Secure Enterprise Integration for Research Reactors

Nick Howarth et al.
Overview

• OPAL
• Enterprise Integration Requirements
  – Neutron Beams
  – Manufacturing
  – Engineering, Operations, Maintenance
• Regulatory Requirements
• Legacy Data Flow Architecture
• Secure Enterprise Integration
OPAL – Multipurpose Reactor

Radioisotope production

Neutron science research

Silicon irradiation
Multipurpose

Users want neutrons...
And data...
Safe, Secure, Sustainable
Integration Requirements

1. Neutron Beams

• Telemetry from plant systems used to provide neutron beams for the Australian Centre for Neutron Scattering (ACNS)

• ACNS uses the data in near real-time when performing experiments with the neutron beams
Integration Requirements

2. Manufacturing

• Scheduling data loaded into the reactor for manufacturing

• Data produced by the reactor during the course of manufacturing activities:
  – Timing data
  – Neutron Flux data
  – Other plant state data
Integration Requirements

3. Engineering, Operations, Maintenance

• Data collected by staff or produced by OT systems

• Data loaded into OT systems for engineering purposes
<table>
<thead>
<tr>
<th>Data Type</th>
<th>Generation Method</th>
<th>Generation Frequency</th>
<th>Usage Requirements</th>
</tr>
</thead>
<tbody>
<tr>
<td>Engineering, Operations,</td>
<td>User generated</td>
<td>Daily or Weekly</td>
<td>Ad-hoc, non-real-time</td>
</tr>
<tr>
<td>Maintenance</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Neutron Beam Line Telemetry</td>
<td>System generated</td>
<td>Multiple samples per minute</td>
<td>Automated real-time analysis</td>
</tr>
<tr>
<td>Manufacturing execution data</td>
<td>User and System generated</td>
<td>Hourly</td>
<td>Corporate ERP system, near real-time</td>
</tr>
</tbody>
</table>
Regulatory Requirements

...and other guidance
Regulatory Requirements

1. Cyber Security Risk Assessment

2. Cyber Security Engineering
   - Data Flows
   - System Architecture
   - Security Controls
Legacy Data Flow Architecture

- Reactor Plant & Instrumentation
- Reactor Control System
- Legacy Reactor Manufacturing Execution System
- Corporate ERP System

Control Network

Corporate Network
Legacy Data Flow Architecture

- Reactor Plant & Instrumentation
- Reactor Control System
- Legacy Plant Maintenance Execution System
- Corporate ERP System

Control Network | Corporate Network

Execution

Scheduling
Secure Enterprise Integration
Secure Enterprise Integration

Control Network

Reactors Plant & Instrumentation
Reactors Control System

Corporate Network

Corporate ERP System
Paper Form

Execution
Scheduling
Summary

1. Minimise “information system” functionality from within the OT environment
   a. Maximise “engineering system” functionality within the OT environment

2. Use a Data Diode to transmit data from the OT to the IT (and physically block connectivity coming back)

3. Limit data entry to strictly controlled formats and media by specifically authorised staff
Cheers 😊