



Obsolescence – Not a Surprise

Evolving capability requirements, technological progress, new materials and manufacturing processes, skills, environmental regulations, industry standards especially for software, and commercial factors all influence designs. **Obsolescence is inevitable.** For consumer items such as cars, white goods and electronics, customers can usually be incentivised to buy the latest product even if the old one still functions effectively. But in Defence, product lifecycles are usually very much longer due to acquisition affordability and the gestation of cutting-edge technology.

Obsolescence is a major contributor to Administrative & Logistic Delay Time (ALDT) and hence to system Downtime but with uncertain time for contractual action to design, certify, manufacture and embody replacements. Unlike non-attributable failures such as birdstrikes, accidental damage or new structural failures, obsolescence is almost always foreseeable and avoidable. Even if a local warehouse burns down, a distant manufacturer facility closes or a software supplier ceases trading, these unpredicted events should not be allowed to dry up supply until contingency plans start to deliver.

But practical experiences suggest that obsolescence causes real, serious and often costly problems that occur far too often Defence. Since the end of the Cold War, countries have observed, understood but tolerated inadequate Security of Supply and reduced Resilience under the guise of taking risk. Current global threats make clear that this attitude is no longer appropriate. After decades of turning blind eyes, what must be done?

Examples of Inadequate Obsolescence Management

The examples of inadequate obsolescence management (OM) are legion.

Sometimes obsolescence is a design choice. For example, before the Nimrod MRA4 first flew with the newest, largest and most sophisticated mission system software in the world at that time, the integrated chips on which the system was based were already obsolescent. The predicted life-time demand was bought in a one-off buy for the fleet as a far cheaper and less risky solution than rewriting and testing the entire software. It was an unenviable but essential stop-gap measure.

Sometimes obsolescence is deliberately planned by the supplier or becomes no longer commercially viable. For a small fleet of aircraft designed and built in-country, national parts suppliers decided for commercial reasons to cease manufacture and repair services leaving the user with rapidly increasing interim costs and eventually no spares. There are countless cases where obsolescence has crept up undetected and unmanaged until major items or piece parts used during repair became unavailable.

Efficiency initiatives since the end of the Cold War have increased readiness and resilience risk as nations optimised logistic infrastructure, reduced inventory, rationalised stock, and outsourced work to industry. This was only tolerable on the premise that there would be sufficient warning of the need to rearm. In 2020, UK's CDS stated that just-in-time supply which had worked for the predictability of stabilisation and counter insurgency operations over 20 years of war in Iraq and Afghanistan would no longer be sufficient. That lesson was not learnt until the war in Ukraine exposed the 'hollowing out' of NATO's warfighting capability. Europe now faces a huge and urgent challenge to increase Defence spending and rebuild industrial growth to restore supply chain resilience.

International crises can also create unexpected pressures. During the first Gulf War the US diverted the flow of all available F18 spares parts, despite their contracts, to their own fleets which left other nations largely unable to fly their aircraft without groundings. Finland's low priority was exacerbated by independence from NATO and the difficulty of resupply across frozen seas very close to Russia. Finland learnt that hard lesson and, ever since, has insisted that Security of Supply is a major strategic issue and requires holdings of at least 6 months' stock and repair capability in-country.

OM Principles

All this has been known for decades. The principles are simple although they can be extensive to implement with commercial implications. Is that why obsolescence is such a problem in Defence?

Fundamentally, obsolescence is a future problem where the timescale and severity cannot be precisely predicted. Regrettably, building the foundations for effective through-life OM delivers no immediate benefit to project or budget managers. Like most IPS except creating essential lists of bits, books and trained bodies for immediate Support, **obsolescence is often seen as a deferrable discretionary activity to reduce early project costs within project affordability constraints, not today's problem.** But ignoring obsolescence will increase Downtime, lose availability and increase cost.

The examples quoted above suggest important principles for OM.

- First, Obsolescence must never be a surprise. **Proactive OM must be initiated from the earliest design stages and continued through-life as an essential discipline of Integrated Product Support.** System designers choose the components so they are best placed and must be responsible for their continuing utility. The same responsibility principle must apply to Government or User Furnished Equipment.

It does not mean that the designer must pay for the design change and replacement parts – that will be discussed later – but they must be responsible for obsolescence surveillance sufficiently far ahead to allow time for resolution.

- Second, **Security of Supply must be planned, maintained and resourced to ensure Resilience**, not just for parts and software languages but also manufacturing processes, facilities, skills, support equipment etc.

Security of Supply is best measured by how long operations could be sustained in each usage scenario by predicting the months of stock available in-country allowing for on-shore repair for each item on the critical spares list and at high risk of obsolescence.

OM stands at the critical interface between engineering and logistics. The major means of mitigating obsolescence combine both disciplines - use of alternative parts and sources (which do not necessarily have to be Fit, Form & Function replacements); cannibalization including from damaged or stored systems; life-of-type buys; repair; reclamation (reduce to resupply); modification; reverse engineering; remanufacture; and redesign. Each has different lead times, cost and their own useful life. **The most critical factor is to know sufficiently far ahead to make and implement decisions to avoid experiencing the impact.**

OM Method

ISO BS EN IEC 62402 - OM¹ explains clearly and simply the required principles. The key to minimizing operational and cost impacts is to proactively look forward and plan ahead in 3 stages:

- **Identification & Assessment.** Each component in the Bill of Materials, particularly LRU/SRUs, software languages, each element of the design and manufacturing processes, support equipment and personnel skills carry some obsolescence risk which must be assessed. Comprehensive analysis could be a huge task but classic risk management techniques can be used to assess probability and impact to allow categorization to focus on the most important and likely areas. This assessment must be conducted from the earliest possible stage. Estimating potential mitigation and resolution costs and timescales is a critical element of this stage.
- **Review.** Obsolescence assessments should be reviewed through-life as an intrinsic part of regular Supportability Audits. Important methods should include appreciating technological advancements; survey of market trends of supply and demand; analysis of current and projected component availability; monitoring manufacturers' announcements, and assessment of potential supply chain disruptions. They should also include supply chain discussions to appreciate commercial positions and the suppliers' willingness and ability to sustain supply for proscribed periods. These will update the initial risk assessment to highlight areas of increasing risk for closer attention.

¹ JSP 886 Vol 7, Part 8.13 OM, now itself obsolete, was an excellent description of Policy, Plans and Processes.

- **Mitigation Strategies.** Specific options for mitigation strategies should be developed for the highest risk items. This should include the classic methods described above. Important issues will always be to answer the critical questions of:
 - How long before we run out?
 - What are the options?
 - How long before we must decide how to act?

Implementation of the strategy options is a major factor to minimize influencing both cost and the loss of availability through additional Downtime. These impacts can be evaluated using Supportability Modelling & Analysis tools to identify the most cost-effective solution.

OM must be a through-life activity. To be effective, it requires communication and collaboration between OEMs, component manufacturers and suppliers to provide early information about production changes and end-of-life alerts. This information is critical to inform lifecycle planning to predict when components may become obsolete and the timescale for mitigation action.

Obsolescence must be expected with long-term use and proactively managed. Processes must continuously monitor the status of components and regularly review potential obsolescences in the context of technology and market evolution.

Commercial Influences

End users suffer the most from obsolescence but do not have visibility of the underlying reasons and cannot resolve them. That means that they must protect themselves through contracts with the OEMs. A proactive obsolescence monitoring service is relatively straightforward to scope, design, and price for contract, and should be an essential requirement of all Support contracts.

However, the monitoring service will not include investigation and pricing of mitigation options which will need OEM assessment. The costs are impossible to forecast when the needs and timescales are unknown. Thus, it is inevitable that the customer must fund additional costs and establish budgets.

This leads to the 2 primary facets of OM:

- **Strategic OM** to estimate the financial risk to include in future budget estimates.
Risk and mitigation assessments for individual items can be used with benchmark costs, time and sensitivity analyses to estimate probable system-level impacts and potential timescales.
- **Tactical OM** to identify, mitigate and resolve specific risks at minimum cost and loss of availability.

Individual item assessments should be considered in the context of projected capability upgrades to establish when obsolescence could be resolved in combined Upkeep, Update & Upgrade modifications. Specific end-of-life obsolescence timescales could be delayed with guaranteed stock and repair capability for a period through life-of-type buys or fixed term contracts. This would often be both least costly and minimise Downtime by avoiding duplicated replacement. It is particularly fitting as part of wider component or system availability contracts.

Where stock-based solutions cannot mitigate or resolve the obsolescence impact, engineering solutions such as modification, reverse engineering, remanufacture and redesign are inevitable. These will inevitably take time to create and at additional cost. Then, the essence is to buy time.

Conclusion

Obsolescence risk is inevitable with long equipment operating lives in an evolving world. In every case, **early start of through-life OM will reveal the need, preferred solution, probable costs and timescales at earliest stage to ease budgeting, planning and delivery with the least availability impact.** Ignoring the inevitability of obsolescence is sleepwalking to increased Downtime, lost availability and greater cost especially as the cost and effort of proactive OM is small.

But like most areas of IPS other than creating essential lists of bits, books and trained bodies for immediate Support, obsolescence is seen as deferrable discretionary activity to reduce early project costs within affordability constraints. **Is that irresponsible self-harm for short-term affordability?**