How Operational Research shaped the MOD's new operating model for science and technology

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DESIGN

Introduction

In 2015 the Government's Chief Scientific Advisor (GCSA) published the Science Capability Review (SCR), which recommended changes to the way that Defence Science and Technology (S&T) was commissioned and managed.

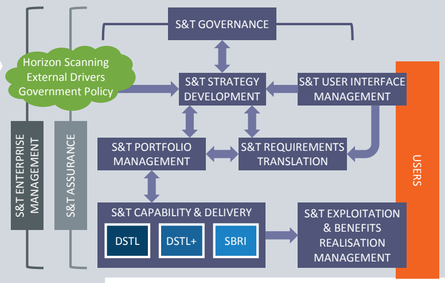
A new model (right) was developed that provides transparency and accountability and, crucially, distinguished the customer from the providers of S&T.

To construct a transformational portfolio of S&T – as was sought – the new model pertains to all S&T for defence and security; nothing is exempt. To manage the impact to ongoing research, and to prepare S&T capabilities, an interim transitional portfolio will be commissioned in April 2017, followed by transformation 1 – 2 years later.

This poster describes the Operational Research that informed the DESIGN of the operating model (right) and its EXECUTION (below).

New Operating Model for Defence Science & Technology

Building on the principal of structural separation between customer and provider, the new model identified discrete functions within the enterprise to integrate customer needs, strategy, delivery, management and assurance.



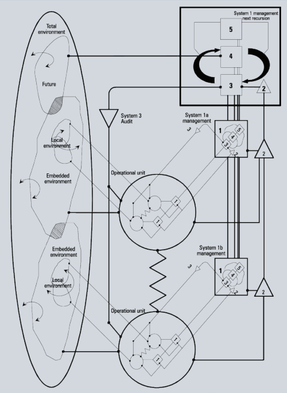
Application of the Viable Systems Model

The Viable Systems Model (VSM) (right), developed by Stafford Beer in 1972, is a template for an organisation (or indeed any autonomous system) intended to survive in a changing environment. Inspired by the survival of organisms in nature, the model emphasises adaptability and is recursive: viable systems may contain viable systems.

As the operating model was designed with the principles of VSM in mind (its functions may be mapped to VSM's five systems), its implementation was tracked using performance metrics derived from VSM.

Information concerning processes, interfaces, assurance and more was captured through a series of structured interviews with lead designers at key points during the design phase.

In addition to informing management about the evolving health of the enterprise, this activity identified cross-functional dependencies and prompted lead designers to engage where necessary to de-conflict their designs



Environment
Anything outside the system that affects, or may be affected by, the system

1 Operations
Parts of the system that enact on the environment

Management
A series of control sub-systems that govern the behaviour of the complete system

2 Responsible for the signalling between Operations and System 3

3 Manages relations between different Operations sub-systems

3* Audit system for Operations

4 A 'foreseeing' sub-system that anticipates the future of the Environment

5 Controls the ethos of the system; its policy and strategy for survival

Adapted from the *Appreciating Systems Blog* at blog.appreciatingsystems.com
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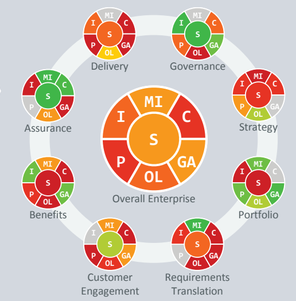
Enterprise Health Dashboard

A custom dashboard was created to visualise the health of each function and that of the overall enterprise, driven by the underlying data about the maturity of the processes, interfaces, assurance and more. (Real data replaced for illustrative purposes)



S System
P Process
I Interfaces
MI Management Information
C Communication
GA Governance and Assurance
OL Organisational Learning

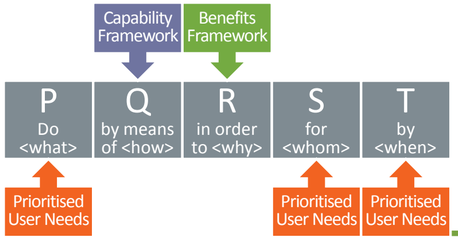
Optimised
Managed
Defined
Emerging
Fragmented

EXECUTION

Definition of S&T Requirements

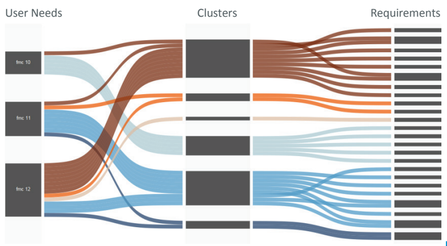
S&T Requirements were derived from the User Needs and conformed to a standard based on Peter Checkland's (et. al.) Soft Systems Methodology (SSM).

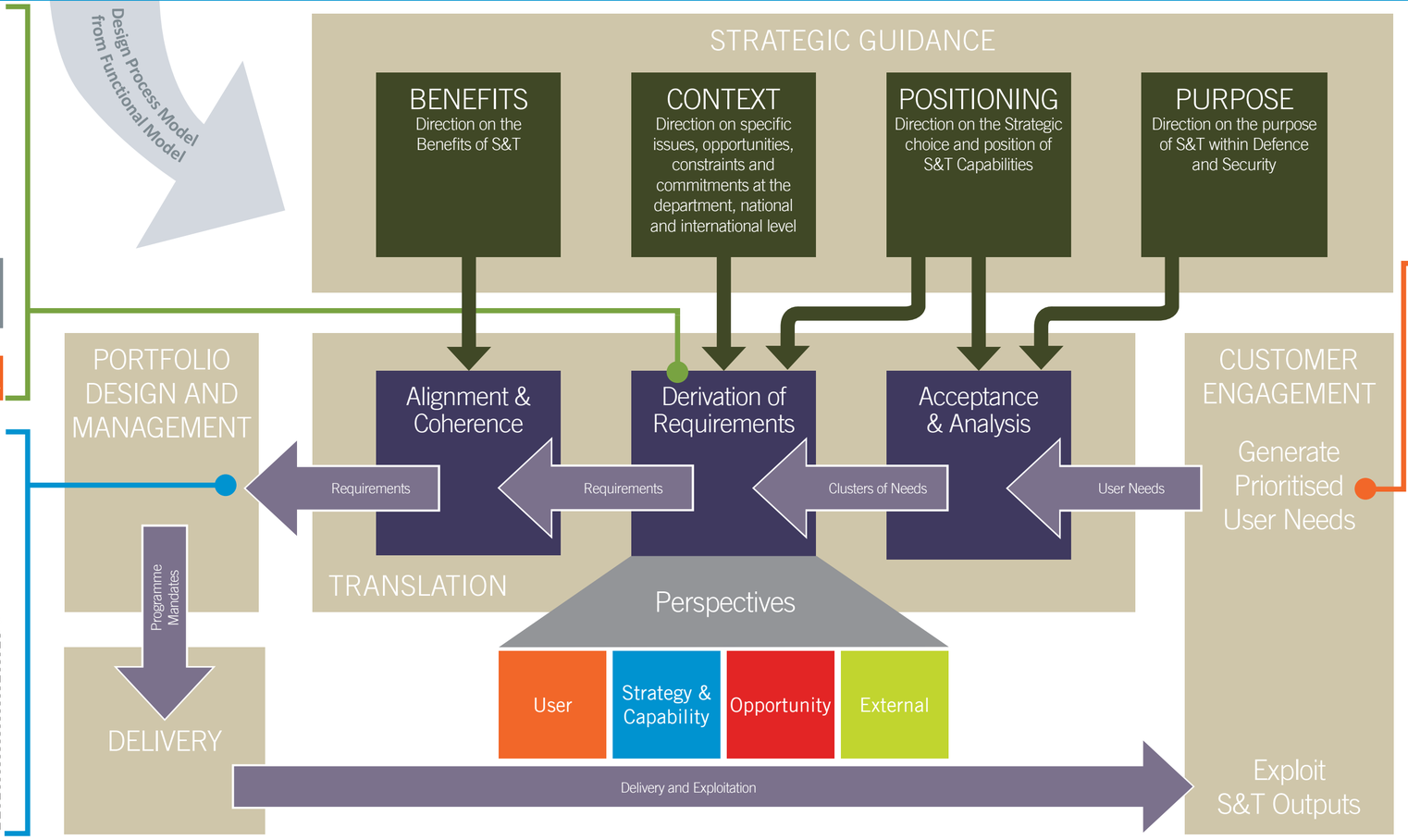
The **what, how** and **why** (denominated P, Q and R, respectively) concepts of Root Definitions were adopted and augmented with 'for whom' and 'by when' (S and T respectively) to provide provenance to each Requirement.



Information Management and Architecture

Throughout translation, information concerning the User Needs and S&T Requirements was captured and integrated into an information architecture. This enabled the 'golden thread' to be traced back to User Needs and forward to Benefits, providing the necessary transparency. Sankey diagrams (below) were produced to visualise the mapping of User Needs to S&T Requirements





Prioritising User Needs

Users (Front Line Commands, Head Office and others) wrote Statements of User Need (SUNs) that articulated a demand for S&T. A number of different metrics were used to score the SUNs.

Multi-Criteria Decision Analysis (MCDA) was applied to calculate an overall 'priority' for each SUN. These were then grouped by priority (right).

All User Needs were 'Translated' into S&T Requirements with a priority derived from the SUNs. Only at Portfolio Design are Requirements included/ excluded from the commissioned Portfolio.

User Needs Grouped by Priority

1	2	3	4	5
4	3	67	51	45
54	80	84	75	13
26	21	63	68	58
77	79	38	42	2
11	52	40	15	30
43	46	49	41	18
74	36	76	6	64
78	27	81	16	82
22	72	37	9	65
47	32	28	31	20
17	35	60	10	14
8	19	56	5	
61	44		34	
53	48		29	
	57		59	
	70		83	
	66		12	
	50		55	
	33		24	
	25		23	
	73		62	
			1	
			69	
			71	
			39	
			7	

For more about this see the presentation on Day 3 of 33 ISMOR entitled *"Managing challenges for defence analysis: an MCDA approach for strategic decisions"*

Next Steps

The derivation of S&T Requirements completed in July 2016. MOD DST will perform alignment and coherence of the entire Requirements set in August – September 2016 and publish the transitional portfolio by the end of 2016. Changes to existing programmes take effect in April 2017.

Summary

Operational Research techniques and principles have informed the design of a new operating model that will govern Defence S&T for years to come. By taking a Viable Systems approach to organisational design, the enterprise may adapt to the changing environment more readily, and maintain an optimal portfolio of S&T over time.

Operational Research techniques were also employed to support the execution of the model: to apply rigour to the prioritisation of User Needs, through to the grammar structure of S&T Requirements, and for enterprise information management. This has provided transparency and underpinned a systematic approach to the process.

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