ultrasonic
- Thermography
- Visual Cameras
- Additional sensors for performance monitoring (press, flow, etc)
- Primary IO system
  - National Instruments (CRIO) & Condition Monitoring Software



# Big Analog Data™ 3-Tier Solution

Acquire

Data Flow:

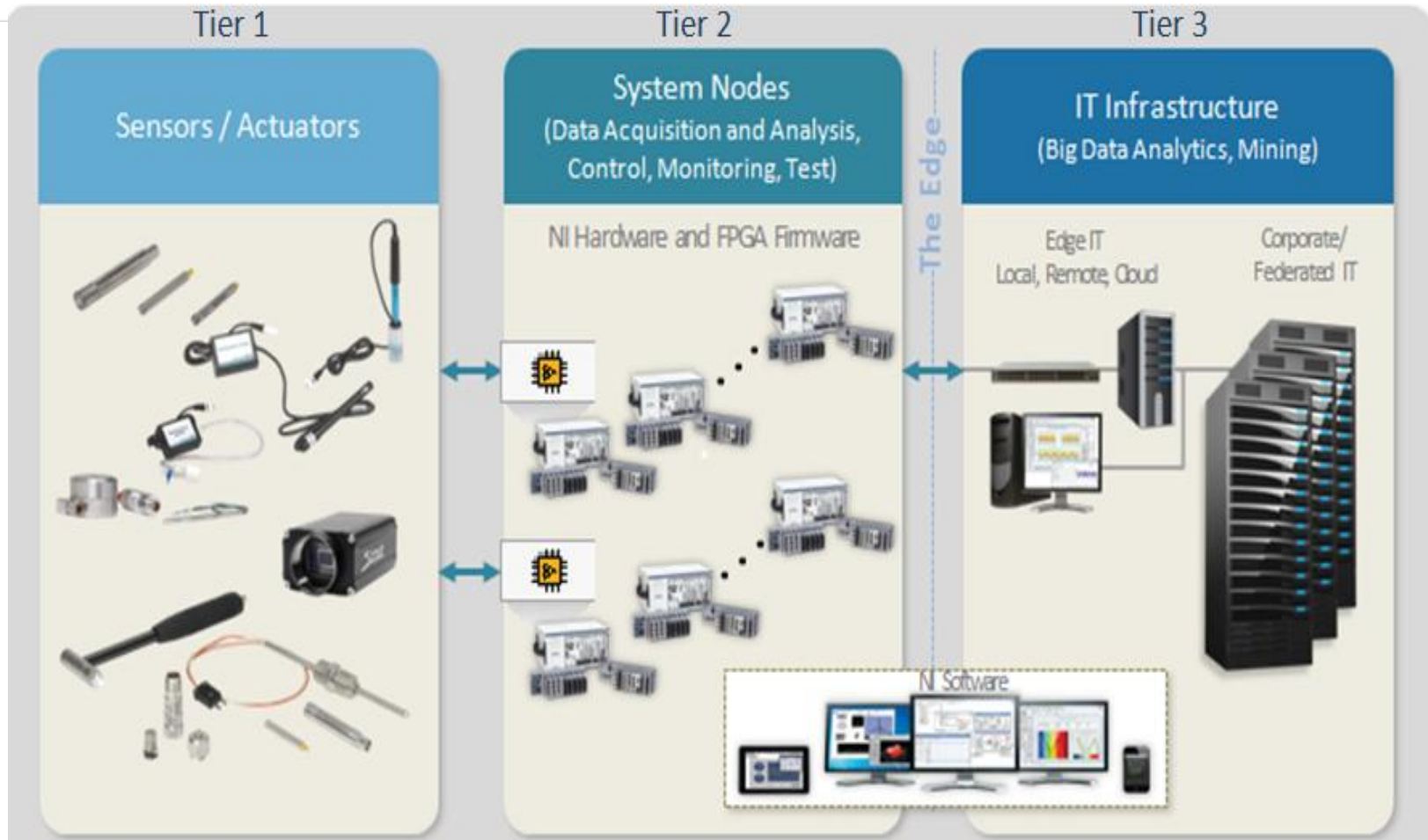
Real-Time

In Motion

Early Life

At Rest

Archive



# Big Analog Data™ Value Extraction (Asset Monitoring)



**Analyze:**

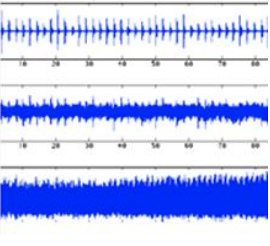
Analytics To decide Whether to Record

Complete Set of Condition Indicators

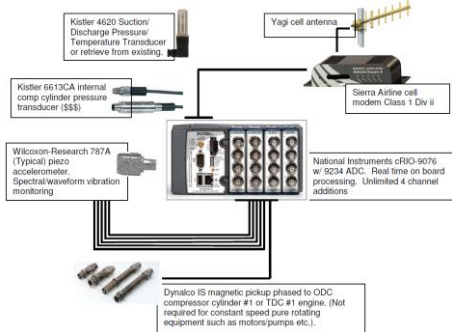
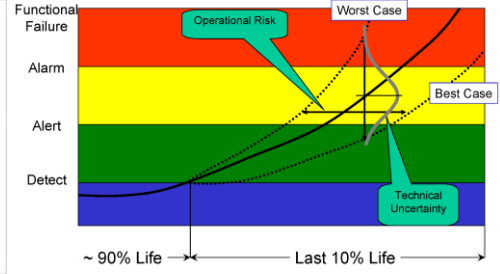
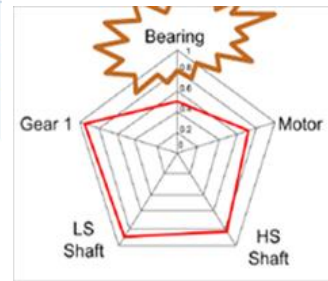
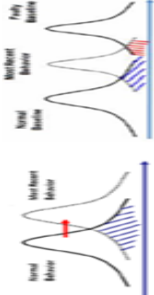
Operational Condition / Mode Segmentation

Comparative Analytics Fault Patterns Predictions

Regulatory Research



COMPONENT	FAULT TYPE	ANALYSIS
GEARBOX	<ul style="list-style-type: none"> <li>Bearing Faults</li> <li>Gear Abrasion</li> <li>Gear Eccentricity</li> <li>Axle Misalignment</li> </ul>	<ul style="list-style-type: none"> <li>ANN, BPM</li> <li>STFT / FFT / Escalator</li> <li>Fuzzy Logic + PMP</li> <li>Wavelet Analysis</li> </ul>
GENERATOR	<ul style="list-style-type: none"> <li>Stator Faults</li> <li>Rotor Misalignment</li> <li>Bearing Faults</li> <li>Shorted Winding Coil</li> <li>Short Circuit</li> </ul>	<ul style="list-style-type: none"> <li>Time Domain Analysis</li> <li>Wavelet + FFT</li> <li>Radial Barkley</li> <li>Time Series Tech.</li> </ul>
ROTOR	<ul style="list-style-type: none"> <li>Rotor Unbalance</li> <li>Bearing Faults</li> <li>Mass Imbalance</li> <li>Asymmetrical Asymmetries</li> <li>Surface Roughness</li> </ul>	<ul style="list-style-type: none"> <li>Time Domain Analysis</li> <li>Fuzzy Logic</li> <li>Spectral Analysis</li> <li>Order Analysis</li> </ul>
ELECTRONICS	<ul style="list-style-type: none"> <li>Overload</li> <li>Thermo-mechanical Fatigue</li> </ul>	



Field Surveillance



Plant Node Computer



Plant Node Computer



IT Servers



IT Servers