



Asset Management – Efficiencies and Vulnerabilities September 12-13 2017 Technical Focus Group Meeting Arlington, VA



Agenda

- Asset Management Basics
- Maintenance Program Approaches
- Industrial IoT System Architecture
- Industrial IoT-Enabled System Benefits
- Industrial IoT System Vulnerabilities
- Recommendations



Basics





ISO 55000 Series Asset Management Standards Published in 2014

ISO Definition

Asset Management Involves

- Coordinated & Optimized Planning
- Asset Selection
- Acquisition/Development
- Utilization
- Maintenance
- Disposal or Renewal of Assets or Asset System







Critical Assets – assets having greatest potential to impact achievement of organizational strategic plan



- Industry 4.0 Trend of automation in manufacturing technologies which merges physical systems, IoT and cloud computing (IBM) – also Industrial IoT (IIoT)
- OT Operational technology hardware and software that monitor and/or control physical devices or processes (Bentley)
- **Big data** data sets so large or complex that traditional data processing applications are inadequate



 Machine learning – Type of Artificial Intelligence that automatically learns from data, without programmed instructions, allowing software to predict outcomes (Analytics Vidhya)

Maintenance Program Approaches

keeping everything running.



Maintenance Program Approaches

"Run it till it breaks" – e.g., light bulb
Performed on time- or machine-run- based schedule – e.g., oil change
Based on actual condition of machine rather than preset schedule
Predictive maintenance, with focus on root cause analysis to eliminate failures

Maintenance Program Approaches



Source: EPRI Power Generation Study



Industrial IoT System Architecture



Example 1



Industrial IoT System Architecture



Example 2



Industrial IoT System Architecture



IoT-Enabled Condition Based Maintenance

Industrial IoT-Enabled System Benefits Source: IBM





Industrial IoT-Enabled System Benefits



Reduce	Reduce capital investment 3-5% (McKinsey)
Reduce	Reduce maintenance costs up to 25% (McKinsey)
Cut	Cut unplanned outages up to 50% (McKinsey)
Eliminate	Eliminate up to 70% of breakdowns (U.S. DOE)
Reduce	Reduce scheduled repairs up to 12% (U.S. DOE)

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Industrial IoT System Vulnerabilities

Industrial IoT System Vulnerabilities



□ Many legacy devices not built for interconnected IIoT

- Cyberattack "surface" increases with increased interconnected devices, cloud back-ends, internet connectivity
- Greater potential for breaches when expanding IT systems to new devices
- Physical harm is possible when IoT is used to control physical assets
- Cyberespionage, protection of IP

Recommendations

Recommendations



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Don't rush the planning phase

Engage all required stakeholders

Find the right vendor

Inventory / condition assessment

Risk analysis

Pilot project

Continual improvement

Recommendations



Segment OT network

Monitor OT network behavior for anomalies

Security

Eliminate unnecessary connections to/from IT networks and the Internet

Incorporate ICS threat intelligence into your system monitoring

Set strong passwords

We Can Assist!



What Our Clients Say About Us . . .

Do whatever it takes to get it right. Able to meet tough deadlines. Good people. Easy to work with. They make sense.Easy to work with.Solid and reputable.Reliable.Honest.Good Relationship.No learning curve.Open to different ideas.On time.Responsive **Responsive**. Highly collaborative. They are the brightest people. **Consistent high quality – the first time.**

They cover the details. Real professional.

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Backup Slides

ISO 55000



ISO 55001 Contents



- 1. Scope
- 2. Normative references
- 3. Terms and definitions
- 4. Context of the organization
 - 4.1 Understanding the organization and its context
 - 4.2 Understanding the needs and expectations of stakeholders
 - 4.3 Determining the scope of the asset management system
 - 4.4 Asset management system
- 5. Leadership
 - 5.1 Leadership commitment
 - 5.2 Policy
 - 5.3 Organizational roles, responsibilities and authorities

ISO 55001 Contents



6. Planning

6.1 Actions to address risks and opportunities for the asset management system

6.2 Asset management objectives and planning to achieve them

7. Support

7.1 Resources

7.2 Competence

7.3 Awareness

7.4 Communication

7.5 Information requirements

7.6 Documented information

8. Operation

8.1 Operational planning and control

- 8.2 Management of change
- 8.3 Outsourcing

ISO 55001 Contents



- 9. Performance evaluation
 9.1 Monitoring, measurement, analysis and evaluation
 9.2 Internal audit
 9.3 Management review
- 10. Improvement

 10.1 Nonconformity and corrective action
 10.2 Preventive action
 - 10.3 Continual improvement