

Decisions in asset management

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Different asset life cycle stages represent very different decision-making environments and offer different opportunities to influence the whole life cycle value. In particular there are three distinct environments (see Figure 1).

1 Beginning of life stage:

In the 'green field' environment of initial investment, procurement or asset creation decisions, we have to make very significant choices with immediate and future cost implications and, potentially, long term business-critical consequences. But we have to make the decisions with inherently weak data, since we have no direct experience of the assets yet; our decisions are based upon potentially long-term forecasts and assumptions about demand, economics, supply chains and resources. So we are facing high cost, business-critical decisions with uncertain information, and the whole asset life cycle in which to suffer the consequences of our misjudgements.

Furthermore, we tend to compound these decision-making problems with the bad habit of recognising and rewarding

engineering or construction projects based mainly on the easiest short-term things to measure, such as delivery 'on-time and under-budget'. This means that subsequent operability, reliability, maintainability and sustainability are treated as less significant in decision-making.

As often quoted in life cycle costing papers and training materials, 80% of the whole life cycle cost may be pre-determined during the design stage, yet only 20% of the cost is actually incurred during the beginning-of-life phase. But, whether we are buying an inkjet printer or a multi-million dollar turbo-compressor, building production facilities or hospitals, the pressure to reduce the initial purchase (or construction) cost is immediate and tangible, whereas future operating, maintenance and eventual renewal costs are fuzzy and, in many cases, 'someone else's problem'. We usually end up paying for it later, however.

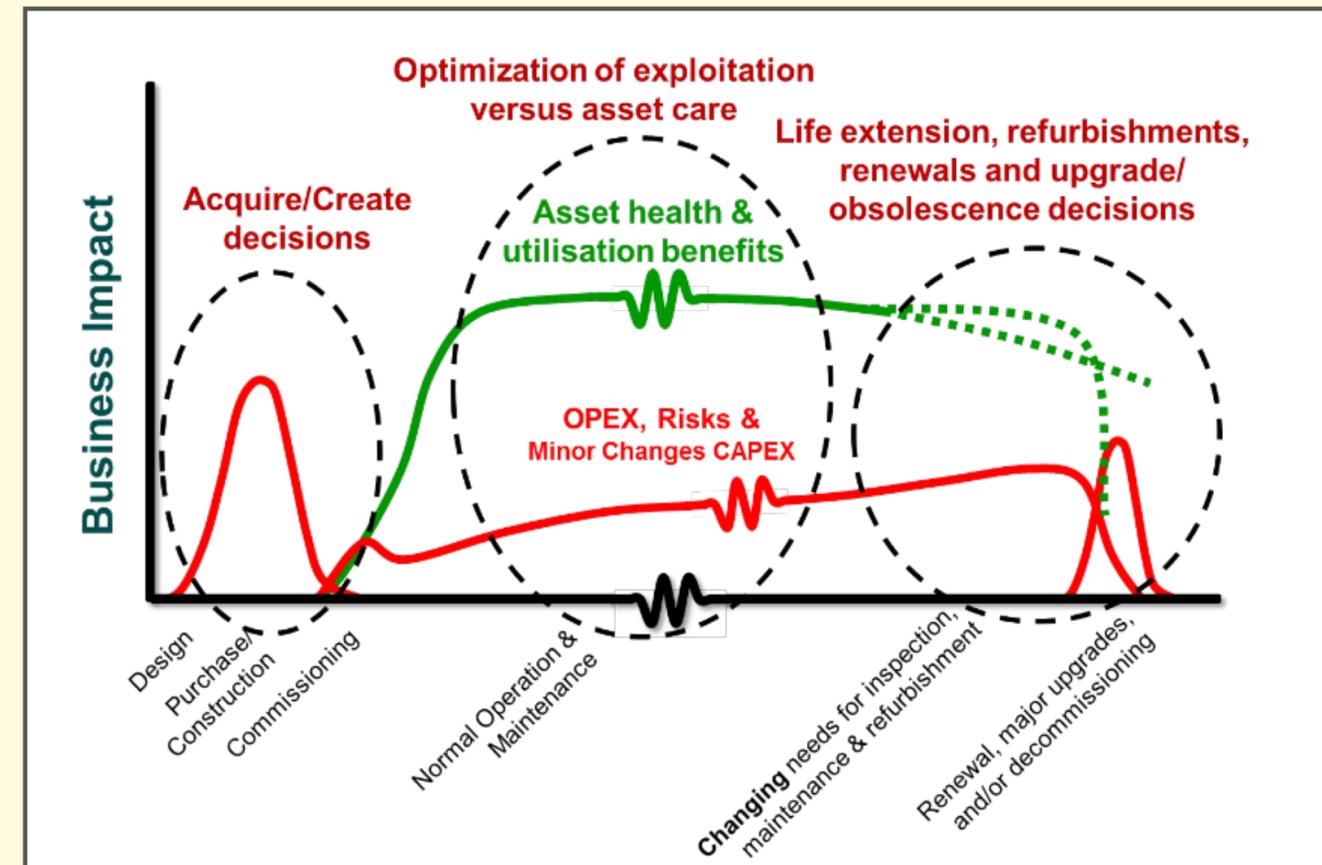


Figure 1. Different decision-making environments in asset life cycles

2 Normal Operation and Maintenance Stage:

The normal, 'steady-state' operational stage of an asset's life, involves the competing desires to *exploit the assets* to the maximum, while also needing to *care for them* to ensure ongoing usefulness. This creates a natural tension between exploiters (operations) and carers (maintenance) that must be addressed in the day-to-day decision-making. For example, shutting down a system for maintenance clearly impacts operations, and the way in which assets are operated or used can have a big effect upon their need for maintenance.

Furthermore, there is often a time-lag to consider decisions about what to do in the short term (operations and/or maintenance) often have a delayed effect upon the need for other actions later. Sweating the assets now, to achieve higher short-term performance, may result in performance losses (asset failures) and extra maintenance or earlier renewal costs in the future.

In contrast to the 'greenfield' decision-making, the operational phase gives us a chance to observe and capture real evidence about asset performance, condition, costs etc. So hard data can increasingly support the decision-making processes.

3 End-of-life Decision-making Stage

No matter how well assets are maintained, there can come a point where 'steady state' is no longer an option. This marks the *end-of-life* decision-making environment, where considerations of major investment such as renewal, modification or decommissioning must be considered (along with options to avoid or defer such interventions).

Of course, this 'aging assets' circumstance is not limited to cases of 'old' assets or deterioration of assets – it also includes changing *external* factors such as customer demand, technology overtake (obsolescence), competition, economics or supply chain changes. And, like the beginning-of-life phase, the 'brown field' redevelopment options represent potentially big costs, uncertainties and business consequences.

In contrast with the green field (beginning of life) cases, we do now have better knowledge and experience of the behaviour of the *current* assets. Nevertheless, extrapolations into the future will still be uncertain and there may be a variety of life extension options, renewal, upgrade or decommissioning issues to consider, many of which will involve high costs and uncertain future impacts.

And the *timing* of such interventions is often critical. When operating costs, performance or risks are changing (i.e. no longer in steady state), then the cost/benefit of refurbishment, replacement or modification (or contingency planning options such as purchase of spares while we can) are tightly dependent on the 'when?' decision. Decisions about aging assets are both business-critical and timing-critical.

Challenges we face in making good decisions

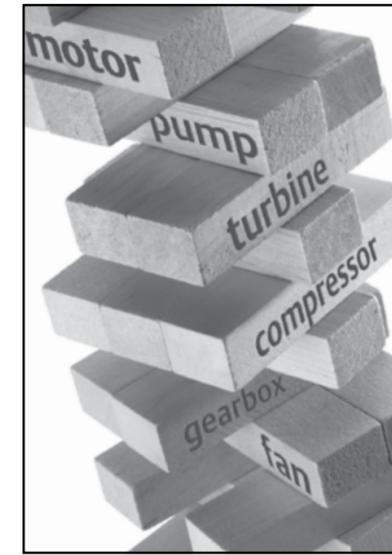
Before identifying the methods for making these different decisions at different life cycle stages, we must first recognise the real-world problems that we face in making the objectively correct or best value choices. These practical problems are typical and widespread, so it is no use introducing sophisticated methods that will fail due to inadequate data, organisational constraints, workforce acceptance or competency. Our decision-making processes and tools must be able to cope with the following:

- **Conflicting interests**

If we only see the world from the perspective of a personal or departmental performance goal or budget responsibility, it will be hard to find and demonstrate the best value position for the organisation. Asset management decisions are invariably cross-disciplinary, so consultation, team-working and collaboration mechanisms are needed to get the right decisions made. Unfortunately we often encounter budget protectionism, vested interests and, even at senior management levels, a difference between what is *said* and what is *done* or encouraged.

- **Conflicting Performance Measures**

Badly chosen performance indicators (KPIs) compound and reinforce the problem of functional silos. If one group can only succeed at the expense of another, then the search for best overall value can easily be lost in the noise of competing priorities and protectionism.



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• Short-termism

Hard evidence today (costs, asset performance) often carries more decision weight and credibility than future forecasts and probabilities. And this problem is compounded by management rotations, regulatory and political cycles (with each leader wishing to make a visible, tangible difference within their short period of responsibility). So decision-making methods will have to compensate; providing quantified and credible evaluation of future impacts when making decisions about immediate actions or expenditures.

• Fire-fighting Culture

Fire-fighting behaviour can be a cultural habit that is hard to break. The reactive workload may be too great to allow 'time to think', or it may be just simpler to wait until forced to act. In such an environment, the shift to proactive, preventive and defect elimination activities is a big culture change. And we often make this worse by celebrating and rewarding the 'heroes' who cope well in an emergency – while failing to recognise and applaud those who do not have such crises in the first place.

• Efficiency Versus Effectiveness

For many years organisations have been chasing ever greater efficiency: doing what we do quicker, smarter, better, cheaper. Unfortunately this preoccupation with improving efficiency can sometimes result in "doing the *wrong* work 10% quicker/better/cheaper". Our decision-making methods need to ensure that we are *doing the right things* as well as *doing them right*.

• Business and communications skills for engineers

Technical staff do not easily speak the same language as the finance director, and technical 'justifications' for asset improvements sometimes get rejected, even if they are the correct things to do. So it is not enough just to determine the right solution; the conclusion must be explained in business terms (value for money). And it is not only the financial approvers who will need convincing. Those who will be responsible for implementing the decision also need to understand and accept why it is the right decision. So explain-ability of the results will be a key feature of good asset management decision-making.

• Quantification of risks

Nearly all asset management decisions will involve risks and uncertainties. So we need a rational and consistent management process for the wide range of commercial, technical, safety and customer/public perception risks that will be encountered. Furthermore, in the case of asset interventions such as inspections, maintenance and renewal, it is often the patterns of changing risks that matter most. Decision-making must consider risks that might be introduced by an intervention as well as the degradation-related, increasing risks that are perhaps the reason for considering an intervention in the first place.

• Data

Too much of it, not enough of it, inadequate quality or the wrong sort, and how is it, or should it be, used?

The whole subject of data, information and knowledge management is a mess for many organisations. And some very expensive mistakes are made in the over-ambition and under-delivery of 'solutions' to the problem: in many cases, the "Enterprise Asset (information) Management" (EAM) system has become a tail that is wagging the dog. So, whilst it is clear that 'fact-based' decisions are highly desirable, the identification of what data to collect, at *what* cost and time investment, and *how we would use it correctly*, must be part of pragmatic decision-making.

All of these issues have to be addressed in decision-making mechanisms that determine the right things to do, for the right reasons, at the right time. So the SALVO process has to be very people-oriented, be able to cope with widely varying data quality, navigate conflicting agendas & yet still retain sufficient transparency so that conclusions are easily explainable to different audiences. Quite a challenge!

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SALVO Process: bridging the gap between technical and financial viewpoints

The SALVO [Strategic Assets: Lifecycle Value Optimization] Process is the result of a 4-year multi-industry collaboration programme to define best practices in asset management decision-making. The Process is now summarised in an easy-to-read guidebook, packed with insights, tips and examples.



Stephen Morris, outgoing President of the Institute of Asset Management (UK), says, "The SALVO Project is an influential piece of research; it goes beyond the theoretical by also developing practical methods for ensuring optimal investment and intervention plans. One of the significant and important features of the SALVO Project is that it has been developed with, and field tested by, some of the world's leading practitioners and organisations. This is an important piece of work that should be part of every asset manager's and infrastructure investor's tool kit."

The full range of outputs from the SALVO project include:

- Modular **training courses** for asset investments, modifications, inspection, maintenance, spares, shutdown strategies, refurbishment, life extension options, obsolescence and replacement decisions.

- Step-by-step **technical 'playbook'**: commercially licensed comprehensive methodology, with competency framework, business processes and culture change assistance.
- Modular **decision-support tool box**: suite of leading edge evaluation tools to guide the process, quantify business impact, calculate optimal intervention timings, explore data sensitivities and capture assumptions/audit trails.

For more information or to purchase the SALVO Guidebook online: see www.SALVOproject.org and www.decisionsupporttools.com



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