ROAM: risk based, obsolescence and aging management

Complete long-term support for legacy systems

Obsolescence and aging issues will eventually affect all equipment installed in nuclear power plants and radioactive material processing facilities. The need to actively mitigate against potential safety and availability impacts are at the core of the business cases of any licensed operation.

Ultra Energy's ROAM is a risk based strategic review and investment process that identifies risks and ensures systems availability. To achieve the best results a comprehensive, long-term strategy to reduce long term costs and ensure continued availability of assets is adopted. It includes analyzing the condition, supportability and serviceability of target assets and their potential to impact safety and ongoing operation.

ROAM helps embed a culture across a customer's organization that recognizes the value of organizing asset management as a long-term sustainment program, rather than a reactive activity. ROAM's contract model encourages the necessary long-term perspective by creating an infrastructure investment commitment that incentivizes availability and ongoing efficiency gains.

ROAM follows a three-step program: review, sustain and extend.

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REVIEW

The review stage establishes the approach required for the client organization. ROAM can be implemented to provide organizational transformation or simply be targeted at specific assets that need to be sustained.

Strategy selection

We work closely with customers to establish a complete obsolescence and aging strategy:

- Assets and facilities affected
- Regulatory requirements
- Operational drivers
- Customer's organizational capability
- Gap analysis
- Support requirements
- General approach, proactive or reactive

Process development

We next define the appropriate ROAM approach:

- Deploy established ROAM processes
- Adapt ROAM processes to meet requirements

Training

Develop and deliver training courses and materials that cover:

- Regulatory requirements
- Organizational responsibilities
- Relevant standards and best practice guidance
- Obsolescence and aging evaluation
- Aging mechanisms
- Equipment obsolescence
- Management of obsolescence and aging

Inventory assessment

Identify all assets to be supported, capturing key information including current condition to allow implementation of a risk-based management approach:

- Manufacturer
- Manufacturers' part number

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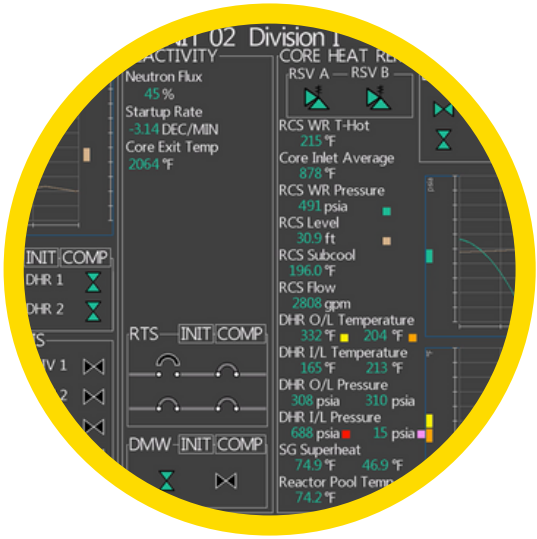
Inventory assessment (continued)

- Modification state
- Quantity
- Location
- Value
- RoHS status
- Maintenance policy
- Critical impact assessment
- Condition assessment

Technology assessment

Identify type and density of technology in use, its availability and the specific capability required to support it:

- Analogue/digital
- Discrete/integrated circuits
- Wound components
- FPGA
- PC, CPU, PLC
- COTS vs bespoke equipment
- Software
- Part/component availability
- Test equipment
- Production processes
- Reliability
- Supporting data sets
- SQEP support capability
- Market availability of components, parts and materials



Risk based prioritization

Taking assessment findings and analyzing using ROAM model weighted scoring of risk to safe and reliable operation, considering:

- Equipment condition - faults, known issues and general condition
- Spares availability - equipment spares and parts spares
- Capability to repair - information, equipment and SQEP personnel
- Analysis performed using a simple, scalable model, SORL
- Investment being directed by the output from safety and operational risk assessment

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Action plan

Work with customer to review support priorities and compare them against organizational constraints to produce implementable recovery plans that consider:

- What needs to be done - prioritized list
- Who is best qualified to do it - SQEP
- When is the best time to do it - facility program
- Who does what and when - client or service provider

SUSTAIN

The sustainment stage focuses on maintaining the baseline position and taking action to support the operation of installed systems.

Inventory management and long-term storage

Using Ultra Energy's established processes and facilities or working with customers to provide local or site-based storage and inventory solutions.

Comprehensive inventory management systems for storage of instrument and components
Purpose built environmentally controlled and continuously monitored storage facilities split across multiple sites
Established component periodic assessment for degradation

Continuous performance monitoring

Use current and historical equipment performance data and condition analysis to support predictive performance trends and investment forecast. Using ROAM templates and processes and trending data from:

- Periodic testing in support of safety cases for unrevealed fault conditions
- Faults and condition of units repaired
- Ongoing equipment condition assessment
- Findings from periodic safety reviews or similar
- Condition of spare components
- Obsolescence assessments
- Spare equipment and component usage

Repair

Working with client to provide a tailored repair service that mitigates key constraints to minimize the risk of safety issues or operational downtime due to failing equipment.

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Repair (continued)

- Repair of analogue, digital and CPU based equipment
- Specialist test hardware
- Development of custom test equipment, fixture and regimes
- ATE facilities
- Site test and repair capability

Obsolescence mitigation

Availability of legacy system spares is critical to sustaining their operation. Active obsolescence management is a critical element in any sustainment and support programme. Using established ROAM techniques and our deep market knowledge we minimize operational risk by:

- A dedicated team provides proactively managing component obsolescence
- Identifying critical high-risk components
- Active monitoring of supply chains for end-of-life components
- Holding spares parts of critical high-risk components
- Output from performance monitoring informs early investment in parts
- Active supply chain management and security
- Management of test facilities, tools, personnel and data availability

Knowledge management

ROAM knowledge management has two key tenets, capture and maintenance of knowledge in the form of equipment support data relating to design, substantiation, testing and repair; and provision of SQEP resource, its sustainment, development and succession planning.

- Identification of critical knowledge source and data sets
- Development of specific knowledge for assets being supported
- Identification of SQEP resource and the baseline skill required
- Development of SQEP skills in target support resources
- Establish succession plans where long-term support is required and resource is limited
- Consider graduate and apprentice development programs
- Data sharing with clients through an online portal

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EXTEND

To sustain safe and reliable operation of legacy systems, our ROAM process recognizes that ongoing maintenance, replacement and in some cases redesign of critical asset or parts is likely to required.

Forward procurement

Forward procurement removes the potential impacts of obsolescence or the loss of an at-risk supplier for critical or expensive to replace components by securing a lifetime inventory,

Substitution

Supporting legacy system generally requires a significant investment in identification and justification of alternative components to overcome issues generated by obsolescence and part availability. ROAM establishes processes that drive the assessment process, including functional considerations and performance characteristics.

Remanufacture

Manufacturing new equipment to the original design and build standard can be achieved where complex safety justification or legislative obsolescence does not impact it. For safety systems or instruments, this can be difficult to justify as redesign for equivalency is required.

Reverse engineering

Where legacy equipment's OEM is no longer trading and there is no or limited supporting data available, reverse engineering is the only viable route to establish function, design logic and critical characteristics. Ultra Energy has considerable expertise in reverse engineering. As unsupported equipment failure rates increase with age, demand for this aspect of our service is growing.

Redesign

Development of replacement equipment can, in the correct circumstance, be a more economical solution than sustainment of legacy systems where support information is limited and parts are not available. Redesign offers the benefits of SQEP and technology availability, compliance to latest standards and easing the development of a long-term management strategy.

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COMPLETE SOLUTION MANAGEMENT FOR LONG TERM SUPPORT OF LEGACY SYSTEM

Ultra Energy is a specialist supplier capable of delivering cultural learning and technical expertise in the support and sustainment of specialist electronic systems.

ROAM in action

- We are actively managing the sustainment of 7,000 system parts
- Supporting parts ranging in complexity from cable assemblies to multi-board systems
- Technologies from analogue discreet, FPGA to CPU based, and complex safety software
- Manage equipment from various origins, our historical supply, unsupported original OEM and within multi-supplier systems
- Repair of between 300-500 items per year
- Bought forward 37 years' worth of stock for one customer
- Undertake more than 50 component equivalency assessments per annum
- Redesign of legacy high integrity systems and instruments, flux channels, temperature, monitoring units, circular speed, monitors and display systems

Our SQEP commitment

- Active graduate and apprentice development programs
- Embedded SQEP development processes
- Critical supplier acquisition for long term support of critical systems
- Active members of the NIA and the National Skills Academy

Example projects

EDF Energy

- Lifetime management of reactor protection system equipment installed across the AGR nuclear fleet, including equipment condition, spares parts and component availability, and ensuring repairs infrastructure is available
- Assessment, refurbishment and upgrade of key safety instrumentation within the diverse guardline systems at Dungeness B, Hinkley Point B and Heysham 1 power plants
- Assessment, refurbishment and upgrade of key instrumentation within the single channel trip system at Dungeness B nuclear power plant
- Flux channel replacement, design of new equivalent nucleonic instrumentation to replace aging instruments

UK MOD

- Commodity support programme, instrumentation repair, refurbishment and remanufacture for submarine high integrity control and operational systems

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About Ultra Energy

Organizations working with nuclear and industrial technologies must deliver reliable operations at the same time as safeguarding people, the environment and infrastructure. We develop and manufacture measurement and control solutions that give our customers complete, long-term control over systems operating in harsh environments, helping them operate safely and increasing the value derived from their investments over their total lifespan.

Now part of Curtiss-Wright, Ultra Energy has worked with nuclear and industrial customers for nearly 70 years. We support customers across the world from facilities located in the US and UK. Our solutions are embedded in strategic national infrastructure and our people are active partners in customer programs that are focused on delivering advanced future nuclear and industrial capabilities.