Q. Why Use SCO?
A. To Sustain Optimum Performance of Support Packages

You should you use SCO to:

- Identify the parts in a support package which will run out in sufficient time to take effective action.
- Identify the remedial actions that will prevent future support system default.
- Prioritise the remedial actions by cost and the lead time needed to take action.
- Justify the business cost benefits of early action.
- Predict future support package performance.

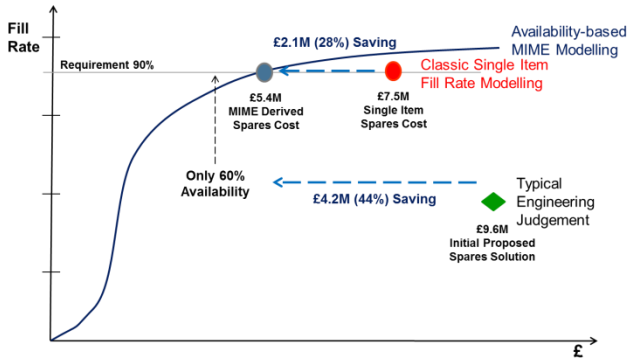
SCO provides near real-time intervention advice to restore and sustain optimum system performance

The aim of spares provisioning is to choose the spares that maximise Operational Availability (Ao) for an affordable cost, or minimises the cost for a required Ao. To preserve system availability, the spares stock must be sufficient to cover the time taken to replenish the stock with a serviceable item. The main drivers are failure rates, repair turn-round times and both purchase and repair costs.

There are 3 typical approaches to calculate stocks.

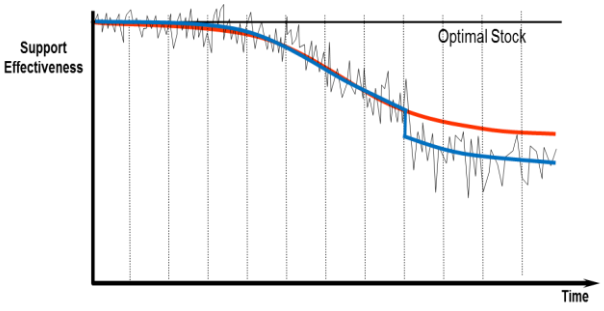
- Engineering judgement based on previous experience, but this is often flawed leading to shortfalls or expensive stock holdings.
- Single Item Modelling works at the item level treating each part independently. Typical measures of performance are Off-the-Shelf and Overall Satisfaction Rates that, in effect, describe the confidence of having a specific part available when required. These measures are also called Fill Rates. This approach can be described colloquially as “Happy Shelves”.
- System-based modelling works at system level, addressing all parts simultaneously with overall system availability being the key performance metric. By choosing to hold the spare with the largest impact on system availability, at a cost, the overall risk or shortage is reduced for the overall system. Multi-Indenture Multi-Echelon (MIME) modelling incorporates these principles for complex environments where spares are required at multiple locations, with partial or full repairs at various levels. This approach can be described colloquially as “Happy Systems”.

Over many years, Engineering Judgement has proven to be least effective and most expensive. Single Item Modelling is better but, for a given Ao, **System-based Modelling typically produces scales that are 25-30% cheaper, as illustrated below from recent MOD data.**



However, three effects will combine progressively to undermine the original effectiveness of the optimised solution as illustrated below.

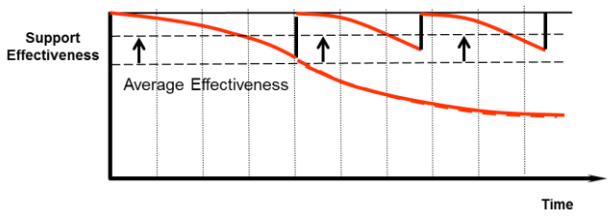
- **Gradual change** in underlying assumptions and conditions – reliability, price increases inflation, delay times, repair costs, NFF rates, technology obsolescence etc.
- **Major change** in the ‘state of the world’ or exogenous influences on the stock solution - fleet size, flying rate, rebasing or route network, operating profile and environments.
- **Short-term Fluctuation** in the probability distributions of attributes which determine steady state averages - failure distributions, actual delivery times, repair fractions, currency fluctuations.



The cumulative impact over time over time degrades inventory efficiency, increases cost and erodes profitability. This impact is well recognised and is the reason why Engineering Maintenance Policy Review should be conducted periodically followed by Scale

Reviews to adjust Spares Scales. Policy suggests that these reviews should be carried out at 5-yearly intervals, but this has withered and largely been forgotten because of a shortage of analytical resources and diminishing experience.

Periodic reviews, as illustrated below, shift average effectiveness depending on their periodicity. The more frequent the activity, the greater the average improvement. Thus ideally, the process should be automated and frequent to minimise degradation.



Re-provisioning

But there is another less well recognised factor in play. Once initial scales are established, stock levels are maintained automatically by algorithms within the various inventory management and ordering systems for re-provisioning (RP).

For consumables, RP is a relatively simple exercise of ordering in economic quantities sufficiently early for the remaining stock to last for the procurement lead time. For repairable items, the planned stock levels should be sufficient to maintain sufficient available serviceable items while unserviceable items are in the repair loop. In both cases, incorrect planning assumptions would lead to incorrect stock levels with either an increased risk of shortage or, just as bad but less immediately visible, excess stock from wasted investment. Using refreshed data would be sensible

RP uses historic consumption trends as the best indication of future need using Establishment Variation Factors (EVFs) to adjust stocks to anticipate future demand needs such as: the introduction of new equipment until a recurring consumption is established; increased consumption due to increased rates of effort; movements of squadrons or aircraft between units; and fleet run-downs. But EVFs are for special cases. In general, the automated algorithms work well provided that manual intervention by inventory managers or units is carefully considered to ensure that unwanted effects do not occur.

However, current RP algorithms are fundamentally Single Item Modelling approaches. All the benefits of adopting System-based Modelling initially will be progressively eroded leading, by a reversal of the previous logic, to 25-33% more expensive and less effective solutions from Single Item approaches.

Given the potential saving, System-based Modelling should be used for RP through-life.

Support Chain Optimisation - SCO

The ideal is to combine very regular and automated periodic review with Availability-Based modelling across the whole system. Fortunately, continuous availability-based RP is now possible through use of TFD's proprietary tool ***SCO***.

SCO takes regular feeds from customer transaction systems such as ERPs to establish '*What Is Where*' across the inventory range. Using transaction histories to derive up-to-date demand patterns, ***SCO*** simulates forward to assess '*What Will Be Where*' to suggest where, when and for what items future stock shortfalls may occur. But while warning of impending support failure is helpful, it provides no indication of how to avoid them. The third function of ***SCO*** is to optimise the system by assessing the comparative costs and benefits of a wide range of potential mitigation measures such as to move, repair, don't repair, expedite, buy, loan, exchange or take engineering action in order to achieve '*What Should be Where*'. Most importantly, ***SCO*** prioritises the candidate actions by cost effectiveness and identifies the available time to act (or wait and see). It identifies what should be done, in what order and in what timescale to avoid support failure and predict the benefit for future mission capability.

SCO provides automated advice perhaps weekly, or monthly for smaller systems. It provides individual inventory range mangers with advice on where to focus their attention for maximum system-level effect through an intervention action list ranked in order of exposure.

SCO provides continuous availability-based inventory optimisation that sustains mission capability at lower cost by preserving the initial benefits of a system-based optimisation, and avoiding normally unseen in-service cost growth.

By recognising and addressing the simple, fundamental weakness of single item management that is endemic within RP systems, ***TFD's SCO*** **provides a quantum step change in inventory management and offers very significant cost avoidance of 25-33%.**