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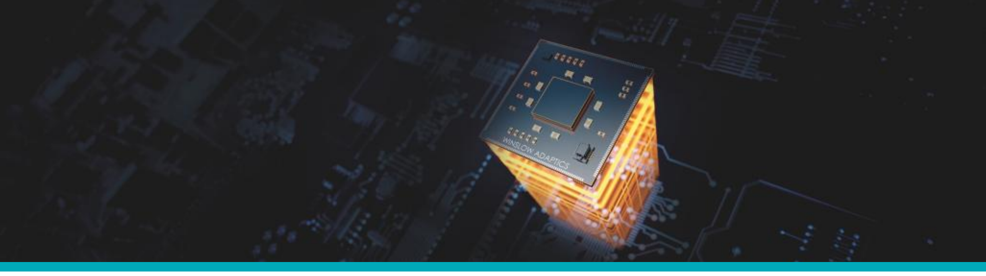


Obsolescence Surgery®

White Paper Series

The Invisible Cost of Obsolescence Execution

A Winslow Adaptics Engineering Methodology

Executive Summary

The Invisible Cost of Obsolescence Execution

Organisations managing long-life systems are under increasing pressure to address obsolescence while maintaining programme confidence, cost control, and operational continuity. Many have responded by strengthening internal capability, appointing dedicated obsolescence managers, and embedding lifecycle thinking into governance structures. In many cases, those roles are filled by experienced engineers with a deep understanding of the systems they support. Yet despite this capability, obsolescence execution continues to consume disproportionate time and attention within engineering and programme teams.

This paper explores why.

The challenges discussed in this paper are rarely the result of inadequate technical capability. More often, they emerge through interruption, context switching, late discovery and the uncertainty that accompanies change within legacy systems. These costs are rarely visible in budgets or resource plans, but they are felt acutely in lost momentum, delayed decisions, and increased programme risk.

Obsolescence strategy and obsolescence execution operate at different levels. Strategy focuses on lifecycle planning, risk registers, mitigation planning, and long-term risk management. Execution is where those strategic decisions are tested against the reality of the existing system. It is here that interface behaviour, mechanical constraints, legacy tolerances and undocumented characteristics begin to influence the engineering solution. Strong strategy does not automatically guarantee smooth execution, particularly in low-volume, high-reliability environments where historical design intent is difficult to reconstruct.

Internal teams often encounter these execution challenges infrequently and under time pressure. Specialists, by contrast, see the same classes of issues repeatedly across programmes and sectors. Internal teams may only encounter these challenges occasionally. Specialist organisations often see similar engineering patterns repeatedly across different programmes and industries. The value lies in repeated exposure rather than superior capability.

The paper suggests that the engineering effort associated with obsolescence execution is often underestimated. Not because organisations are unable to undertake the work themselves, but because that effort is drawn from engineering resource that already has competing demands.

The intent of this paper is not to advocate wholesale outsourcing, nor to diminish the role of internal obsolescence teams. On the contrary, it argues that protecting internal focus is increasingly critical as obsolescence pressures grow. Controlled, time-bounded specialist involvement, particularly through early-stage engineering assessment and feasibility activities, can act as a means of containing execution risk while preserving internal ownership and decision-making authority.
Ultimately, the goal is not to replace internal expertise, but to protect it.

1. "We'll handle it internally"

For many organisations, the default response to an obsolescence challenge is to manage the resulting mitigation activity internally. This is neither naïve nor unusual. Most engineering-led organisations have strong technical capability, established processes, and a detailed understanding of the systems they support. In many cases, responsibility for obsolescence sits with a dedicated role, supported by engineers who have lived experience of the platform in service.

Choosing to handle the resulting execution activities internally is often a rational decision. It preserves control, maintains continuity of knowledge, and avoids unnecessary external dependency. For clearly defined issues, with good documentation and limited interaction with surrounding systems, this approach can be effective.

However, obsolescence execution rarely arrives in isolation. It often emerges alongside ongoing programme activity, schedule pressure, and competing priorities. What begins as a contained task can quickly expand as undocumented assumptions surface, historical context is lost, or interface constraints become more complex than anticipated.
The question, therefore, is not whether internal teams are capable of handling obsolescence execution. The more useful question is whether absorbing that execution work, in addition to existing responsibilities, carries a cost that is not immediately visible and whether that cost is fully understood.

For the purposes of this paper, 'obsolescence execution' refers to the engineering activities required to evaluate, develop, validate, and implement a response to an obsolescence challenge within an existing system. This may include assessment, interface analysis, feasibility activities, integration, validation, and other supporting engineering work necessary to progress from risk identification to an agreed solution.

2. The modern obsolescence manager's reality

The role of the obsolescence manager has evolved significantly in recent years. In many organisations, it is now a hybrid position combining strategic oversight, technical judgement, and programme coordination. It is not uncommon for obsolescence managers to have engineering backgrounds, enabling them to engage credibly with both internal teams and external suppliers.

Alongside technical understanding, the role increasingly encompasses governance, risk reporting, audit readiness, supplier engagement, and alignment with long-term lifecycle strategy. These responsibilities require breadth of focus and continuity of attention.

The engineering activities associated with obsolescence execution often arrive on top of this workload. They are rarely neatly packaged. Information may be incomplete, documentation inconsistent, and original design intent unclear. Addressing these issues requires time, concentration, and a willingness to explore uncertainty, all of which compete with the wider responsibilities of the role.

The resulting pressure is not a function of insufficient capability. It is a function of cognitive load. As the scope of obsolescence management expands, the ability to absorb detailed execution work without impact elsewhere becomes increasingly constrained.

2.1 When obsolescence sits within engineering

Not all organisations have a dedicated obsolescence manager or formal obsolescence function. In many cases, responsibility for obsolescence sits within the engineering department itself, often distributed across multiple roles or absorbed by individuals alongside core design, support, or programme responsibilities.

This model is common, particularly in smaller teams or where systems have historically been stable and well understood. It allows decisions to be made close to the technical detail and can work effectively while obsolescence issues remain infrequent or well bounded.
However, when obsolescence execution is absorbed into engineering roles already operating at or near capacity, the invisible costs described in this paper can become more pronounced. Investigative work competes directly with delivery activity, and the impact of interruption is felt immediately in schedules and resource availability.

In such environments, the distinction between strategy and mitigation may be less formal, but the underlying pressures remain the same. Obsolescence execution still requires time, focus, and the ability to manage uncertainty. Its hidden costs continue to accumulate, even when they are not explicitly recognised as such.

3. The invisible cost stack

Much of the cost associated with obsolescence execution is not captured in budgets or resource plans. Instead, it accumulates quietly through a combination of time, disruption, and deferred activity.

3.1 Fully loaded internal cost

Internal engineering effort is often perceived as a fixed cost, already paid for, and therefore “free” to deploy. In reality, the fully loaded cost of internal resource includes far more than salary. Facilities, tools, compliance, management overhead, and non-productive time all contribute to the true cost of engineering effort.

This cost exists regardless of whether it is explicitly allocated to a task. When execution work is absorbed internally, it is still being paid for just not always recognised.

3.2 Interruption and context switching

Obsolescence execution frequently interrupts ongoing work. Engineers are required to step away from current tasks to investigate legacy interfaces, reconstruct historical decisions, or interpret incomplete data. The impact of this interruption is rarely linear. Time spent regaining context and re-establishing momentum can exceed the duration of the task itself.
As a result, a seemingly small investigation can carry a disproportionate productivity cost, particularly in teams operating close to capacity.

3.3 Opportunity cost

Perhaps the most significant cost is what does not happen as a result. Time spent on detailed execution work is time not spent managing broader obsolescence risk, progressing active programmes, or addressing emerging issues elsewhere in the system.

These opportunity costs are difficult to quantify, but they are often felt in delayed decisions, reduced oversight, and increased exposure to downstream risk. Over time, they contribute to a sense of constant pressure without a clear source.

4. Strategy vs Execution: Where friction appears

Obsolescence strategy and obsolescence execution operate at different levels of the system, and they are governed by different constraints. Strategy is necessarily abstracted. It deals with lifecycle planning, risk classification, mitigation pathways, and long-term intent. Execution, by contrast, is concrete. It is where change meets physical reality.

This distinction is often underestimated.

A well-constructed obsolescence strategy may identify that a component requires replacement, that a mitigation route is acceptable, and that risk has been managed at a system level. Execution is where those decisions are translated into hardware that must physically fit, electrically behave, and remain supportable over time.

At this stage, assumptions become critical. Mechanical envelopes that were once generous may now be constrained by modern packaging. Electrical interfaces that were tolerant in legacy designs may behave differently when driven by contemporary devices. Test approaches that relied on historical knowledge may no longer align with current tools or access limitations.

None of these issues indicate a flaw in strategy. They arise because strategy necessarily simplifies reality in order to manage it. Execution exposes the detail that strategy cannot practically capture. Friction occurs when the effort required to resolve these execution-level uncertainties is underestimated. What appears as a straightforward mitigation on paper can demand significant investigative work once undocumented behaviour, incomplete data, or cross disciplinary constraints emerge.

In organisations where obsolescence is managed alongside ongoing delivery, this friction often manifests as late discovery. Issues surface not because they were ignored, but because they could not be seen until execution was underway. By that point, time pressure and resource constraints amplify their impact.

Understanding this distinction is key. The challenge is not to improve strategy at the expense of execution, or vice versa, but to recognise that each requires different forms of attention and that execution carries a cost that is often invisible until it is already being paid.

5. Risk asymmetry: learning once versus applying experience repeatedly

A significant but often overlooked aspect of obsolescence execution is the difference between solving a problem for the first time and drawing on experience gained from solving similar problems repeatedly.

Internal engineering teams develop deep expertise around the systems they support. Depending on the nature of those systems, some obsolescence challenges may arise infrequently. When they do, engineers must invest time in reconstructing context, interpreting historical decisions and validating assumptions, often under schedule pressure.

This learning is valuable, but it is not always reusable. Once the immediate issue has been resolved, attention naturally shifts to the next engineering priority. The knowledge gained may remain within the team, but opportunities to apply it again can be limited.

Specialist engineering organisations develop experience in a different way. While every programme presents its own challenges, many of the underlying engineering issues are familiar. Mechanical constraints introduced by modern packaging, electrical behaviour that differs from legacy devices, or test approaches that no longer reflect the original design intent are encountered across many different applications.

The distinction is not one of engineering capability. It reflects the different ways experience is acquired. Internal teams build expertise through deep knowledge of their own systems. Specialist organisations develop experience by working across multiple programmes, technologies and industries, recognising engineering patterns that may not be immediately obvious within a single environment.

This difference becomes more significant where obsolescence execution is infrequent or unpredictable. Each investigation begins with its own technical context, and time is spent understanding the problem before engineering decisions can be made. That investment is often entirely appropriate, but it still draws on valuable engineering resource.

From a risk perspective, the question is not whether internal teams can resolve execution challenges. It is whether repeatedly investing engineering time to reduce uncertainty is the most effective way to manage programme risk, both now and over the longer term, when relevant experience may already exist elsewhere.

Recognising this distinction allows organisations to make more deliberate decisions about how engineering effort is applied. Internal teams contribute system knowledge, operational understanding and design authority. Specialist engineering organisations contribute experience gained from solving similar classes of engineering problem across multiple applications. Those perspectives are complementary. Used together, they can reduce uncertainty while allowing the organisation to retain ownership of both the engineering decisions and the final outcome.

6. When internal execution makes sense and when it begins to strain

Not all obsolescence execution places the same demands on an organisation. In many cases, handling execution internally is entirely appropriate and effective. Problems arise not from internal execution itself, but from the cumulative impact of complexity, uncertainty, and timing.

Internal execution typically works well when the scope of change is well understood and bounded. This is often the case where documentation is complete, system behaviour is known, and the interaction with surrounding hardware or software is limited. In such cases, internal teams can progress efficiently, drawing on existing knowledge and established processes.

Execution also tends to remain manageable when obsolescence issues can be addressed in isolation, without significant interaction across mechanical, electrical, or test domains. Where assumptions are clear and risk is localised, internal handling offers speed and continuity.

Strain begins to appear when these conditions no longer hold.

Incomplete information and undocumented design decisions introduce uncertainty from the outset. Where work spans mechanical, electrical or test disciplines, that uncertainty often grows as the investigation progresses. When those discoveries are made late in the process once schedules are committed and resources allocated further amplifies its impact.

In these situations, the challenge is not technical difficulty alone, but the way execution work competes with ongoing responsibilities. Engineering teams and obsolescence managers are required to switch context, revisit assumptions, and resolve ambiguity while still maintaining oversight of broader lifecycle risk.

Over time, this pattern can lead to a reactive mode of operation, where execution tasks are addressed as they arise rather than being contained proactively. The result is often a sense of constant pressure, even when individual issues appear manageable in isolation.

Recognising the conditions under which internal execution begins to strain allows organisations to intervene earlier. That intervention may take different forms depending on the organisation, the programme and the engineering challenge. The important point is that the decision is made deliberately, rather than as a reaction to mounting pressure.

7. Containing execution without losing control

When obsolescence execution begins to strain internal capacity, the response is often framed as a binary choice: absorb the work internally or outsource it entirely. In practice, engineering decisions are rarely that straightforward. There is a wide middle ground in which execution effort can be contained without transferring ownership or decision-making authority.

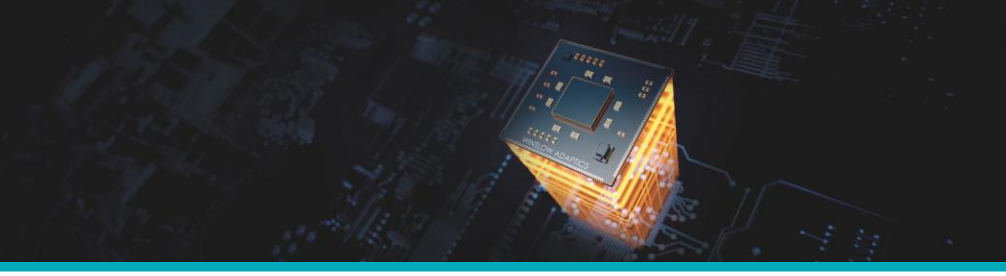
Containing execution means understanding what needs to be established before significant engineering effort is committed. It involves deciding what needs to be understood, over what timescale, and to what level of confidence before further engineering work begins. Not every uncertainty has to be resolved immediately, but early, focused investigation can prevent much larger problems emerging later in the programme.

Time-bounded feasibility and early-stage engineering assessment are one way of achieving this. By limiting the scope and duration of the work, organisations can resolve key uncertainties, establish whether a viable engineering path exists, and decide how best to proceed before committing significant engineering resource.

Crucially, containment does not equate to relinquishing control. Internal teams retain responsibility for decisions, priorities, and risk acceptance. External support, where used, operates within clearly defined parameters and contributes to decision-making rather than replacing it.

This model is particularly effective in environments where obsolescence execution is episodic rather than continuous. Instead of repeatedly absorbing high-impact learning under time pressure, organisations can compress uncertainty into deliberate, managed activities that align with programme planning and resource availability.

By reframing specialist involvement as a governance tool rather than a delivery shortcut, obsolescence managers and engineering leaders can protect internal focus while maintaining confidence in execution outcomes.



Conclusion: Protecting focus, not replacing expertise

The challenges explored in this paper are not the result of inadequate capability or insufficient diligence. They reflect the increasing complexity of obsolescence execution in long-life systems, and the growing breadth of responsibility carried by those tasked with managing it.

Obsolescence managers and engineering teams are increasingly being asked to balance long-term strategy with the practical demands of programme delivery, often in environments where information is incomplete and historical context is fading. In this setting, the cost of execution is often paid invisibly through disruption, delayed progress, and cumulative pressure rather than explicit expenditure.

Making these costs visible enables more deliberate choices. It allows organisations to distinguish between work that is best absorbed internally and work that benefits from controlled, specialist engineering support. Seen in that context, external involvement is not a loss of capability, but a means of protecting it.

As obsolescence pressures continue to grow, the ability to manage execution effort, not just technical risk, will become increasingly important. The goal is not to reduce internal expertise, but to ensure it is applied where it adds the greatest value.

As obsolescence pressures continue to grow, the ability to manage execution effort, not just technical risk, will become increasingly important. The goal is not to reduce internal expertise, but to ensure it is applied where it adds the greatest value. As engineering demands continue to grow, decisions about where and how engineering effort is applied will become just as important as the technical solutions themselves.

This paper is the first in the Winslow Adaptics Engineering Insight Series. The series explores the engineering challenges associated with sustaining long-life electronic and electromechanical systems, encouraging informed discussion and supporting better engineering decision-making rather than prescribing a single solution.

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