Network Advisory: Equipment Lifecycle Management

Q1 2025

Readout produced by Michael O'Neil, Contributing Analyst

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Smarter Together

The Uptime Network is a community of data center owners and operators under mutual NDA. No member organizations or individuals are named.

This readout is based on a Tutorial led by Ron Davis, Uptime's Vice President, Digital Infrastructure Operations, and 20 members of the Uptime Network on January 15, 2025.

These readouts are designed to capture the iterative, collaborative knowledge-shared between Network members and Uptime technical SMEs. These documents do not necessarily represent the opinions of Uptime's technical leadership or members but instead provide members resources to track our community's ongoing discussions. These readouts are intended for Uptime Network internal use.

Email suggestions for future topics to Matt Stansberry: mstansberry@uptimeinstitute.com.

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January 15, 2025

Meeting Notes

Historically equipment lifecycle planning involved tracking the normal wear and tear on the infrastructure against assumptions on the Expected Useful Life (EUL) of the equipment. Now organizations are facing rapid technological changes and early obsolescence at a component level that disrupt conventional planning processes. Network members are concerned about how these changes will be addressed in their budgets.

Ron Davis
VP of Digital Infrastructure Operations
Uptime Institute

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Attendance: 20 Member Organizations

Finance | Manufacturing | Colocation | Healthcare

Topics discussed:

Uptime's recommended best practices for assessing Equipment Lifecycle Management

Sample expected useful life (**EUL**) of various data center infrastructure components

Network member challenges, questions and suggested best practices.

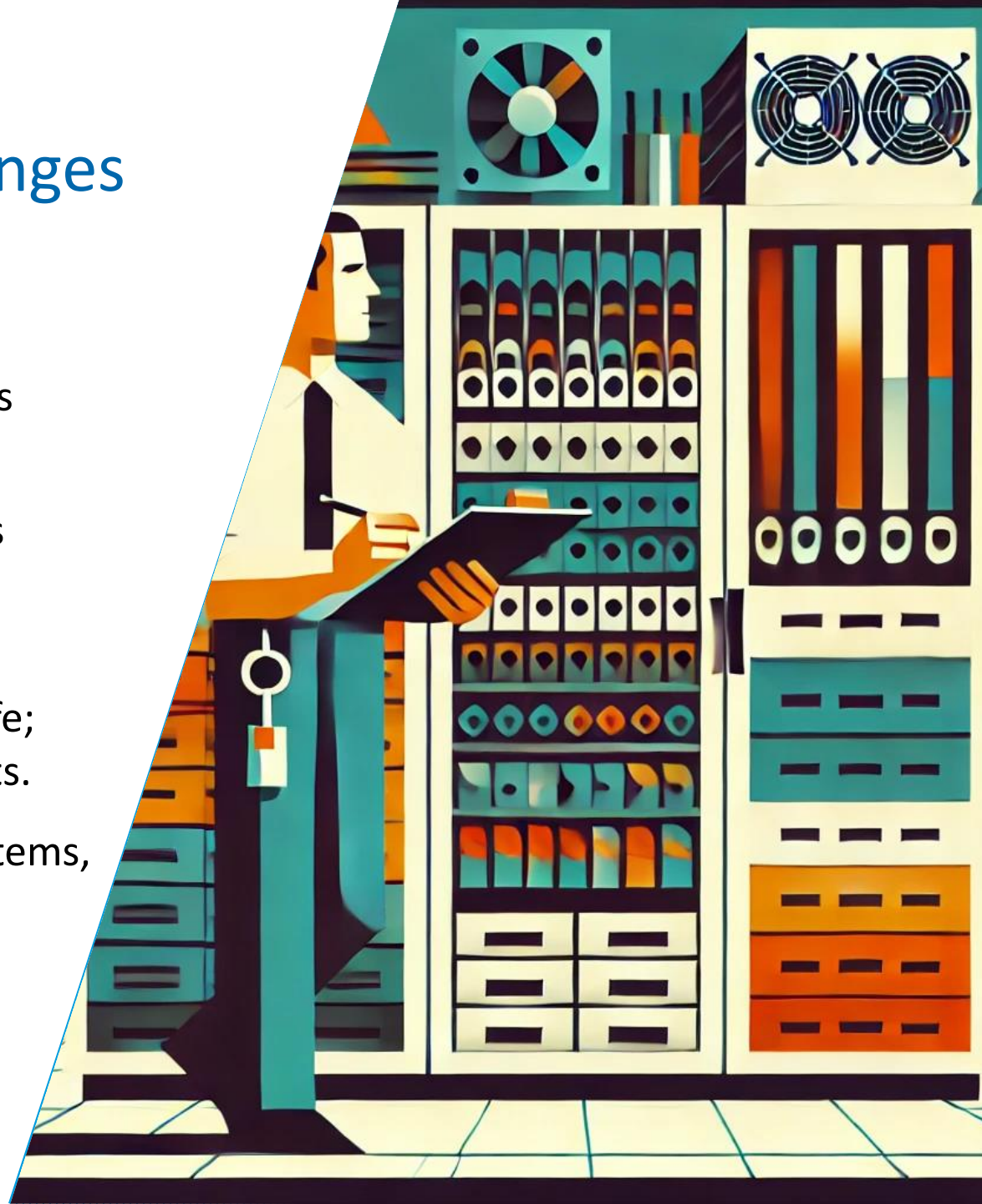
From Uptime Institute's Management & Operations Assessments and Accredited Operations Specialist training

An effective equipment lifecycle plan:

- Aligns with an organization's overall business and IT strategies to support its long-term goals and objectives.
- Includes regular capacity assessments to ensure that critical systems can meet current and future demands.
- Allocates budget for upgrades, replacements, and maintenance based on TCO calculations and a life-cycle expectations for when critical systems and equipment need to be replaced.
- Updates annually based on analysis of new regulations, technologies or business priorities.
- Maintains an up-to-date inventory of all critical equipment, systems, and infrastructure in a Computerized Maintenance Management System (**CMMS**).

Network members identified challenges

- No credible, publicly available EUL standards exist. Unofficial, incomplete or tribal knowledge only.
- Lifecycle information on new high-density equipment is even less available (i.e. CDUs)
- Tracking parts obsolescence – especially for electronics (PLCs, VFDs, BMS, I/O cards…) is difficult to manage. Supplier notifications have limited distribution.
- Stockpiled replacement parts may have limited shelf life; integrated batteries may not outlast in-use components.
- Some members rely on vendor managed inventory systems, contracted with equipment providers.



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Keys to Success: CMMS and Consistent ELM Policy

Roundtable Participant Recommendations

Computerized Maintenance Management Systems (CMMS)

Attendees identified a clear need for an effective CMMS that captures key asset information over time and provides parent/child visibility into subcomponents.

Consistent Policy Communication

Organizations should implement a lifecycle management strategy that articulates **both how decisions are made and how budgeting functions** to avoid cross-departmental misalignment (e.g. Operations incentivized on availability, Accounting is incentivized on financials)

Network members and Uptime repeatedly observed organizational alignment on IT and Business Strategy is critical to make Equipment Lifecycle Planning programs fully effective.

Lifecycles are not Static

Equipment lifecycles have been changing. Key factors that require firms to revisit processes include:

- Changes in critical load – e.g., AI deployments
- Changes in equipment technology – e.g., Lithium-Ion batteries
- Third-party components and all electronic controls are at risk of obsolescence before the “parent” unit’s expected useful life (EUL).

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Dealing with the component challenge:

Network Members are proactive in tracking parts availability, especially for electronics – for example, via annual reviews with product suppliers regarding part status/obsolescence, especially for electronics (e.g., PLCs).

- Experience with similar equipment can help identify highest-priority (most at-risk) components.
- Issues with parts supplies can be “costly…and invasive.” Parts repairs have long lead times; new parts for aging equipment may require base unit modifications.
- OEM notification letters are part of this process, but not a sufficient basis for planning.
- Members use CMMS/asset management systems to track both requirements and availability.
- Spare parts inventories (and management systems) play an important role, should be assessed annually.

Annual Assessments

Organizations should conduct annual assessments of all critical equipment to evaluate the following:

- Condition
- Functionality
- Obsolescence (efficiency, performance, service support, and parts)
- Regulatory Impact
- Sustainability
- Cost considerations

Based on the assessment result, develop plans for equipment upgrades, replacements, or refurbishments to align with the life-cycle management strategy.

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Uptime: Prioritize criticality and performance degradation

Sample questions from Uptime's Data Center Risk Assessments:

- Asset condition: Is the asset new, like new (well maintained), or visibly deteriorated?
- Asset performance: Is the asset functioning at initial target levels, or has performance degraded (and by how much?)
- Parts availability: Are parts readily available, available via special order with long lead times, or unavailable?
- Operational impact: Would failure of this asset have a significant impact on our ability to serve clients, a moderate impact, or low/no impact on delivery capabilities?

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Expected Useful Life

All critical equipment, systems, and or infrastructure have a period for which it is expected to operate within acceptable availability tolerance. This period is referred to as EUL and is typically based on equipment manufacturer recommendations, organizational expertise, and national or international standard recommendations, as well as individual technical assessments based on site operating conditions and or environments. The site should formally document the EUL for tracking against associated equipment age/usage.

The table on the right is for example use only. Actual EUL levels vary significantly in different organizations. Uptime Network members are creating an anonymized EUL chart to show more real-world examples and to demonstrate how the range of EUL estimates can shift based on company's technology investment strategy and vertical industry.

EQUIPMENT	SAMPLE EUL
Centrifugal chiller	20 years
Galvanized metal cooling tower	15 years
Air-cooled condensers	20 years
Evaporative condensers	20 years
Computer Room Air Conditioning Units	20 years
Computer Room Air Handling Units	25 years
Switchgear and distribution equipment	25 years
Transformers (dry type)	30 years
Uninterruptible power supply systems	25 years
Diesel Generators	35 years
Electrical motors (general)	20 years
Motor-speed control devices	15 years
Motor control centers/control panels	25 years

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Considerations for early obsolescence

- Functionality: Operation and or performance are not aligned with current technological advancements or changes in the site and or organizational operational requirements.
- Vendor Support: Manufacturers have reduced or eliminated available service support, updates, spare parts/hardware, and or software/firmware for critical equipment.
- Regulatory/Environmental: Critical systems emissions, effluent, materials, components and or consumables are no longer in accordance with all applicable laws, regulatory requirements, and environmental responsibilities and or best practices.
- New critical load demand: Industry changes may require that existing systems be replaced by technologies capable of accommodating higher-density workloads (AI).

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Planning with CMMS

Uptime Guidance: The following information should be included in your CMMS for all critical equipment, systems and infrastructure

- Install date
- Expected useful life (EUL)
- Expected total cost of ownership (TCO)
- Make, model, serial number, etc.
- Replacement costs
- Vendor relationships for support, updates, and expertise.

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Lifecycle Planning with CMMS considerations

Network members noted:

- It's useful to be able to integrate the CMMS with adjacent systems – e.g., tracking change management via ticketing system, tracking expenses
- Codes (how found, type of failure, cause, secondary cause) are important elements, but not captured in a standard catalogue.
- CMMS is especially important for organizations that manage multiple data centers – provides comparisons that can indicate equipment or facility anomalies.
- Parent/child relationships are important at two levels:
  - Understanding system dependencies (what are the downstream impacts of failure?)
  - Tracking system components (which parts are needed for this system? Where are they inventoried, how do they fit within the unit?)

TCO Comparison

A TCO analysis should be performed for each asset to gain insights into the financial implications and identify opportunities for cost optimization.

TCO for in-service equipment:

- CapEx: Identify and quantify the initial investment costs, including equipment purchase, installation, and infrastructure setup.
- OpEx: Analyze and formally document, track, and record ongoing operational expenses, such as energy consumption, consumables, operations (staffing, etc.), and licensing fees.
- Maintenance Costs: Calculate costs related to routine maintenance, repairs, and spare parts (hardware, firmware, and software).
- Refurbishment Costs: Estimate the costs associated with restoring/refurbishing aging equipment and systems.

TCO for Potential Replacement Units

- CapEx: Identify and quantify the initial investment costs, including equipment purchase, decommissioning/removal existing units, installation, and infrastructure setup.
- OpEx: Analyze and formally document, track, and record ongoing operational expenses, such as energy consumption, consumables, operations (staffing, etc.), and licensing fees.
- Maintenance Costs: Calculate costs related to routine maintenance, repairs, and spare parts (hardware, firmware, and software).
- Refurbishment Costs: Estimate the costs associated with restoring/refurbishing aging equipment and systems.

MEMBERS NOTED TCO INFORMATION WAS OFTEN INCOMPLETE OR DIFFICULT TO CALCULATE

Organizational Alignment Matters

Network Member example: If you have a CRAH unit that has a 20-year expected useful life but includes mechanical components (fans) that need to be replaced at 10 years – and you're notified at the 10-year mark (as you're replacing the fans) that the control board will be unavailable in two years, what's the best strategy? Hope the control board lasts for another ten years? Stockpile a replacement board, or two? Or abandon the component replacement, migrate to a new unit, and absorb a 10-year depreciation hit? Finance can speak to the financial implications here – but finance's objective (managing cost) is very different from the operations team's goal (maintaining availability).

Network Member Recommendations

- Commitment to regular (annual) review is essential.
- “It’s all about triggers” – e.g., MOPs that tie to work orders which prompt evaluations.
- A portfolio wide repository for spare parts may well be a better approach than maintaining individual site repositories.
- Sustainability: Effective maintenance is critical to efficient equipment function and forestalls the need for replacement units.
- Develop an evaluation and grading system that works in your context “Get good, work towards perfect.”

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Take the Next Steps

- Join our next tutorial on Fire Risk Management with Uptime Institute CTO Chris Brown, Feb 13, 2025 at 12pm ET. Register here.
- Discuss changing ELM requirements with your peers in-person at the Uptime Network Americas Spring Conference: March 18-19, Wyndham Atlanta Buckhead Hotel & Conference Center. Registration is open now as tour spaces are limited.
- Further Reading:
  - Uptime Membership 2024 Data Center Maintenance Survey
  - Data center management software: the evolving role of DCIM
  - Ongoing discussion on CMMS parent/child assets on Inside Track
- Email Matt Stansberry to request a private briefing on this topic with Uptime Intelligence analysts and/or Uptime Technical Consultants: mstansberry@uptimeinstitute.com.

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