WHITE PAPER: OBSOLESCENCE MANAGEMENT: A STRATEGIC, ENGINEERING-LED APPROACH

Optimising Operational Availability, Reducing Cost and Risk, and Future-Proofing Systems Through Life

Executive Summary

Obsolescence is one of the most persistent, unpredictable, and costly risks facing long-life, mission-critical systems. Equipment lifecycles are frequently out-of-sync with rapid commercial technology turnover, shifting supply chains, cybersecurity requirements, and tightening regulations. Reactive obsolescence discovery leads to increased cost and downtime, and avoidable risk.

This white paper outlines Steatite's Strategic Obsolescence Management (OM) approach: from designing out obsolescence, proactive monitoring, engineering-led assessments, actionable options, governed decisions, and planned tech refresh pathways that maintain compliance, security, and availability.

1. Understanding Obsolescence in Modern, Complex Systems

Modern defence platforms, medical devices and transport infrastructure often contain hundreds or thousands of components. A single obsolete or unsupported item can impact legislation or tolerance certification, cybersecurity, interoperability, and operational availability. Drivers include rapid tech lifecycles, regulatory shifts, product and product support discontinuation, and regular software support requirements.

Figure 1 displays the obsolescence drivers and impacts, several of which are listed below:

- Semiconductor manufacturers discontinue parts with limited notice.
- Legacy interfaces become incompatible with newer technologies.
- Regulatory requirements evolve, particularly in medical and defence sectors.
- Security protocols must be maintained and up to date. This includes the strict defence-related Secure by Design requirements.
- Environmental and sustainability directives (such as RoHS or REACH) restrict materials and designs.

Without a robust obsolescence strategy, these factors can force costly redesigns even premature system retirement.

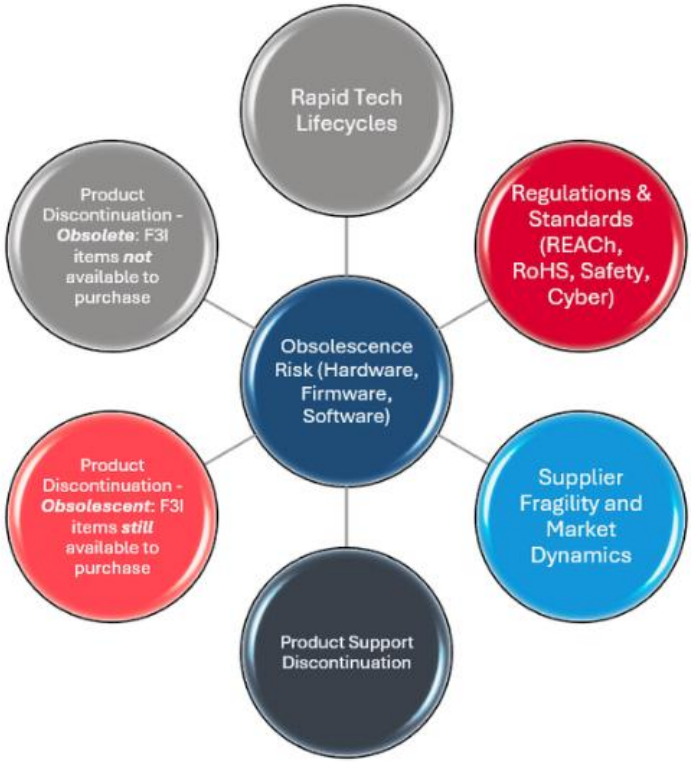

Figure 1: Obsolescence drivers and impacts

2. Why Reactive Obsolescence Management Fails

Legacy approaches rely on obsolescence resolution substitutions that trigger urgent sourcing, unplanned redesign, and increasing schedule/cost impacts.

Strategic OM replaces reactive actions with forecasting and alignment to maintenance periods, and planned update/upgrade windows, enabling obsolescence mitigation, rather than the often more expensive resolution.

The impacts of a Reactive OM approach are displayed in Figure 2.

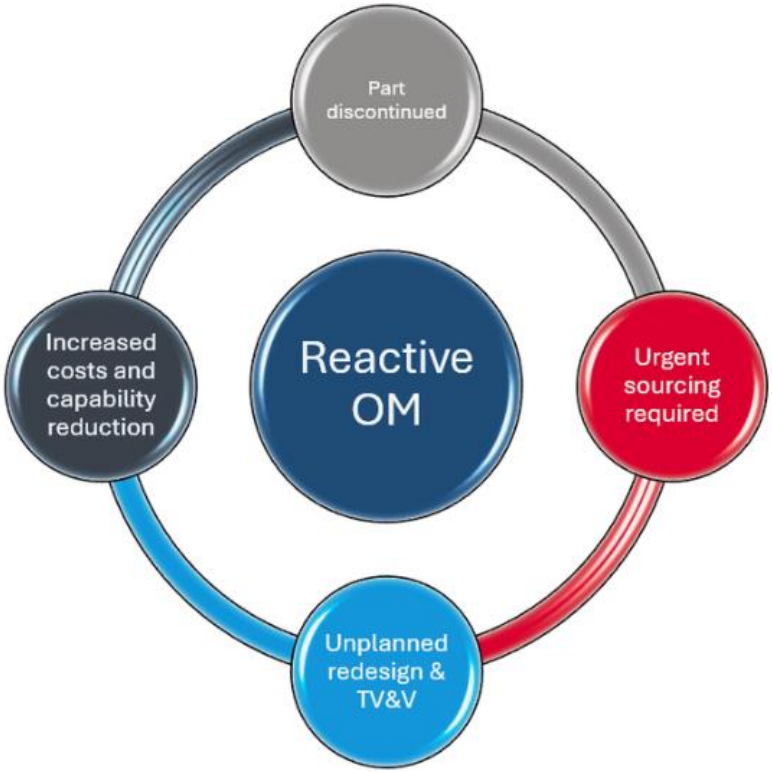

Figure 2: Obsolescence Management Reactive Approach[1]

[1] TV&V – Test, Verification and Validation

3. Cost Avoidance

Cost can be avoided through strategic obsolescence planning and management. Mitigation is normally cheaper than resolution, but resolution can still be planned to reduce cost and impact. The later you leave it to resolve an obsolescence issue, the more costly the solution becomes, becoming increasingly expensive dependent on the available options as displayed in Figures 3 and 4.

As shown in Figure 3, option costs increase on the chart from left to right and are further detailed in Figure 4. The options on the left of the chart are those planned and dealt with earlier. The further right on the chart, the more likely the mitigation or resolution option has not been dealt with sufficiently early, and the result is higher costs and impacts, i.e. utilisation of existing stock to change design.

Figure 3 – Cost Avoidance vs Non-Recurring Engineering Cost Graph

Resolution	Definition	NRE Cost (£)	Cost Avoidance (£)
Existing Stock	Item owned in the supply chain and can be allocated to the project	100	1,200
Reclamation	Use of an item located in surplus equipment or equipment beyond economical repair (Cannibalisation)	1,300	4,000
Equivalent	Item which is functionally, parametrically and technically interchangeable (Fit Form Function and Integration (F3I))	5,300	8,200
Alternative	Item whose performance may differ from that specified, for one or more reasons, e.g. quality or reliability level, tolerance, parametric, temperature range	13,500	2,400
Aftermarket	Item is available on the market, but not from the OEM or supplier	15,900	57,100
Emulation	Manufacturing process that produces a substitute F3I item for the unobtainable item.	73,000	1,400
Redesign - Minor	Item is designed out of the product. The cost for redesign can include; engineering, programme management, integration, qualification and testing, e.g. a minor redesign would represent a change to the layout of a circuit board	74,400	231,500
Redesign – Major	Item is designed out of the equipment. The cost for redesign can include engineering, programme management, integration, qualification and testing, e.g. a major redesign would be a circuit board replacement	305,900	0

Figure 4 – Cost Avoidance vs Non-Recurring Engineering Cost Table

4. Obsolescence Management Strategic Approach

Steatite's obsolescence approach follows the internationally recognised principles detailed in BS EN IEC 62402-19. These principles are tailored to project specific, mission-critical realities:

- Continuous monitoring, resulting in early identification.
- Engineering-led impact assessments.
- Structured, auditable decision-making aligned to programme governance and configuration control.

The Strategic Obsolescence Management (OM) Approach involves continuous monitoring of component lifecycles, supplier roadmaps, and market trends. However, monitoring alone is insufficient. The key is translating insight into actionable strategies.

A strategic approach typically includes:

- Design to Mitigate Obsolescence:
    - Lifecycle risk assessment during system design.
    - Approved vendor lists with second-source options.
    - Modular and open architecture – enabling independent sub-system or component upgrades.
    - Updates/upgrades/tech refreshes planned into maintenance and upkeep lifecycle.
- Strategic Life of Need[2] (LNBs) buys aligned with projected demand.
- Fit Form Function & Integration (F3I) replacements identified through proactive monitoring and global supply chain reach.

The dedicated **Steatite Obsolescence Manager** ensures Strategic OM begins with visibility and foresight, and the Through-Life Support (TLS) service requirements are effectively 'baked in' to the TLS operation, maintenance and upkeep programme. To enable this, our Obsolescence Manager will generate bespoke, tailored **Obsolescence Management Plans** (OMPs) to meet each product, project and customer's specific OM requirements.

By integrating these practices from Design Concept through to Disposal, products can avoid disruptive redesigns and maintain system integrity over time. See section 3 – Cost Avoidance.

Figure 5 contains Strategic OM considerations for inclusion in a product lifecycle.

[2] Last Time Buy and Bridge Buy terms replaced by Life of Need Buy. LNB is a spare parts purchase to cover the item life duration required, i.e. for the remaining planned life of the product, or until the next planned update/upgrade resulting in a replacement of the affected item.

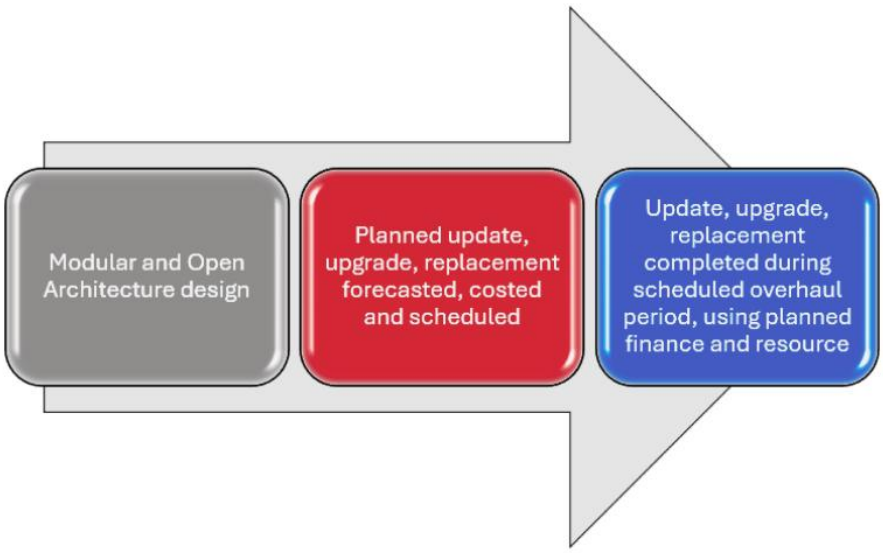

Figure 5: Obsolescence Management Strategic Approach

Figure 6 illustrates the Steatite Strategic OM approach process.

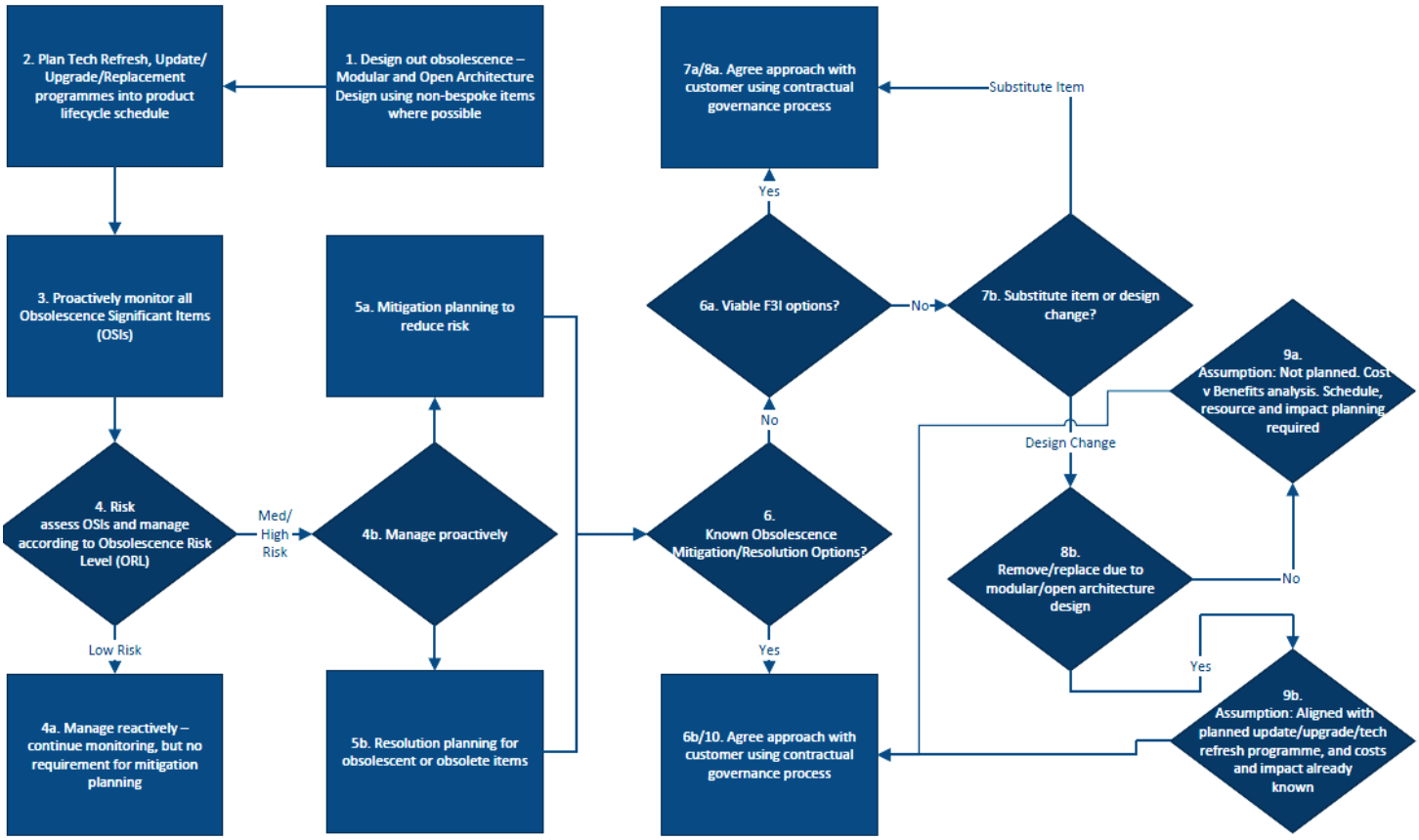

Figure 6: Steatite Obsolescence Management Approach

5. Through-Life Service Integration

OM does not operate in isolation. It is a core component of a broader TLS strategy, particularly for systems deployed in harsh or regulated environments where ongoing maintenance, updates and upgrades are essential throughout operational life.

A comprehensive through-life services model combines multiple Integrated Logistics Support (ILS) disciplines to keep systems reliable, compliant and supportable over long lifetimes. As a Design, Manufacturing and TLS Service Provider, Steatite integrates proactive obsolescence monitoring and mitigation, refresh planning, maintenance strategies, configuration control and end-to-end assurance, providing continuity from design through product and customer specific, tailored TLS service packages.

Sustainment Engineering is central to this approach, enabling controlled, incremental changes rather than disruptive redesigns. By continuously adapting to issues such as component obsolescence, cybersecurity updates, or shifting operational requirements, it ensures updates are implemented without compromising overall system integrity.

Configuration Management is equally critical, providing the foundation for traceability and compliance. In regulated environments it is essential to understand exactly what has changed, when, and why. Effective configuration management ensures all updates are documented and auditable, supporting certification requirements, whilst providing engineering teams with a clear baseline for future work commitments.

Maintenance, Repair and Overhaul (MRO) capabilities are vital for extending the life of legacy hardware. Instead of replacing systems outright, component-level repair and reconditioning can restore functionality and improve reliability. This is particularly valuable in sectors where equipment is expected to operate for decades; helping reduce costs and maintain or improve availability and overall capability, through avoidance of unnecessary downtime.

Tech Refresh programmes offer a structured way to introduce modern components without full redesign. By carefully integrating newer technologies into existing platforms, organisations can enhance performance, security and supportability while preserving F3I and certification intent. This allows systems to evolve over time while avoiding the cost, risk and recertification burden associated with complete redevelopment or overhaul.

6. Supplier Intelligence – Component Sourcing: Beyond Availability

Securing components is not simply a matter of finding stock. In high-reliability sectors, origin traceability and authenticity are critical factors for ensuring item and component quality assurance requirements are met.

To ensure quality and traceability, the correct approach to component sourcing goes well beyond simply locating available stock. It relies on access to franchised and authorised distribution channels, supported by rigorous supplier qualification processes that assess reliability and compliance.

This is complemented by robust internal Steatite inspection and testing protocols, to verify component authenticity and guard against counterfeit risks. In parallel, global sourcing networks play a crucial role in identifying and securing hard-to-find or obsolete parts, ensuring continuity of supply, even for long-life and legacy systems.

In addition, staying ahead of component roadmaps and working with supply chain partners helps mitigate the risk of losing access to mission-critical items.

7. Intelligent, Data-Driven Monitoring

Steatite blends supply-chain intelligence analysis, cyber/software support management, in-service (usage, maintenance and upkeep) trend analysis, and engineering analysis. This goes beyond basic database checking, and consequently reduces false positives and enables timely, contextual awareness decision making.

Figure 7 displays the interdependent activities required for successful Strategic OM.

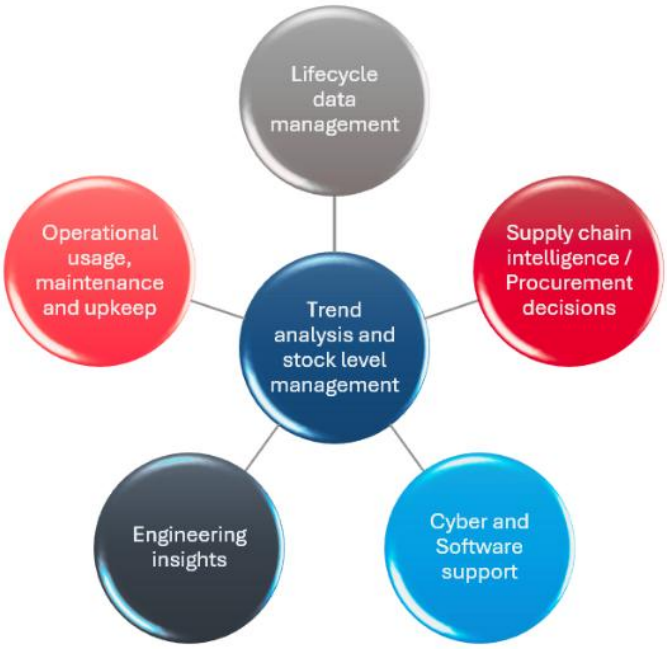

Figure 7: Strategic Obsolescence Management Loop

8. Mitigation Strategies that Protect Capability

Mitigations include controlled life-extension programmes, F3I alternatives, configured engineered updates, and planned technology refresh programmes.

8.1 Technology Refresh: The Most Effective Long-Term Strategy

Planned tech refresh programmes are forecasted and scheduled into the product lifecycle. This ensures minimal operational impact, and cost and resources are already included in the project budget and resource planning. Consequently, the programme of work will normally be scheduled to align with overarching planned maintenance or overhaul activities. The Tech Refresh programme will likely involve modernisation of hardware, firmware or software while preserving F3I and certification.

Steatite plans, integrates and validates refresh activity to maintain performance, security and compliance with defence, rail, medical and industry standards. Modular and Open Architecture design are key components to the tech refresh programme.

9. Conclusion

Obsolescence is inevitable, disruption is not. Steatite provides a comprehensive OM capability spanning design, manufacture, and in-service, through to disposal. This includes:

- Designing out obsolescence,
- Mitigation planning for planned updates, upgrades and tech refresh programmes
- Resolution solutions for inevitable unplanned events.

Steatite's Strategic Obsolescence Management approach ensures our critical systems continue to perform reliably, cost-effectively and securely long after their original components have faded from the market. The result:

- Reduced obsolescence risk.
- Reduced cost, effort and resources.
- Enhanced operational availability and capability.
- Enhanced life-cycle value.

See how we control obsolescence management for critical systems and speak to us about supporting your product lifecycle.

10. About Steatite

Steatite is a UK-based provider of high-reliability and ruggedised electronics for defence and other regulated sectors. Products include integrated systems, computing platforms and communications technologies. We combine deep engineering knowledge with structured through-life support to maintain secure, compliant and supportable capabilities across service life.