Q. Why Use Tempo?

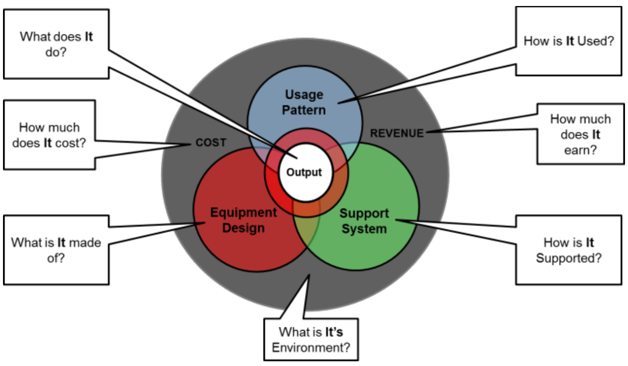
A. The First Spares Optimization Tool to Deal Directly with Changes over Time

You should you use ***Tempo*** when you need to:

- Develop optimum spares scales to meet fleet availability targets where:
    - The operational usage or fleet disposition changes over time through fleet expansion, re-basing, re-role or run-down.
    - Equipment design changes over time because of obsolescence, modifications, upgrades, or reliability improvement programmes.
    - Support arrangements change over time as maintenance and repair policies, contractors, their performance and price evolve.
    - While minimising wasted investment in stock with a short useable life.

Tempo – The Next generation Inventory Optimization Tool

The cost and output of a Capability are defined by the interaction of its Usage Pattern, its Equipment Design as described by the system structure and the related attributes such as reliability and maintainability, and the Support System.



The critical outcomes of operational performance such as system availability and cost are the result of the complex interaction of these three key features.

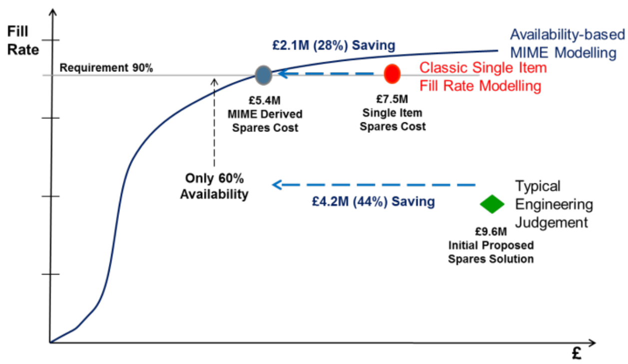
Spares Provisioning

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 the failure rates, the repair turn-round times, if appropriate, and both the purchase and repair costs. Reducing repair turn-round times will minimise the need to hold spares to stock the pipeline.

There are 3 typical approaches to calculate stocks.

- Engineering judgement based on previous experience. This approach 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 which, 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 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 the least effective and most expensive approach. Single Item Modelling for each item is better but for a given availability level System-based Modelling typically produces scales that are 25-30% cheaper as illustrated below from recent MOD data.



However, all current spares optimisation tool are steady state and assume long-term, steady-state scenarios, which remain unchanged forever. In the real world, the situation always changes as basing, activity levels, support arrangements, even system configuration, evolve. Thus, current tools will be incorrect in calculating optimum scales for changing scenarios.

In a best attempt to address the issue, users of steady-state tools can chain together a sequence of runs. But each run is unaware of subsequent changes and optimises a permanent situation.

Why *Tempo* is Different

Tempo changes the game by addressing directly – and correctly – the complex impact of time. It creates a calendar of changes in such as operating pattern, hardware and support scenarios: basing, usage rates and Ao targets, configuration, lead times, reliability improvements and prices. For the first time, technological obsolescence and the remaining useful life of parts can be applied to directly influence future spares purchasing decisions and minimize waste from buying excessive parts that will be retired early.

Tempo automatically manages the changes to reduce time, labour and errors. It incorporates 7 important changes to take direct account of time:

- ***Tempo*** captures changes to key variables over time such as changes to hardware attributes such as reliability and unit price, and changes to fielding scenarios such as fleet size and usage rates.
- ***Tempo*** maintains a complex set of calendars to separate and account for specific points at which inventory solutions are required. These include budget cycles, delivery schedules, reliability growth or wear-out, and the Mean Technological Life (MTL) by class or item.
- ***Tempo*** considers the specific time period over which a spare part can be used which might be less than the whole system life because the procurement or repair lead times delay the delivery of benefit from a spare. Approaching the end of system life has the same effect. Obsolescence or MTL can shorten the usefulness and, thus, the Return on Investment of a spare.
- ***Tempo*** evaluates each increase in stock against hybrid and multiple performance targets to meet complex contractual frameworks that could include targets for Ao, fill rate and delay times.
- ***Tempo*** contains an enhanced analytical engine that uses an economic present value 'bang for buck' ratio for marginal optimization.
- ***Tempo*** relieves the analyst of drudgery and reduces error-prone analytical tasks. Currently, analysts using steady-state models must split scenarios into multiple time-slices, one for each fixed condition, and load results from the last run as inputs to the next. As the volume of change increases, complexity, workload, time and the probability of error grow exponentially.
- ***Tempo*** delivers new time-based analytical outputs showing the comparative inventory and performance results through time.

Tempo is ideal for:

- Budget trade-offs between expensive, long-lead time parts that will be critical at some stage and inexpensive short lead time items that might provide immediate performance. ***Tempo*** determines the proper mix by comparing the cost and return corrected to Net Present Value.
- Complex, multi-period Performance Based Logistics environments with multiple metrics and KPIs. ***Tempo*** can optimize a complex mix of metrics by comparing the incentive reward against the cost.
- Obsolescence and Aging Systems where technology insertion, mid-life upgrades and late-life spares requirements are inevitable. ***Tempo*** recognizes the differences between the useful life of a part and that of the system in which it is fitted, and calculates their respective value.
- Scenarios of simultaneous new-fleet build-up and old-fleet retirement, characterized by changing Ao targets, operating tempos and basing. ***Tempo*** provides all solutions in a single run.
- Expeditionary temporary deployments, training exercises and other time-bound excursions requiring spares solutions integrated with long-term, normal deployment solutions.

A solution optimized in ***Tempo*** is superior to one provided by steady-state tools because it:

- Explicitly handles inevitable changing scenarios
- Avoids the errors implicit in steady-state models including over-stocking of life-limited and long-lead time parts
- Maximizes return on investment and avoids waste from market-driven obsolescence
- Optimizes procurement timing to match fleet build-up, re-basing and run-down for lowest cost.
- Deals explicitly with time, eliminating the drudgery of hand-made multi-period calculations

***Tempo* is the next generation Inventory Optimization Tool**