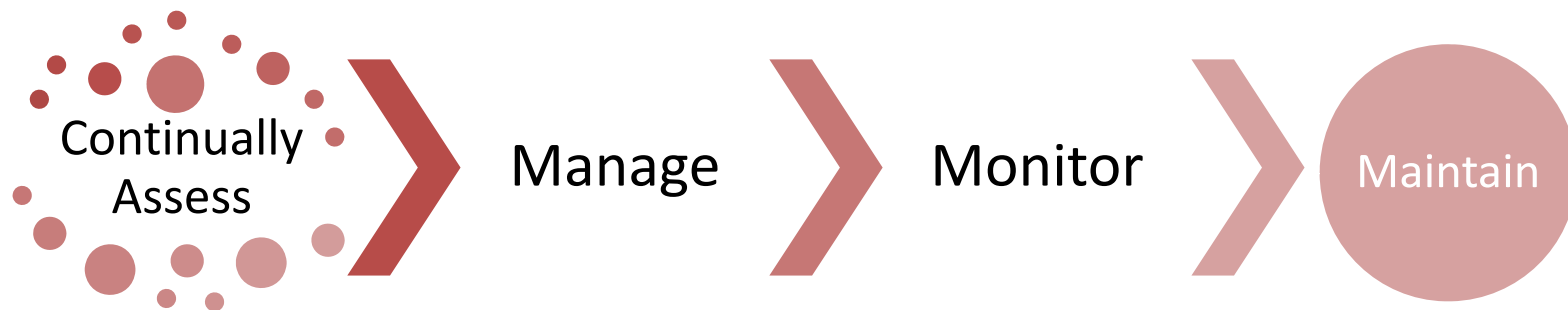
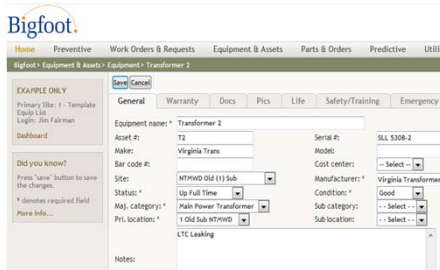


# Asset Management for the Smart Grid

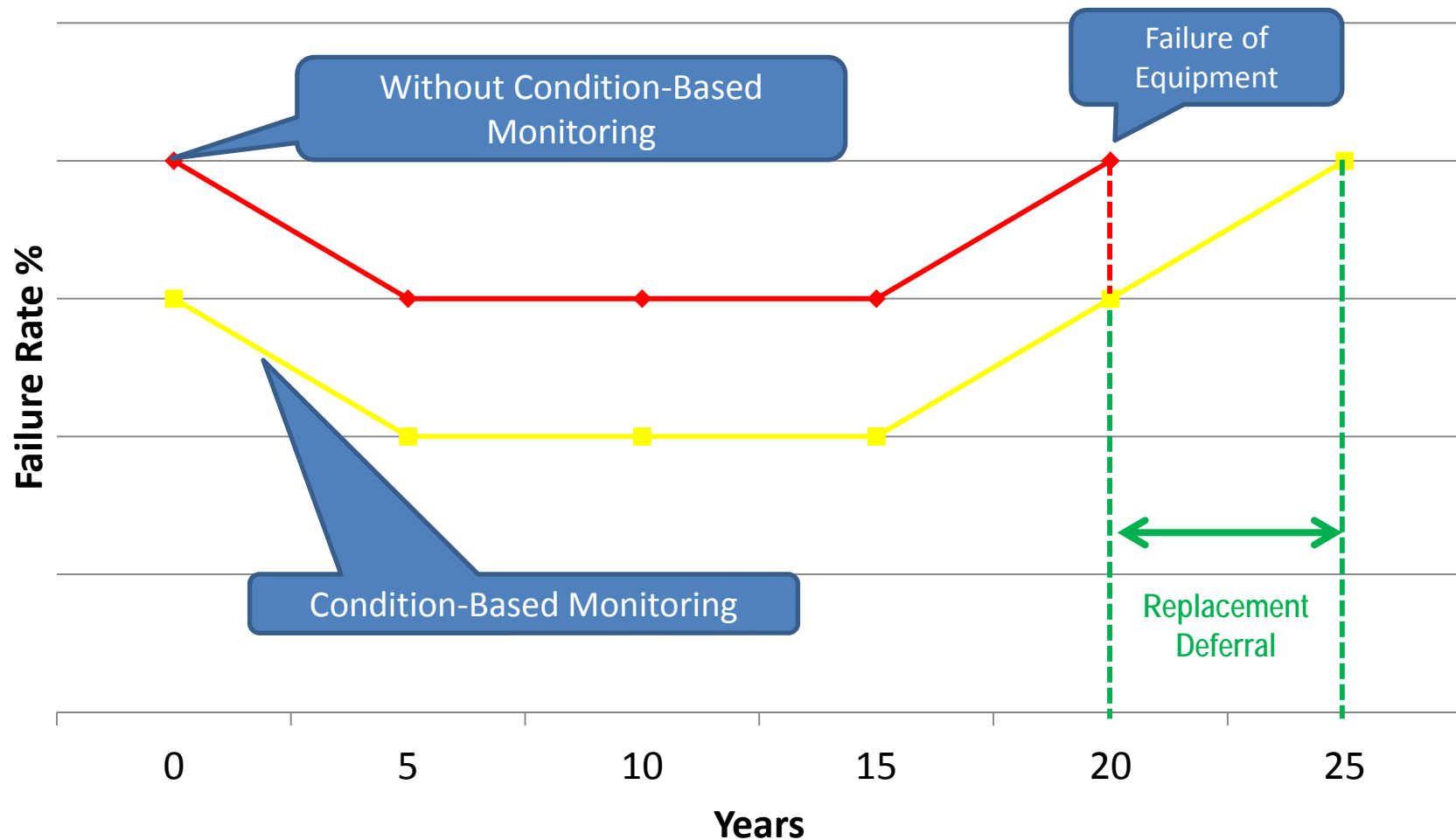
Ernst Camm

Manager, Consulting & Analytical Services  
S&C Electric Company

# Asset Management Defined

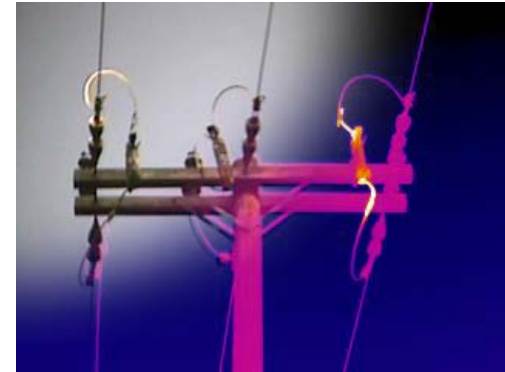


# Condition-Based Monitoring



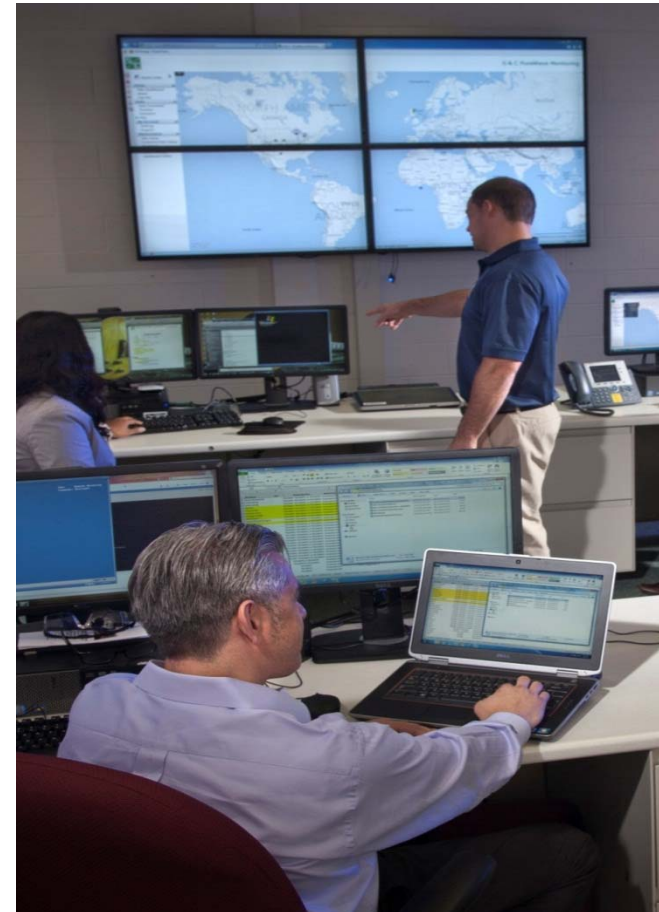
# Routine Maintenance Activities

- NETA Testing
- Visual Inspections
- Maintenance and Cleaning
  - CO<sub>2</sub> Cleaning Services
- Infrared Testing
- Ultra-sound Testing
- Preventative Maintenance
- Emergency Response (Reactive Maintenance)



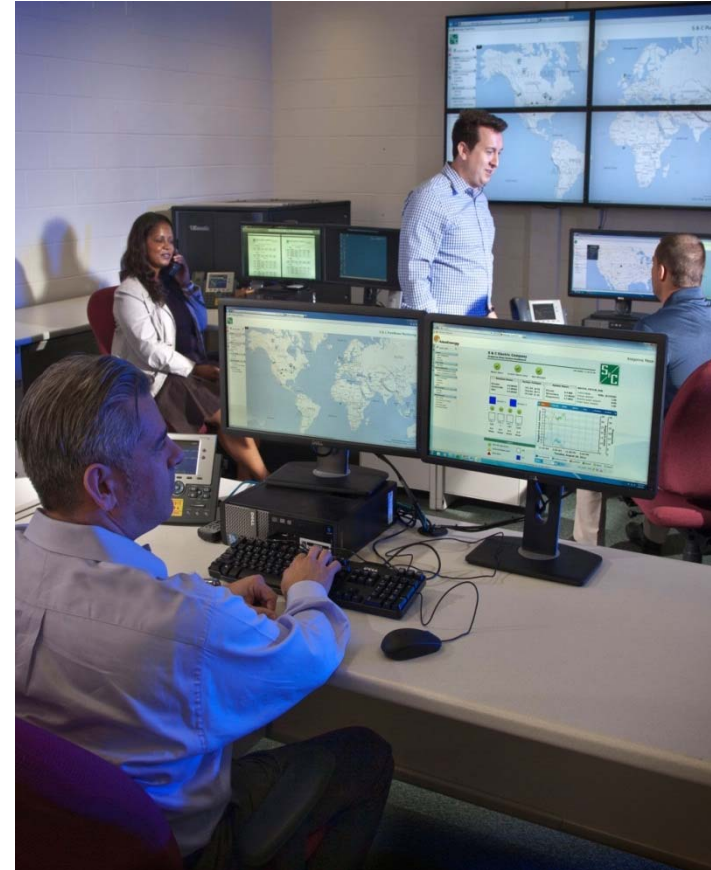
# Condition-Based Monitoring

- Real-Time Dissolved Gas Analysis (DGA)
- Temperature Alarms
- HV Bushings (leakage current)
- Monitor Breaker Positions
- Inverter Alarms
- Gas Pressure
- System Availability
- Run Cycles

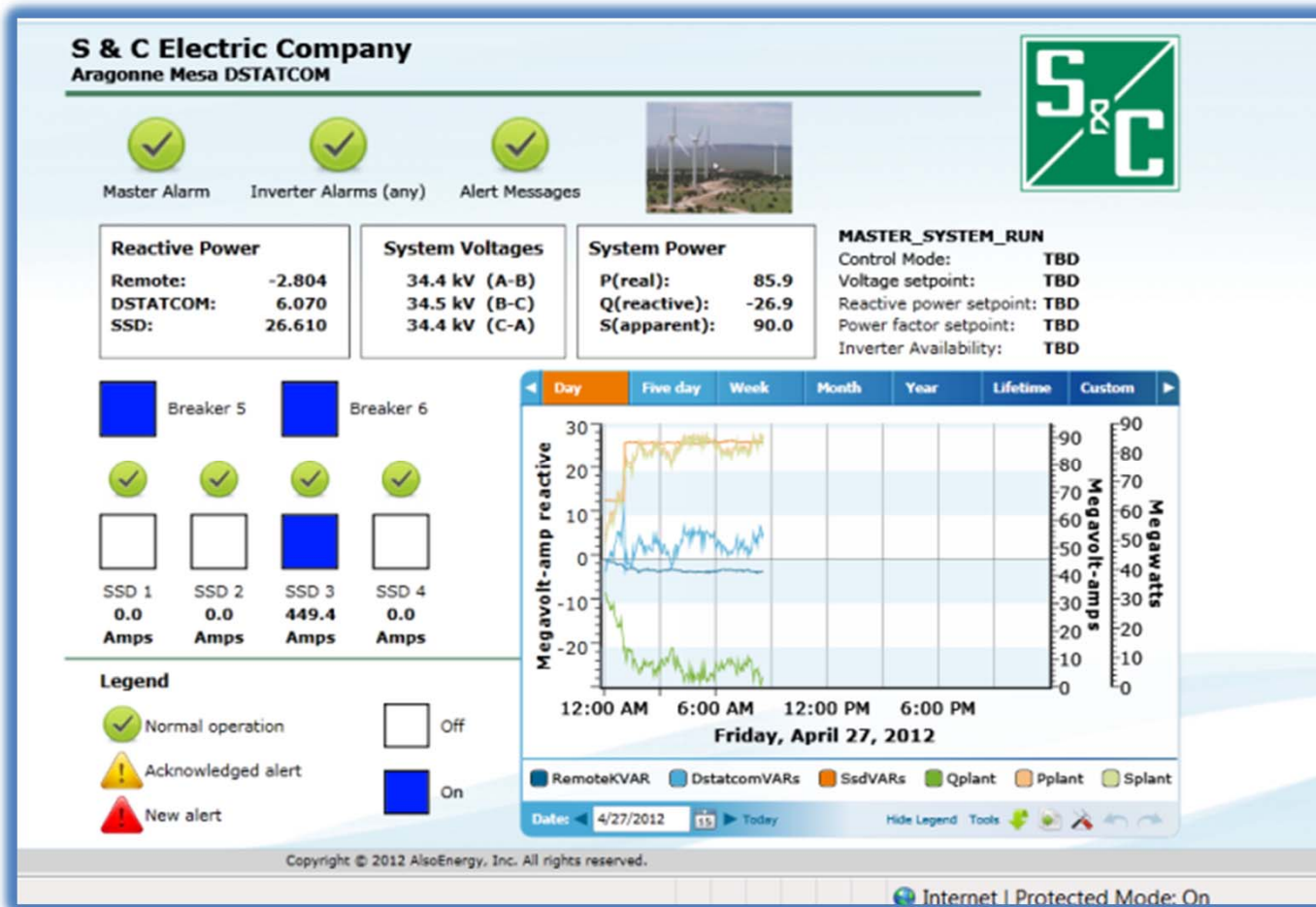


# Condition-Based Monitoring

- Power Quality Products
  - PureWave® DSTATCOM
  - PureWave® UPS
  - PureWave® SMS
- IntelliTeam® CNMS
  - S&C SpeedNet™ Radios
- Real-Time Monitoring
  - Power transformers
  - Circuit breakers
  - Grounding transformers

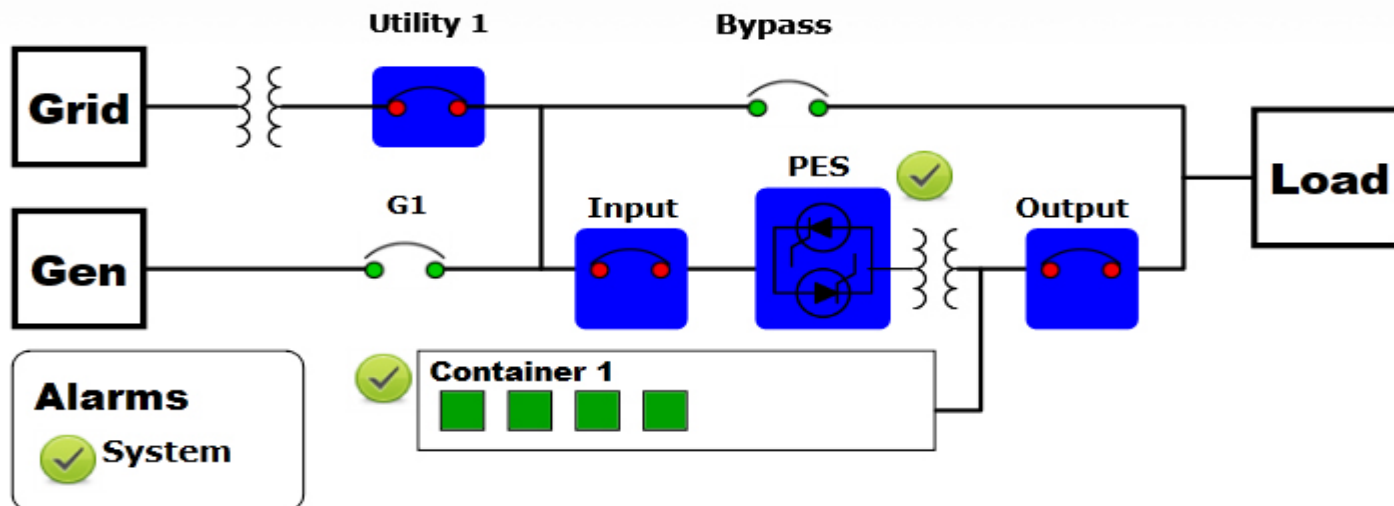


# Condition-Based Monitoring of PureWave<sup>®</sup> DSTATCOM



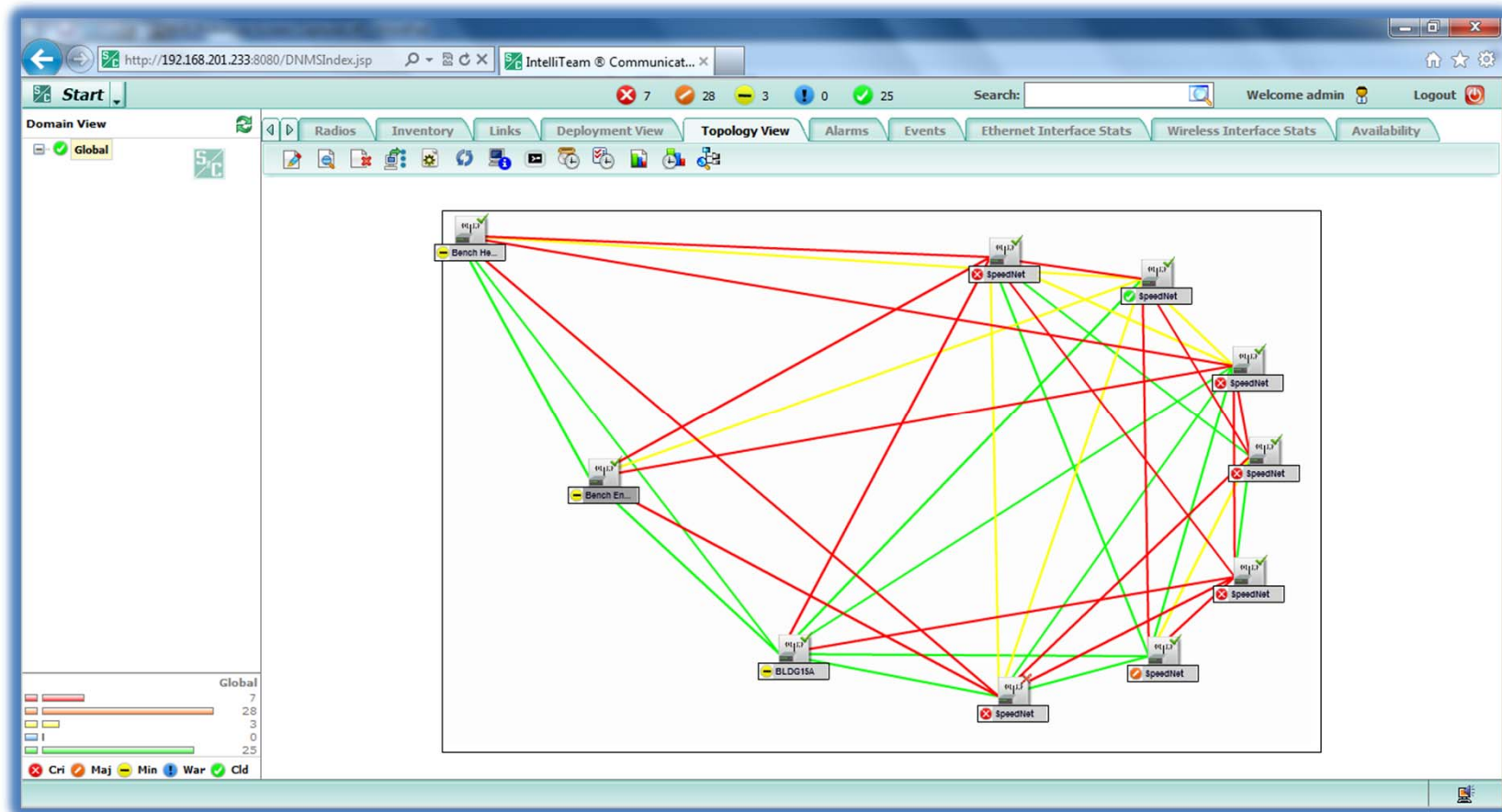
# Condition-Based Monitoring of PureWave<sup>®</sup> UPS

Phase A:	285.3 V	549.1 A		
Phase B:	283.4 V	578.6 A	439.5 kW	0.935 pf
Phase C:	282.8 V	593.6 A	469.8 kVA	





# Condition-Based Monitoring of IntelliTeam<sup>®</sup> CNMS



# Condition-Based Monitoring of Power Transformers



# Condition-Based Monitoring of Circuit Breakers



# Summary

- CBM systems implemented at more than 100 sites
- Response times for alarm/trouble conditions greatly improved
- Damage/unplanned outage prevention applying Data Analytics for early detection of impending failure