Aspîre - Analyse. Optimise. Deliver.

Support Optimisation
Reversing the Salami Slicer

"*A journey of a thousand miles begins with a single step*"
Lao Tzu, 6th century BC

"*… we should think small, not big, and adopt a philosophy of continuous improvement, through the aggregation of marginal gains*"
Sir David Brailsford – British Cycling Team 2015

The idea that small steps can combine to deliver a substantial effect has stood the test of time. 2,600 years having passed between these two quotes…

…but is such an approach applicable to Support Engineering in the 21st century?

Many of the issues associated with the cost and effectiveness of modern Support Solutions are the result of a preoccupation with, and the endless pursuit of, a 'silver bullet', the hope that a single 'big fix' will address all our problems.

The problem with big fix solutions is that whilst they seem to be achievable, they tend to hover just out of our grasp. As a result, because the big fix is always 'coming', Support Engineers often encounter strong resistance when they try to introduce even quite small changes. This is a great mistake…

There is a wealth of literature that argues the effectiveness of incremental change strategies, Kaizen being the most well known example and the success of British Cycling, headed by Sir Dave Brailsford, the most recent. Dave Brailsford applied the theory of Marginal Gains when coaching the British Cycling Team and achieved astonishing success in both track and road events, in the Olympics and the Tour de France respectively.

The idea obviously works in the world of cycling, but is it applicable to Support Engineering? The simple answer is…yes.

A Support Solution is a very complex system. It includes aspects of:

- The **Mission System** – the system design
- The **Employment Plan** - the manner and the environment in which that system is deployed
- The **Support System** - the support infrastructure, processes and resources etc.

This concept has been addressed in other articles; the critical point, in this context, is that we are dealing with complex systems the elements of which interact in complex ways.

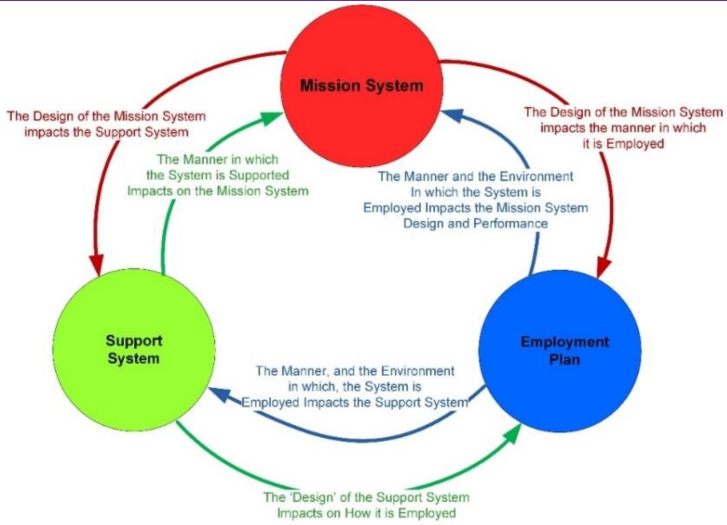


Figure 1 - The Elements of the Total System interact in a complex manner

So…what?

Well, when small improvements are made to different aspects of such systems, they can, through these interactions, deliver a dramatic, sometimes unexpected, improvement at the level of the **Total System**.

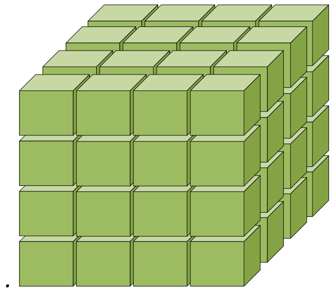
Imagine that the Support Solution is a hosepipe and that a kink represents an opportunity for improvement. If a single kink is eased it will have little effect on the output of the hosepipe, if however all the kinks are eased, even just a little, then the flow through the hosepipe improves. Hence a series of small changes may have a significantly greater impact than a single large one.

Simple, isn't it?

The hosepipe is a good analogy, but complex systems interact in more complex ways and emergent properties - which exhibit themselves at the level of the Total System - are a product of those interactions. Those critical Support parameters, **Availability** and **Through Life Cost (TLC)** are real-world examples of emergent properties.

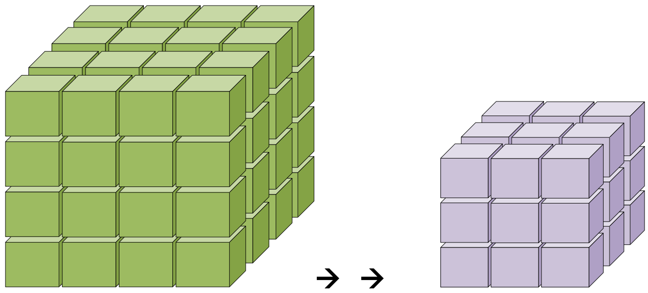
The key word above is product. The level of improvement (or otherwise) is more akin to the product of all changes rather than their sum.

Consider the illustration below.



Imagine a system with three variables and that each variable is represented by an axis of a cube. That the cube is 100 cm on each side and is composed of sixty four cubes

Now imagine that we reduce each face of the cube by 25 cm by removing a layer of cubes from each axis.



What percentage of our system is left? (Make a rough estimate before making any calculations).

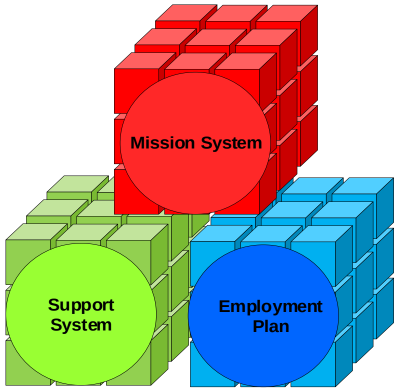
The answer may come as a bit of a surprise…

The original cube was 100cm x 100cm x 100cm = 1,000,000 cm^3.

The new cube is 75cm x 75 cm x 75 cm = 421,875 cm^3.

We are left with only **42%** of our original cube.

But Support Engineering is more complex than this, and is not constrained to only three variables as in the cube analogy.



Consider the number of variables that affect the support characteristics of the Mission System, the Support System and the Employment Plan, consider how these three elements may interact…

Understand also that this can work against, as well as for, us.

When ILS programmes are under resourced, when Support Analyses are not performed and the maintenance plan is not optimal, when support resources are cut to save money, then the cumulative effect of this "salami slicing" of will be a detrimental reduction in operational capability and an increase in TLC that may be far greater than our intuition would lead us to believe

But…

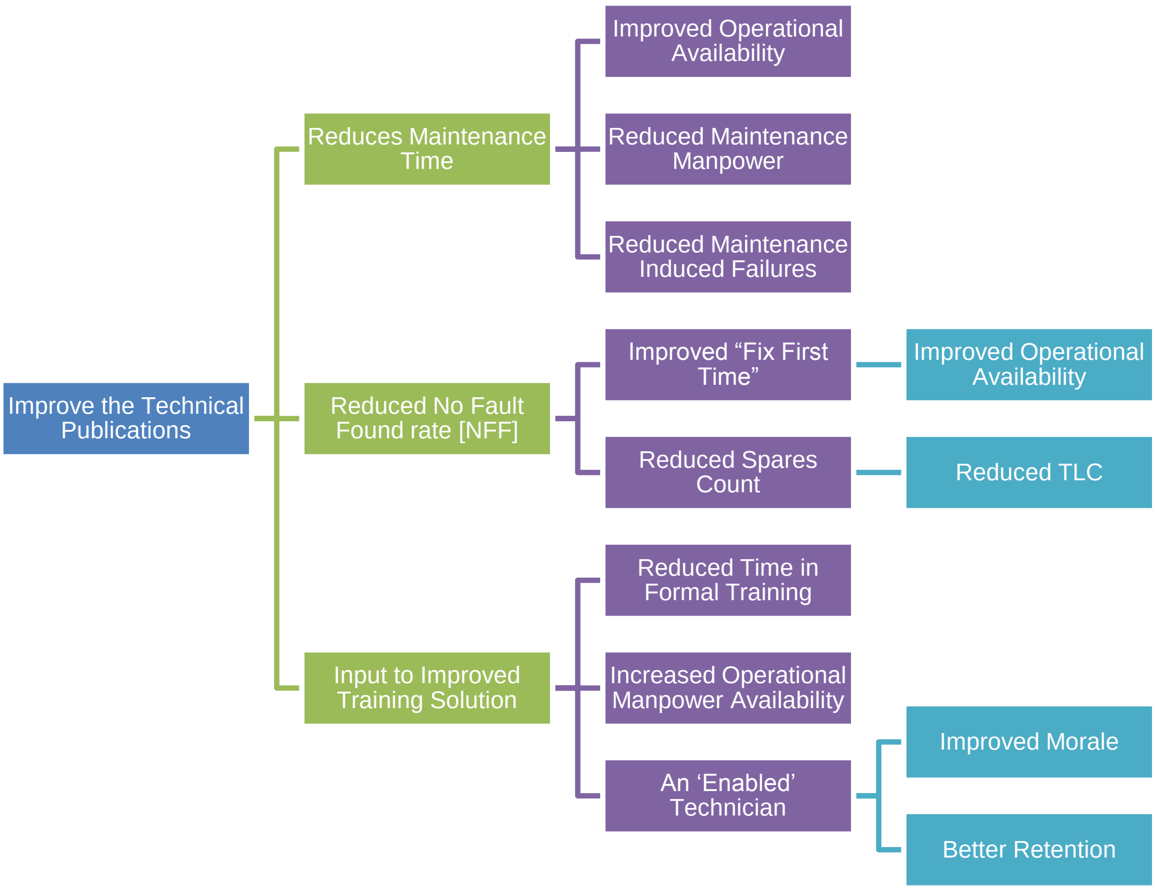
We **can** "*Reverse the Salami Slicer*".

We can:

- ❑ Gain an understanding of these complex interactions and make them work for us
- ❑ Deliver significant improvements by making a select number of small changes
- ❑ Test and plan our interventions prior to implementation, by using a simulation, by conducting sensitivity analyses, or …
- ❑ We could also adopt the "just do it" approach often promoted for Kaizen[1].

Leaving aside hosepipes, cubes and salami what could this look like in a real support solution?

Let's make a single, simple change and see how profound an effect it can have.



This hierarchy is not exhaustive but to illustrate how a single small change can continue to affect the support solution lets pick up on the potential to reduced TLC because we have reduced the spares count.

The cost benefit is not just in terms of the cost of spares per se however, we have to consider the cost of movement of such

[1] *The Kaizen philosophy is that we should not over analyse the need or the probable cost benefits of small improvements but just implement them, and do so continuously.*

spares to and from the theatre of operations, the cost of storing the resources in theatre, the cost of contractor fault investigations, and the cost of packaging etc.

Reducing any support resource in theatre has a potentially profound effect, less resources means that we need less storage space, less storage space means fewer buildings; less people means less food, less water, fewer cooks, fewer vehicles, fewer facilities etc. Operationally this means less people in harm's way, fewer resources to move around the theatre of operations, fewer to protect from enemy action. Fewer vehicles means less fuel, fewer support resources for those vehicles, and so it goes on.

Combine that simple improvement to technical publications with changes to the Mission System design, a modification programme introducing slightly more reliable equipment with improved Built in Test [BIT] say, or perhaps we purchase some improved test equipment that enables us to rapidly identify and to eliminate intermittent faults associated with electrical harnesses; and you can understand how these factors can combine in order to produce unexpectedly large benefits.

A remorseless and continuous programme of incremental improvement, addressing the support of critical Defence systems would deliver a colossal return on investment [ROI], in terms of TLC, whilst improving operational effectiveness.

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